

Senior Services and Long-Term Care
City Of Toronto

BENDALE ACRES
EMERGENCY POWER UPGRADES 2024

PROJECT MANUAL

ISSUED FOR TENDER
January 2024

ISSUED FOR MLTC REVIEW
TBD

MSA PROJECT NO: 21501.F03

MONTGOMERY SISAM ARCHITECTS INC.
CROSSEY ENGINEERING LTD.

ARCHITECTURAL
ELECTRICAL

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DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

Document	Title	Discipline	Pages
00 00 00	Cover Page	A	1
00 01 10	Table of Contents	A	2

DIVISION 01 - GENERAL REQUIREMENTS

Section	Title	Discipline	Pages
01 00 00	General Requirements	A	24
-	Appendix SA - Suggested Alternatives	A	1

DIVISION 02 - EXISTING CONDITIONS

Section	Title	Discipline	Pages
02 40 00	Demolition and Removals	A	7

DIVISION 03 - CONCRETE

Section	Title	Discipline	Pages
03 30 10	Concrete Work	A	5

DIVISION 04 - MASONRY

Section	Title	Discipline	Pages
04 20 00	Unit Masonry	A	8

DIVISION 05 - METALS

Section	Title	Discipline	Pages
05 12 23	Structural Steel for Buildings	S	5
05 41 00	Load-Bearing Metal Studs	A	5
05 50 00	Miscellaneous and Metal Fabrications	A	7

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

Section	Title	Discipline	Pages
06 10 00	Rough Carpentry	A	5
06 20 00	Finish Carpentry	A	8

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

Section	Title	Discipline	Pages
07 85 00	Firestopping and Smoke Seals	A	4
07 92 00	Sealants	A	5

DIVISION 09 - FINISHES

Section	Title	Discipline	Pages
09 21 16	Gypsum Board	A	12
09 51 00	Acoustical Ceilings	A	6
09 91 00	Painting	A	10

DIVISION 26 - ELECTRICAL

Section	Title	Discipline	Pages
See Electrical Drawings		E	

END OF DOCUMENT

1 SUMMARY OF WORK

- 1.1 Work under this Contract covers the following major items.
- 1.2 The Scope of Work for this Project is to include, but not be limited to the following:
- .1 A recent addition of a new generator requires the installation of advance emergency power connections and additional electrical panels in the lower and upper penthouse.
 - .2 Replace existing and damaged finishes to ceiling and drywall as a result of the connection works.
 - .3 The project requires routing from the basement where the generator is located through multiple levels and eventually terminating in the mechanical penthouse. Installation of the new electrical panels requires the relocation of existing services.

2 ALTERNATIVES

- 2.1 All alternatives must be submitted with the bid using Appendix SA.

3 WORK RESTRICTIONS

- 3.1 Contractor's Use Of Site:
- .1 Use of site is limited to immediate areas of work. Areas designated for storage of material and equipment where specific to the project, are to be coordinated with the Owner and Building Services Manager.
 - .2 Do not unreasonably encumber site with materials or equipment. Move stored products or equipment which interfere with operations of Owner and Building Services Manager, or other Contractors. Obtain and pay for use of off-site additional storage, or work areas as required by the Work.
 - .3 Sign-in procedures: All Contractors/Subcontractors should sign-in daily meeting City of Toronto standards and CAN/CSA Z317.13 -12 - Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities.

3.2 Coordination with Occupants:

- .1 Coordinate performance and sequencing of the Work with the Owner. Notify the Owner 48 hours in advance of noise-generating activities or interruption of any building services which may disrupt normal operations. Do not interrupt building services without Owner's and Building Services Manager's permission.

3.3 Hours of Work:

- .1 Hours of work for this contract are generally confined to 8:00am to 5:00pm Monday to Friday. Where required by sequencing of the Work, or where shutdown of building services is required, portions of the Work may be required to be performed outside of regular daily business hours, or on weekends. All Hours of Work permitted will be subject to approval from the Building Services Manager and will be as identified in the Ministry Of Health Operational Plan for the Work.

4 **PROJECT MANAGEMENT & COORDINATION**

4.1 Project Coordination:

- .1 Contractor is responsible for the overall coordination of the Work. Coordinate the work of all subcontractors, and provide such assistance as is necessary, including but not limited to;
 - .1 Providing site dimensions and layout,
 - .2 Providing temporary facilities and controls,
 - .3 Scheduling subcontractors work to prevent conflicts,
 - .4 Scheduling and administering regular subtrade scheduling and coordination meetings throughout progress of the Work.
 - .5 Scheduling and administering regular subtrade safety meetings throughout progress of the Work.
- .2 Contractor shall facilitate production of interference drawings where necessary for coordination of the Work. Provide such interference drawings to the Consultant for review.
- .3 Coordinate with Owner as required for any Owner supplied and installed items required by this Project. Provide miscellaneous blocking and mounting as required for intended items.

4.2 Project Meetings:

- .1 Schedule and administer regular project progress meetings throughout progress of work. Frequency of meetings as agreed by Owner Consultants and Contractor at start-up meeting. The minimum for progress meeting shall be bi-weekly.
- .2 Distribute written notice of each meeting to Owner & Consultants four days in advance of meeting date. Indicate full agenda of coming meeting.

- .3 Contractor shall submit meeting notes within 24 hours of the meeting and from these records and other notes the official minutes can be prepared. Itemize significant proceedings and decisions. Identify 'action by' appropriate parties. Reproduce and distribute copies of minutes within three days after each meeting and transmit to meeting participants and affected parties not in attendance.
 - .4 Standard Templates for Minutes of Meeting will be distributed for the Contractors use at the Pre-Construction Meeting.
 - .5 Contractor to provide Project Contact List within 4 days following the Pre-Construction Meeting. Standard templates for the Contact List will be distributed for the Contractors use at the Pre-Construction Meeting.
- 4.3 Project Site Administration:
- .1 Contractor to maintain at the Jobsite - 1 - 8.5" x 11" Binder containing the following:
 - .1 Contract Documents.
 - .2 Building Permit & all other required permits
 - .3 Building Permit Review Documents
 - .4 Addenda.
 - .5 Reviewed shop drawings.
 - .6 Change Orders and other Contract modifications.
 - .7 Field test and inspection reports.
 - .8 Approved schedules.
 - .9 MSDS Sheets and relevant Product Data.
 - .10 Contact List.
 - .11 Notice of Project.
 - .12 Rform correspondence.
 - .13 All additional items requested as per the Owners Pre-Construction List.
- 4.4 Submittal Schedule:
- .1 Provide schedule for submittal of all Shop Drawings, Product Data and Samples at the Project Pre-Construction Meeting.
 - .2 Provide complete list of all manufactured products to be used in the course of the Work, including those amended by addenda.
- 4.5 Additional Documents:
- .1 Consultant may issue additional documents in the form of drawings, specifications, schedules, or written instructions to assist proper execution of the Work. These documents shall take the form of either a Supplemental Instruction or Change Order.
- 4.6 Submittals:
- .1 Submit to Consultant, all items specified for review, at least 10 days before reviewed submissions will be needed, and in orderly sequence so as to not cause delay in the Work. Do not proceed with work affected by the submittal until review is complete.

- .2 Review all submittals prior to submission to the Consultant. Submittals not stamped, signed, and dated will be returned without review.
- .3 Verify field measurements and affected adjacent work are coordinated. Contractor's responsibility for errors and omissions in submission, or deviations from requirements of Contract Documents, is not relieved by Consultant's review of submittals.
- .4 A 2 week standard timeframe is assumed for the preparation and submission of Sample, Shop Drawings, and Product Data. All Samples, Shop Drawings and Product Data which do not meet this criteria must be identified at the project Pre-Construction Meeting.

4.7 Submission Requirements:

- .1 Submit digital copies of all submittals. Submittals by Email, or as copies of an email transmissions are not acceptable and will not be reviewed. Shop drawings and product data sheets not submitted in the scale type of the contract documents (ie. metric for metric drawings) will not be reviewed.
- .2 Accompany submissions with transmittal letter containing date, Project title and number, Contractor's name and address, drawing/page numbers of each shop drawing or data sheet, identification (ie. "structural steel shop dwgs."), and number of copies submitted.

4.8 Return of Submissions:

- .1 If no errors are discovered or only minor corrections are made, one copy of the submission will be returned. If shop drawings or data sheets are rejected, noted copy will be returned and resubmission of corrected shop drawings or data sheets through the same procedure indicated above, shall be made.

4.9 Distribution of Submittals after Review:

- .1 Distribute copies of shop drawings and product data which carry Consultant's stamp to all affected parties.

4.10 Product Data Sheets

- .1 Manufacturer's standard schematics, catalogue sheets, diagrams, schedules, performance charts, illustrations and other descriptive data are acceptable in lieu of shop drawings, where specified.
- .2 Submit product data sheets or brochures requested in specification Sections, and as the Consultant may reasonably request where shop drawings will not be prepared due to standardized manufacture of product.
- .3 Submit copies of all WHMIS Data Sheets.

4.11 Samples:

- .1 Submit duplicate samples for review, in sizes requested in respective specification sections. Label samples as to origin and intended use in the Work. Where colour, pattern or texture is criteria, submit full range of samples.
- .2 Deliver samples prepaid to Consultant's office.
- .3 Reviewed samples will become standards of work and material against which installed work will be checked on project.

5 CONTRACT ADMINISTRATION

- 5.1 The Contract Administration office functions performed by the Consultant will generally be done through the web based contract administration software "Rform" by Re Form Technologies Ltd. (www.rform.ca).
- 5.2 Contractor will be required to participate with the balance of the project team by using Rform for the duration of the project. Rform is a free service to the Contractor and does not require the Contractor to pay any setup or usage fees.
- 5.3 Contractor will be provided with instructions on the access and operation of Rform in the event they are not familiar with it's function or operation. The Contractor's staff involved in the project will be provided with access to Rform at no cost to the Contractor.
- 5.4 Suppliers and Subcontractors will not be provided with access to Rform. The distribution of information issued by the Consultant, and coordination of that information, remains the responsibility of the Contractor.
- 5.5 Rform will be used for issuing electronic project related documents, including Requests for Information, Supplemental Instructions, Proposed Change Orders, Change Orders, Change Directives, Progress Claims, Certificates of Payment, Submittal Reviews, and other forms as may be required. At the discretion of the Consultant, Rform may also be used for the distribution and filing of other project related documents, including but not limited to Field Review Reports, Test Reports, Meeting Minutes, and so on. Rform will also provides automatically generated logs of documents issued within Rform.
- 5.6 Contractor will be required to print hard copies of all project related documents issued through Rform, and to maintain files of those documents on site at all times.
- 5.7 Notwithstanding that Rform does not require signatures for the issuance and approval of documents, adjustments to the Contract Price and Contract Time in a Change Order shall only be deemed to be agreed to by the Owner and Contractor when executed by hand.

6 CONSTRUCTION PHOTOGRAPHS

- .1 General:
 - .1 Provide construction photographs in accordance with procedures and submission requirements specified in this section.
 - .2 Photographs shall be taken using a digital camera.
 - .3 Photo Print Size: minimum 100 x 150mm.
- .2 Progress Photographs:
 - .1 Provide construction photographs, documenting progress of the Work. Submit one digital set, with each monthly progress draw.
 - .2 Submit progress photographs with each monthly progress draw, documenting the following milestones;
 - .3 Completion of excavation and pouring of footings,
 - .4 Completion of foundations prior to backfilling,
 - .5 Completion of structural frame,
 - .6 Completion of rough-in of mechanical and electrical services before concealment.
 - .7 Completion of building veneers.
 - .8 Completion of each interior finish material.
 - .9 Orientation of Photographs: provide photos from at least 2 general viewpoints, as well as specific views as required by milestones specified above, and as determined by Consultant prior to first Progress Draw.
 - .10 Identification: legible identification on 20 x 50mm white label on top left corner of all photographs indicating the following:
 - .1 Project name and number,
 - .2 Orientation,
 - .3 Date of exposure.
- .3 Final Photographs:
 - .1 In addition to progress photographs, provide 1 digital set of images, of final photographs of the completed project.
 - .2 Orientation of Photographs: provide final photos as follows:
 - .1 General viewpoints as defined above.
 - .2 Views of all exterior elevations.
 - .3 Views of site showing paved and landscaped surfaces.
 - .4 Interior views of all spaces.
 - .5 Specific views as determined by Consultant .
 - .3 Identification: legible identification on 20 x 50mm white label on top left corner of all photographs indicating the following:
 - .1 Project name and number.
 - .2 Orientation.
 - .3 Date of exposure.

7 **QUALITY CONTROL**

7.1 Independent Inspection and Testing:

- .1 Independent Inspection and Testing Consultants will be engaged by the Owner for the purpose of inspecting and/or testing individual portions of the Work. The initial cost of such services will be borne by the Owner, as allocated under Allowances.

7.2 Reports:

- .1 Submit one digital copy of inspection and test reports to the Consultant.
- .2 Provide copies to Subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested. Submit one copy of inspection and test reports to the Building Official having jurisdiction, where required by that official.
- .3 The cost of tests beyond those called for in the Contract Documents or beyond those required by the law of the Place of Work shall be appraised by the Consultant and may be authorized as recoverable.

7.3 Inspection and Testing - General:

- .1 Furnish test results and mix designs as may be requested.
- .2 The cost of tests and mix designs beyond those called for in the Contract Documents or beyond those required by the law of the Place of Work shall be appraised by the Consultant and may be authorized as recoverable.

7.4 Inspection and Testing - Procedures:

- .1 Notify the appropriate agency and Consultant in advance of the 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 an orderly sequence so as not to cause delay in the Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store, cure and inspect test samples.

7.5 Quality Of The Work:

- .1 Quality of the Work shall be first class, executed by workers experienced and skilled in the respective duties for which they are employed. Immediately notify the 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. The Consultant reserves the right to require the dismissal from the site, of workers deemed incompetent, careless, insubordinate or otherwise objectionable.

7.6 Defective Materials and Work:

- .1 Where evidence exists that defective work has occurred, or that work has been carried out incorporating defective products, the Consultant may have independent tests, inspections, or surveys performed in order to determine if work is defective.
- .2 Tests, inspections, or surveys carried out under these circumstances will be made at the Contractor's expense in the event of defective work, or at the Owner's expense where work is in conformance. This does not include re-testing of soil compaction during placement, where evidence exists of non-conformance with the Contract documents, but rather only if re-testing is called for after completion of compaction.

8 **TEMPORARY FACILITIES AND CONSTRUCTION CONTROLS**

- 8.1 Provide temporary utilities, facilities and controls in order to execute the work expeditiously. Remove from site all such work after use.

8.2 Vehicular Access & Parking:

- .1 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractor's use of roads. Maintenance shall include regular snow removal, and regular power washing to remove mud and dirt.
- .2 Where site access for construction vehicles necessitates use of public roads, remove mud and dirt from such roads where contaminated by construction vehicles.
- .3 Traffic Control: Provide and maintain flagpersons, traffic signals, barricades and flares, lights, or lanterns as required to perform the work and protect the public.
- .4 Provide and maintain adequate access to project site.
- .5 Build and maintain temporary access roads where indicated or required, and provide snow removal during period of work.
- .6 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractor's use of roads. Maintenance shall include regular snow removal if not provided under separate contract, and regular power washing to remove mud and dirt.
- .7 Where site access for construction vehicles necessitates use of public roads, remove mud and dirt from such roads where contaminated by construction vehicles.
- .8 Traffic Control: Provide and maintain flag persons, traffic signals, barricades and flares, lights, or lanterns as required to perform the work and protect the public.

8.3 Construction Parking:

- .1 Parking for construction equipment vehicles will be limited to the site or immediate areas of work.
- .2 Parking for Contractors' and Subcontractors' personal vehicles will not be permitted on site unless authorized by the Owner and Building Services Manager.

8.4 Temporary Utilities:

- .1 Temporary Electricity and Lighting:
 - .1 Connect to existing power supply in accordance with Canadian Electrical code.
 - .2 Install temporary facilities for power such as pole line and underground cables to approval of local power supply authority.
 - .3 Electrical power and lighting systems installed under this contract can be used for construction requirements provided that guarantees are not affected thereby. Make good damage. Replace lamps which have been used more than a period of 3 months.
 - .4 Provide temporary lighting in all areas of construction, to the minimum requirements of the Occupational Health and Safety Act, and minimum requirements specified herein.
- .2 Temporary Water Supply:
 - .1 Water supply is available in existing building and will be provided for construction usage at no cost.
 - .2 Permanent water supply system installed under this contract can be used for construction requirements provided that guarantees are not affected thereby. Make good damage.
- .3 Temporary Heating and Ventilating:
 - .1 Provide and maintain all temporary heat and ventilation necessary during construction, including cost of installation, fuel, operation, attendance and maintenance. Use of direct-fired heaters discharging waste products into work areas will not be permitted unless prior approval is given by Consultant.
 - .2 Prevent hazardous accumulation of dust, fumes, mists, vapours or gases in areas occupied during construction.
 - .3 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
 - .4 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
 - .5 Ventilate storage spaces containing hazardous or volatile materials.
 - .6 Maintain strict supervision or operation of temporary heating and ventilating equipment.
 - .7 Conform to the requirements of CAN/CSA Z317.2-01 – Special Requirements for Heating Ventilating and Air Conditioning (HVAC) Systems in Health Care Facilities.

- .4 The permanent HVAC systems of the building, or portions thereof, may not be used for construction purposes.

8.5 Construction Facilities:

- .1 Temporary Telephone and Facsimile: Provide and pay for temporary telephone. Cellular telephones are acceptable.
- .2 Equipment, Tools and Materials Storage:
 - .1 On site storage of materials and equipment is not permitted unless authorized by the Building Services Manager. Provide adequate weathertight enclosures with raised floors, for storage of materials, tools, and equipment which are subject to damage by weather.
 - .2 Temporary enclosures required by subtrades as workshops shall be provided by those trades.
 - .3 Confine the Work and the operations of employees to limits indicated by the Contract Documents. Where on-site storage is authorized, do not unreasonably encumber the premises with Products.
 - .4 Do not load or permit to be loaded any part of the Work with a weight or force that will endanger the Work.
- .3 Site Storage and Overloading:
 - .1 Confine the Work and the operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the premises with products.
 - .2 Do not load or permit to be loaded any part of the Work with a weight or force that will endanger the Work.
- .4 Sanitary Facilities:
 - .1 The Owner's existing facilities may not be used. Provide sanitary facilities for work force in accordance with governing regulations and ordinances. Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition. Where portable toilet facilities are provided, empty and sanitize such facilities on a weekly basis, or more frequently if required.
 - .2 Owner's existing facilities may not be used, unless designated by the Building Services Manager. Use only those facilities when so designated. Maintain designated facilities in a clean and sanitary condition while in use by construction workers.
 - .3 Permanent new facilities may not be used.

8.6 Construction Safety:

- .1 Provide applicable spare safety equipment such as helmets, safety glasses, and harnesses, and enforce their use by Consultants, the Owner, their representatives and any authorized visitors to the site.

- .2 Provide and maintain fences, gates and locks, covered walkways, guard rails, barriers, night lights, and appropriate warning signage as required for the protection of the public, and of public and private property; as required by the General Conditions of the Contract, the Occupational Health and Safety Act and Regulations for Construction Projects, and by all authorities having jurisdiction. Erect and maintain sturdy railings around shafts, and the like, to protect workmen and the public from injury.
 - .3 Contractors are to provide relevant certifications for all workers and sub-contractors at the pre-construction meeting. Copies shall be kept onsite in the Project Binder.
- 8.7 Temporary Barriers & Enclosures:
- .1 Dust Screens:
 - .1 Provide dust tight screens or partitions to localize dust generating activities, and for the protection of workers, finished areas of Work and the public.
 - .2 Dust screens shall consist of, as a minimum, 0.15 mm thick polyethylene sheets secured to appropriate framing and sealed at all joints and at perimeter to prevent migration of dust.
 - .3 Maintain and relocate protection until such work is complete.
 - .2 Temporary Partitions:
 - .1 Provide temporary partitions to separate the work areas from occupied resident areas.
 - .2 Temporary partitions shall consist of 92mm steel studs with 16mm Type X gypsum board both sides. Partitions shall be constructed as fire separations having a 1 hour fire resistance rating. Provide 89mm thick sound attenuation batt insulation.
 - .3 Provide lockable fire-rated hollow metal doors and frames for access to work areas by workers, and to prevent access by resident or unauthorized personnel.
 - .4 Provide temporary windows.
 - .3 Contractor to provide security until dust screens and temporary partitions are erected.
 - .4 Dust Screen and Temporary partitions must be erected to the satisfaction of the Building Services Manager and the Consultant. A Dust Control/Temporary Partition Layout Proposal, must be submitted for review by the Building Services Manager and Consultant prior to the start of the Work.
 - .5 Security:
 - .1 Where security of an existing building has been reduced by the Work, provide temporary means to maintain security. Provide and pay for security service to patrol the site if building cannot be otherwise secured.
 - .2 Adhere to the Owner's policies for security and access to long term care centre.

- .6 Building Access:
 - .1 Access existing building only at points designated by the Owner.
 - .2 When designated by the Owner, elevators assigned for Contractor's use may be used for moving workers and materials within building. Protect walls of elevators to approval of Consultant before use. Accept liability for damage, safety of equipment and overloading of existing equipment.
- .7 Site Signs and Notices:
 - .1 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Consultant.
 - .2 No other signs or advertisements of any description except notices regarding safety and instruction, shall be put up around the building, or site, without the approval of the Consultant.
 - .3 Provide and install all temporary signage as required to direct interior and exterior traffic flows.

9 FIRE SAFETY

9.1 Fire Fighting Equipment:

- .1 Provide and maintain in working order, ULC labelled, 9kg 4A 60BC type fire extinguishers, and locate in prominent positions to approval of authorities having jurisdiction.

9.2 Fire Department Access:

- .1 Construction activities must not obstruct access routes designated for fire department equipment. If necessary that existing access be obstructed or deleted, alternative access, acceptable to the fire department, must be provided prior to commencement of construction, in accordance with Ontario Building Code location and design criteria for required access routes.

9.3 Control of Combustible Materials:

- .1 The stockpiling of construction materials adjacent to the existing building must be carefully controlled in accordance with the Ontario Fire Code. Materials stored, and their proximity to equipment used in construction, may create a fire hazard. Control of combustibles on a construction site is regulated under the Occupational Health and Safety Act.

9.4 Hot Work And Red Tag Permit Training:

- .1 All Contractors including Sub-Contractors who are involved in this Project shall submit written certificates prior to commencement of work confirming that all staff performing work has successfully completed "Managing Impairments Using FM Global's Red Tag Permit System" and "Managing Hot Work Using FM Global's Hot Work Permit System".

- .2 In order to successfully complete the training, a grade of 80% is required. The contractor and sub-contractor's staff must be re-certified every three years.
- .3 The free online training session can be accessed through <http://training.fmglobal.com>. Each session takes less than one hour to complete and can be accessed 24 hour a day, seven days a week from any computer connected to the Internet.
- .4 Contractor to coordinate with the City's Project Manager to obtain the login credentials. Authorization will be obtained by the Project Manager by sending an e-mail to onlinetraining@fmglobal.com with the name, company name and e-mail address of the person(s) requiring authorization. Please note that 24 hours is required to allow for confirmation of contractor authorization. Contractor is responsible for coordinating registration of the courses with the City's Project Manager.

10 PRODUCT REQUIREMENTS

10.1 Product Options:

- .1 Provide products specified under individual specification sections. Where Specification lists two or more products, or two or more manufacturers of the same product, the Contractor may select one of the listed products or manufacturers. Confirm selection of products and manufacturers when requested by the Consultant.
- .2 When only one product or manufacturer is listed in the specifications, it is intended that only that product or manufacturer is acceptable.

10.2 Availability:

- .1 Immediately upon signing Contract, review Product delivery requirements, and identify lead times for supply of all Products. If lead times in supply of Products may affect the Construction Schedule, notify the Consultant in order that appropriate action may be authorized in ample time to prevent delay in performance of the Work.
- .2 In the event of failure to notify the Consultant at commencement of Work, and should it appear that Work may be delayed for such reason, the Consultant reserves the right to substitute more readily available products of similar character, at no increase in Contract Price.

10.3 Reference Standards:

- .1 Within the specifications, reference standards are identified. Conform to these standards, in whole or part, as specifically requested.
- .2 If there is question as to whether any product or system is in conformance with applicable standards, the Consultant reserves the right to have such products or systems tested to prove or disprove conformance. The cost for such testing will be born by the Contractor.

10.4 Product Transportation & Delivery:

- .1 Transportation and delivery costs of Products required in the performance of the Work, are included in the Contract Price.
- .2 Products must be appropriately crated, skidded, boxed, shrink-wrapped, or otherwise packaged to protect such products from damage during shipment. Products which arrive at the site in a damaged condition must be rejected and returned to the supplier/manufacturer for immediate replacement.

10.5 Product Storage, Handling and Protection:

- .1 Handle and store Products in a manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions.
- .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 the Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store sheet materials and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .5 Remove and replace damaged Products at own expense and to the satisfaction of the Consultant.

10.6 Manufacturer's Instructions:

- .1 Unless otherwise indicated in the specifications, install or erect Products in accordance with manufacturer's printed 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 the specifications and manufacturer's instructions, so that Consultant may establish correct course of action.
- .3 Improper installation or erection of Products, due to failure in complying with these requirements, authorizes the Consultant to require removal, replacement where necessary, and re-installation at no increase in Contract Price.

10.7 Fastenings:

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

- .2 Space anchors within limits of load limit or shear capacity and ensure that they provide positive permanent anchorage. Wood or any other organic material plugs are not acceptable.
- .3 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .4 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

10.8 Quality Of Materials:

- .1 Products, materials, equipment and articles (referred to as Products throughout the specifications) incorporated in the Work shall be new, not damaged or defective, and of the best quality (compatible with specifications) for the purpose intended. If requested, furnish evidence as to type, source and quality of Products provided.
- .2 Defective products, whenever identified prior to the completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is a 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 the quality or fitness of Products, the Consultant may request additional testing based upon the requirements of the Contract Documents, to confirm acceptability of products or materials.
- .4 Unless otherwise indicated in the specifications, maintain uniformity of manufacture for any particular or like item throughout the 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.

10.9 Defective Materials and Work:

- .1 Where evidence exists that defective work has occurred, or that work has been carried out incorporating defective products, the Consultant may have independent tests, inspections, or surveys performed in order to determine if work is defective.
- .2 Tests, inspections, or surveys carried out under these circumstances will be made at the Contractor's expense in the event of defective work, or at the Owner's expense where work is in conformance. Where tests incorporate a number of samples, payment will be assessed, by the Consultant, based on the ratio of conforming to non-conforming results. This does not include re-testing of soil compaction during placement, where evidence exists of non-conformance with the Contract documents, but rather only if re-testing is called for after completion of compaction.

- 10.10 Warranties & Guarantees:
- .1 Warranties and Guarantees shall commence at Date of Substantial Performance of the Contract as certified by the Consultant.
 - .2 Warranties and Guarantees shall be original copies, printed on company letterhead, or on a standard company warranty certificate, bearing the name of the company.
 - .3 Warranties and Guarantees shall indicate:
 - .1 Name of the Principal (the Manufacturer/Subcontractor),
 - .2 Name of the Obligee (the Owner),
 - .3 Name and address of Project,
 - .4 Commencement date (Date of Substantial Performance),
 - .5 Duration of warranty or guarantee,
 - .6 Clear statement of what is included, and what if any exclusions there are, and
 - .7 Signature of Principal's representative having signing authority.

11 **EXECUTION REQUIREMENTS**

- 11.1 Preparation:
- .1 Field Engineering:
 - .1 Locate, confirm and protect control points prior to starting the Work. Preserve permanent reference points during construction.
 - .2 Establish reference lines and elevations. Locate and lay out by instrumentation.
 - .2 Survey Requirements:
 - .1 A certified land survey prepared by a Registered Ontario Land Surveyor (OLSA member), acceptable to Owner, will be required under the following circumstances:
 - .1 Where the Work is an entirely new building,
 - .2 Where the Work is an addition to be constructed up to site setback line(s), as legislated by municipality, or
 - .3 Where the Work is a long term care centre or addition thereto.
 - .2 Establish two new permanent bench marks on site, referenced to existing bench mark(s) by survey control points. Record locations, with horizontal and vertical data for inclusion in Operations and Maintenance Manual.
 - .3 Records:
 - .1 Maintain a complete, accurate log of control points and survey work as work progresses.
 - .2 On completion of foundations and major site improvements, prepare certified survey showing dimensions, locations, angles and elevations of foundation work.

11.2 Cutting and Patching:

- .1 Submit a written request in advance, for approval 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 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .3 After uncovering, inspect conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.
- .4 Perform cutting, fitting and patching, including excavation and fill, to complete the Work. Perform work to avoid damage to other work.
- .5 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .6 Cut rigid materials using power saw or core drill. Pneumatic or impact tools not allowed.
- .7 Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. At penetration of fire-rated wall, ceiling, or floor construction, completely seal voids with fire stopping material, full thickness of construction element. Refer to 'Firestops and Smoke Seals Section' where provided. Maintain Fire Separation to code as required at no additional cost to the Owner.
- .8 Refinish surfaces to match adjacent finishes; for continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit to the satisfaction of the Consultant at no additional cost to the Owner.
- .9 Provide all openings greater than 200mm in non-structural elements of work for penetrations of mechanical and electrical work. Divisions 21, 22, 23 and 26 shall provided all sleeves and locations for sleeves. The cost of all cutting and patching required by Divisions 21, 22, 23 and 26 shall be paid for by those trades.
- .10 Ensure that all cutting and patching work, including that paid for under Divisions 21, 22, 23 and 26, is properly performed by the respective trades skilled in that line of work. Restore work with new products in accordance with Contract Documents.

- 11.3 Location Of Equipment and Fixtures:
- .1 Location of mechanical and electrical equipment, fixtures and devices indicated or specified, are to be considered as approximate. Final location of such items will be determined on site, based on integration with structural and architectural elements, and as required by coordination with other trades. In the event of a conflict, final determination of location of these items rests with the Consultant at no additional cost to the Owner.
 - .2 Prepare and submit for review by the Consultant, interference field drawings, to indicate relative position of various services and equipment, at the following locations as a minimum:
 - .1 Under all rooftop mechanical units.
 - .2 At locations of all major ductwork, piping, and conduit crossovers.
 - .3 Where ductwork passes under major structural elements.
 - .3 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.
 - .4 Request a review of items by Consultant once rough-in is underway, prior to final installation, and obtain approval for actual locations.
- 11.4 Concealment:
- .1 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas, except where indicated otherwise.
- 11.5 Lighting Fixtures at Suspended Ceilings
- .1 Ensure that secure support is provided for lighting fixtures by suspended ceilings, or by separate hangers, or by both.
 - .2 Coordinate the ceiling system and lighting fixture installations to provide adequate support.
 - .3 Submit affidavits with acceptable design information confirming that the installation of the suspended ceiling system and/or separate fixture hangers will provide adequate support for the lighting fixtures without exceeding specified deflection tolerances for the ceiling system.
 - .4 Conform to current requirements of the Electrical Safety Authority (ESA).
- 11.6 Existing Services:
- .1 Where work involves the interruption of, or connection to existing services, carry out such work as directed by governing authorities, with minimum of disturbance to pedestrian and vehicular traffic.

- .2 All interruption of shut down of Building Systems must be fully coordinated with the Consultant and Building Services Manager.
 - .3 Before commencing work, establish location and extent of service lines in area of work and notify Consultant of findings.
 - .4 Submit schedule to, and obtain approval from Consultant for any shutdown or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties.
 - .5 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
 - .6 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.
 - .7 Remove abandoned service lines to distance of 1200mm from foundations. Cap or otherwise seal lines at cut-off points as directed by Consultant.
 - .8 Record locations of maintained, re-routed and abandoned service lines.
- 11.7 Alterations, or Additions to Existing Building:
- .1 Execute work with least possible interference or disturbance to occupants, public and normal use of premises. Arrange with Owner to facilitate execution of work.
 - .2 Interruptions to building services shall require a minimum of 72 hours written notice to the Owner. Obtain Owner's approval before interrupting any building service.
- 12 **CLEANING & WASTE MANAGEMENT**
- 12.1 Conduct cleaning and disposal operations to comply with local ordinances and environmental protection legislation.
 - 12.2 Store volatile wastes in covered metal containers, and remove from premises at end of each working day.
 - 12.3 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
 - 12.4 No Mixing of Materials in open areas used by Building Occupants.
 - 12.5 Area for Mixing of Materials to be determined by the Consultant and Building Services manager
 - 12.6 Failure to maintain site cleanliness to the satisfaction of the Building Services Manager and the Consultants will result in cleaning performed by the owner and charged to the Contractor. (for both general cleaning and final cleaning).

- 12.7 All cleaning materials used (for both general cleaning and final cleaning) to be reviewed and approved for use by the Consultant and Building Services Manager.
- 12.8 Cleaning During Construction:
- .1 Maintain the Work in tidy condition, free from accumulation of waste products and debris, other than that caused by the Owner or other Contractors.
 - .2 Remove waste material and debris from the work areas and deposit in waste container at the end of each working day.
 - .3 Vacuum clean interior areas prior to start of finishing work. Maintain areas free of dust and other contaminants during finishing operations.
 - .4 Individual Subcontractors are responsible for the daily clean-up and removal of debris related to, or generated by, their own work. The overall responsibility for project cleanliness rests with the Contractor.
- 12.9 Waste Management:
- .1 Audit, separate and dispose of construction waste generated by new construction or by demolition of existing structures in whole or in part, in accordance with Ontario Regulations 102/94 and 103/94 made under the Environmental Protection Act.
 - .2 Fires, and burning of rubbish or waste on site is prohibited.
 - .3 Burying of rubbish or waste materials, except as specified herein, is prohibited.
 - .4 Disposal of waste or volatile materials such as mineral spirits, oil, gasoline or paint thinner into ground, waterways, or sewer systems is prohibited.
 - .5 Empty waste containers on a regular basis to prevent contamination of site and adjacent properties by wind-blown dust or debris.
- 12.10 Final Cleaning Operations:
- .1 Immediately following Date of Substantial Performance, and prior to Owner occupancy of the building or portion of the building affected by the Work, conduct full and complete final cleaning operations.
 - .2 Final cleaning operations shall be performed by an experienced professional cleaning company, possessing equipment and personnel sufficient to perform full building cleaning operations.
 - .3 Remove all surplus products, tools, construction machinery and equipment not required for the performance of remaining work, and thereafter remove any remaining materials, equipment, waste and debris.

- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .6 Cleaning operations shall include the removal of all stains, spots, scuff marks, dirt, dust, remaining labels, adhesives or other surface imperfections.
- .7 Remove all paint spots or overspray from all affected surfaces.
- .8 Vacuum, clean and dust behind grilles, louvres and screens.
- .9 Broom clean and spray wash all exterior paved surfaces.
- .10 Remove dirt and other disfiguration from exterior surfaces.
- .11 Clean all areaways, drywells, and drainage systems.
- .12 Clean all equipment and fixtures to a sanitary condition, clean or replace filters of mechanical equipment.

13 PROJECT CLOSE-OUT PROCEDURES

13.1 Inspection and Declaration:

- .1 Arrange for, conduct and document final inspections, close-out and commissioning at the completion of the Work in accordance with procedures described in the Conditions of the Contract and OAA/OGCA Document 100.

13.2 Substantial Performance:

- .1 Contractor's Inspection:
 - .1 In addition to the requirements outlined in the Conditions of the Contract, the following items shall accompany the Contractor's application for Substantial Performance. These items must be submitted and reviewed and complete in all respects, and all verification certificates and reports having been submitted and approved by the Consultants prior to issuing Substantial Completion:
 - .1 Completed Maintenance Manuals for all disciplines,
 - .2 As-Built Drawings for all disciplines,
 - .3 Occupancy Permit (where required by Municipality),
 - .4 Air Balance Report (legible technicians worksheets are acceptable),
 - .5 Gas fired appliances inspection,
 - .6 Plumbing Inspection,
 - .7 Domestic Water Quality Test Report,
 - .8 Sprinkler dry test verification letter stamped and signed by sprinkler design Engineer,

- .9 Mechanical start-up reports (Boilers, HVAC Units, Chillers, Water Softeners, etc.),
 - .10 Fire Alarm verification (include legible technicians worksheets),
 - .11 Emergency Lighting verification,
 - .12 ESA Certificate,
 - .13 Systems operations have been demonstrated to Owner's personnel.
- .2 The Contractor and all Subcontractors shall conduct an inspection of the work, identify deficiencies and defects, and make corrections as required to conform with the Contract Documents. Notify Consultant in writing of satisfactory completion of Contractor's Inspection and that corrections have been made. Request a Consultant's Inspection.
- .2 Consultant's Inspection:
 - .1 The Consultants shall perform an inspection of the Work to assess the validity of the Contractors application, and shall identify in separate lists, unfinished work and deficiencies. Contractor shall correct work accordingly.
- .3 Deficiency Review:
 - .1 Following the issuance of the Certificate of Substantial Performance and prior to the Contractor's application for Final Payment and release of any monies retained as "Finishing Holdback", the Contractor shall continue to complete unfinished work and correct deficiencies. At the request of the Contractor, the Consultants shall conduct up to two general deficiency reviews during this period.
 - .2 The first review will be undertaken only if the Contractor has inspected the Work, and states in writing that the unfinished work noted in their application for Substantial Performance has been completed, and at least 50% of all deficiencies have been corrected.
 - .3 The second review will be undertaken only if the Contractor has inspected the Work, and states in writing that at least 90% of the deficiencies have been corrected.
 - .4 If the Consultants determine during either review that the above noted criteria for progress have not been met, they may terminate the deficiency review.
- .4 Reinspection:
 - .1 Should reinspection by Consultant be required due to failure of work to comply with Contract Documents, the Owner will deduct amount of Consultant's compensation for reinspection services from monies owed to the Contractor.

14 CLOSE-OUT SUBMITTALS

14.1 Quality:

- .1 Spare parts, maintenance materials and special tools provided shall be new, not damaged or defective, and of the same quality and manufacture as products provided in the Work.
- .2 If requested, furnish evidence as to type, source and quality of Products provided.

- .3 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- 14.2 Delivery, Storage, and Handling:
- .1 Deliver all materials required as maintenance materials, spare parts or special tools, to the site, include shipping costs, and store as directed.
 - .2 Store spare parts, maintenance materials and special tools in a manner to prevent damage, or deterioration.
 - .3 Store in original and undamaged containers with manufacturer's seals or labels intact.
 - .4 Store materials subject to damage from severe climatic changes in a climate-controlled, weatherproof enclosure.
 - .5 Store paints and freezable materials in a moderately heated and ventilated room.
- 14.3 Maintenance Materials, Spare Parts & Tools:
- .1 Provide spare parts in quantities specified in individual specification sections. Provide identical items to those installed in the Work.
 - .2 Provide maintenance materials in quantities specified in individual specification sections. Provide identical items of same manufacturer, dye lot or production run as items in the Work.
 - .3 Provide special tools in quantities specified in individual specification sections, and tag items identifying their function and equipment or products to which they are associated.
 - .4 Receive and catalogue all items. Check inventory and include approved listings in Operations and Maintenance Manual.
 - .5 Obtain receipts for delivered products and submit prior to Substantial Performance.
- 14.4 Operations and Maintenance Manual:
- .1 Prepare Operations and Maintenance Manual during the course of construction and have completed prior to Date of Substantial Performance.
 - .2 Maintain digital copy of the Operation and Maintenance Manual volume(s) for periodic review and comment, as requested by the Consultant during the course of construction.

- .3 Submit digital copies of the final completed volume(s) and one digital copy as either a PDF or Microsoft Word document with the application for Substantial Performance in accordance with OAA/OGCA Document 100.
- .4 Provide table of contents and index tab sheets for each volume. Itemize and tabulate contents.
- .5 Group drawings as to content, and index for quick reference.
- .6 Each copy of the Operation and Maintenance Manual shall contain, as a minimum, the following information:
 - .1 Project contact list including after hours/emergency contact numbers.
 - .2 All contract documents including tender calls, addendums, contract and change orders.
 - .3 Contact information, including after-hours/emergency contact numbers, for maintenance and repairs.
 - .4 Warranty and guarantee certificates.
 - .5 Equipment start-up and troubleshooting instructions.
 - .6 Equipment schematics & diagrams.
 - .7 Catalogue of all maintenance materials and quantities.
 - .8 Maintenance data.
 - .9 Approved and stamped all shop drawings.
 - .10 Before and after photographs organized such that the before and after photographs of any one are positioned adjacent to each other for easy reference.

14.5 Record Drawings:

- .1 Upon attaining Substantial Performance completion of the Work, obtain base CAD drawings, from the Consultant. The electronic files will be in AutoCAD 2007. Update the AutoCad drawings to include all contract changes.
- .2 Submit electronic files to the Consultant for review. Any subsequent changes found by the Consultant shall remain the responsibility of the Contractor at no charge to the Owner.

END OF SECTION

APPENDIX SA – SUGGESTED ALTERNATIVES

Bidder: _____

The following Suggested Alternatives are **NOT INCLUDED** in the Bid price.

Individual Suggested Alternatives may be discarded or incorporated into the Final Contract Price at the discretion of the Owner.

Provide the appropriate data for comparison showing conformance to specified standards, dimensions, fabrication, colour, quality assurance, warranty, execution etc. as necessary for the Consultant to confirm the Suggested Alternative meets or exceeds the specifications. At the time of this submittal, provide the Consultant with the relevant Architectural details which prove conformance with the design intent and co-ordination with and installation by affected trades.

Suggested Alternative Prices **DO NOT INCLUDE** H.S.T.

Suggested Alternatives identified on this form are for Divisions 1 to Division 26 inclusive.
We submit a proposal to substitute for:

specified in Section _____ of the Specifications, the following alternative:

The Suggested Alternative is submitted for the following reason:

We ensure that a comparison has been made of all specified characteristics, that the Suggested Alternative does not alter the intent of the Drawings and Specifications and we hereunder tabulate significant variations which lessen the performance characteristics and quality of materials, increase the weights and / or dimensions, and substitute different materials for those specified.

The effect on the stipulated price is (choose one):

ADDITION (\$ _____) DEDUCTION (\$ _____)

(Submit a separate sheet for each item)

1 General**1.1 SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for demolition and removals Work in accordance with the Contract Documents.
- .2 Work included: Requirements for demolishing, salvaging and removing wholly or in part the various items designated on the drawings or required to be removed or partially removed for the receipt of the Work of this Contract, including not necessarily limited to:
 - .1 Alteration and renovations to existing building.
 - .2 Cutting and removing of walls, floors, ceilings, doors and frames , in the existing buildings as indicated.
 - .3 Patching, making good openings and chases in walls, floors, ceilings, including the supply and installation of lintels, channels and finishes.
 - .4 Removal of rubbish, debris, demolished fixtures, fitments and items not scheduled to remain the Owner's property, resulting from the demolition and preparatory work.
 - .5 Remove abandoned services such as conduits, pipes, wiring, ducts, fixtures, equipment, etc. where required for the work or indicated on the drawings.
 - .6 Removal of all mechanical items including plumbing fixtures, services etc. where required for the work or indicated on drawings and or where not required to be relocated.
 - .7 Removal of existing electrical items including fixtures, etc. where required for the work or indicated on the drawings and not required to be relocated.
 - .8 Removal and disposal of existing flooring, existing wall base, and all other related products impacted by the work.
 - .9 Removal of moveable furniture, fixed furniture and equipment as required for a complete installation.
 - .10 Drywall and masonry repair and replacement as indicated.
 - .11 Dust control during the operations of the work of this Section.
 - .12 Removal shall mean removal from site and safe disposal in a legal manner.

1.2 REFERENCES

- .1 CSA S350-M, Code of Practice for Safety in Demolition of Structures.

1.3 SUBMITTALS

- .1 Where required by Authorities having jurisdiction, submit a Fire Plan to local fire department for review and approval.
- .2 Submit shop drawings, diagrams and details in accordance with Section 01 00 00.
- .3 Submit for approval, a plan showing impacts, interruptions and delays to Owners operations.

- .4 Submit Dust Control Plan conforming to requirements of the City of Toronto's Public Health Services.
- .5 Submit to Consultant, details of where rubble, debris and other materials are to be disposed or reused. Include each disposal/reuse site location, operator's name and business address, type of license under which site operates, and criteria used by site to assess suitability of rubble, debris and other materials for disposal.
- .6 Give notice to Utility Authorities controlling services and appurtenances which will be affected by demolition Work.

1.4 QUALITY ASSURANCE

- .1 Prepare waste audits, waste reduction workplans, source separation programs and recycling programs as required by jurisdictional authorities and update programs and implement such programs as required.
- .2 Perform the work of this section in accordance with the 'Environmental Protection Act' including Ontario Regulation 102 and the 'Environmental Assessment Act' including Ontario Regulation 103.
- .3 Conform to Fire Code, Regulation under the Fire Marshals Act.
- .4 The demolition contractor must engage a registered professional engineer who holds a certificate of authorization and an appropriate level of liability insurance to prepare demolition procedures.
- .5 As part of the contract requirements, the engineer for the demolition contractor should be required to sign the general review commitment required by city building departments.

1.5 SITE CONDITIONS

- .1 Interruptions to Owners operations will not be permitted.
- .2 Perform operations, machine and equipment movements, deliveries and removals at time or times that will permit uninterrupted operations in and around structures, including parking, deliveries, and Site access and egress.
- .3 Take over structures to be demolished based on condition on date that Tenders close.

2 Products

2.1 MATERIALS

- .1 All materials requiring removal shall become the Contractor's property and shall be removed and disposed of from the site, as the work progresses, unless indicated otherwise.
- .2 Salvaged material: Salvage and stockpile original materials as indicated on site or indicated on drawings. Salvaged materials shall not be chipped, cracked, split, stained or damaged. Store items off of moist surfaces.

3 Execution

3.1 GENERAL

- .1 Clean up rubble and debris, resulting from Work promptly and dispose at end of day or place in waste disposal bins. Empty bins on regular basis.
- .2 Stockpiling of rubble, debris, and surplus Products on Site will not be permitted.
- .3 Remove, handle and transport Products indicated to be salvaged and stored for future use. Transport Products to storage area(s) designated by Consultant. Perform Work to prevent any damage to Products during removal and in storage. Products damaged during removal, will be inspected by Consultant. Consultant will determine extent of damage and accept or refuse Products.
- .4 Communicate Dust Control Plan procedures to all appropriate personnel on site and their head offices and due diligence measures to be maintained to control all fugitive emissions.
- .5 Take precautions to guard against movement, settlement or collapse of adjacent services, sidewalks, driveways, or trees. Be liable for such movement, settlement or collapse caused by failure to take necessary precautions. Repair promptly such damage when ordered.

3.2 EXAMINATION

- .1 Examine adjacent structures and other installations prior to commencement of demolition and removals Work in accordance with Authorities having Jurisdiction.

3.3 PROTECTION

- .1 Provide, erect and maintain required hoarding, sidewalk sheds, catch platforms, lights and other protection around Site before commencing work. Maintain such areas free of snow, ice, mud, water and debris. Lighting levels shall be equal to that prior to erection.
- .2 Prevent movement or damage of adjacent parts of existing structure to remain. Supply and install bracing, and shoring as required. Make good damage caused by demolition to acceptance of Consultant.
- .3 Protect adjacent structures and property against damage which might occur from falling debris or other causes. Repair or replace damage caused from Work of this Section to acceptance of Consultant.
- .4 Do not interfere with use of adjacent structures and Work areas. Maintain free, safe passage to and from adjacent structures and Work areas.
- .5 Take precautions to support affected structures. If safety of structure being demolished, adjacent structures or services are endangered, cease demolition operations and take necessary action to support endangered item. Immediately inform Consultant. Do not resume demolition until reasons for endangering have been determined and corrected and action taken to prevent further endangering.
- .6 Hang tarpaulins where debris and other materials are lowered. Build in around openings with wood and plywood at locations used for removal of debris and materials.
- .7 Prevent debris from blocking surface drainage system, elevators, mechanical, and electrical systems which are required to remain in operation.
- .8 Pay particular attention to prevention of fire and elimination of fire hazards which would endanger Work or adjacent structures and premises.
- .9 Supply and install adequate protection for materials to be re-used, set on ground and prevent moisture pick-up. Cover stockpiles of materials with tarpaulins.
- .10 Close off access to areas where demolition is proceeding by barricades and post warning signs.
- .11 Supply, install and maintain legal and necessary barricades, guards, railings, lights, warning signs, security personnel and other safety measures, and fully protect persons and property.

- .12 Dust/weather partitions:
 - .1 Prior to demolition Work proceeding in existing structures, temporarily enclose Work areas, access and supply and install dustproof and weatherproof partitions. Design partitions to prevent dust and dirt infiltration into adjoining areas, prevent ingress of water, and to resist loads due to wind.
 - .2 Prevent dust, dirt and water from demolition operations entering operational areas.
 - .3 Adjust and relocate partitions as required for various operations of Work.
 - .4 Upon completion of Work, remove and dispose of partitions from Site.
- .13 Dust protection:
 - *Negative pressure exhausted to the outside. Make good any finishes or building elements impacted as a result of negative pressure exhausts.
- .14 Blasting is not permitted.

3.4 PREPARATION

- .1 Disconnect and/or re-route electrical data, communication and telephone service lines entering structures to be demolished. Remove abandoned lines as indicated on Contract Drawings. Post warning signs on electrical lines and equipment which is required to remain energized.
- .2 Disconnect and cap designated mechanical services, as indicated on drawings
- .3 Disassemble and remove mechanical equipment, ductwork and piping complete with supports and associated components.
- .4 Do not disrupt active or energized utilities designated to remain undisturbed.
- .5 Perform rodent and vermin control to comply with health regulations.

3.5 DEMOLITION

- .1 Perform demolition with extreme care. Confine effects of demolition to those parts which are to be demolished.
- .2 Perform Work and prevent inconvenience to persons outside those parts which are to be demolished.
- .3 Carry out demolition in accordance with the requirements of CSA S350-M.
- .4 Demolish parts of structure to permit remedial Work as indicated.
- .5 Do not overload floor or wall with accumulations of material or debris or by other loads.
- .6 Perform Work to minimize dusting. Keep Work area wetted down with fog sprays to prevent dust and dirt rising. Supply and install temporary water lines and connections that may be required. Upon completion, remove installed temporary water lines. Use covered chutes, water down.
- .7 Do not sell or burn materials on Site.
- .8 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as Work progresses.
- .9 At end of day's Work, leave Work in safe condition with no part in danger of toppling or falling.
- .10 Drainage and sewer system protection:
 - .1 Ensure that no dust, debris or slurry enters drainage and sewer system on Site.
 - .2 Remove and dispose of debris and slurry promptly from Site.
 - .3 Comply with City of Toronto Sewer Use By-Law.
11. Where doors are scheduled to be removed, include removal of door hardware.
12. Remove interior partitions, fittings, fixtures and accessories as indicated on drawings. Partitions and walls shall be removed full height to structure above.
13. Remove interior finishes, such as ceiling and floor finishes, where new finishes are indicated on Room Finish Schedule.
 1. Removal of existing ceilings shall include complete removal including bulkheads and suspension system.
 2. Removal of adhesive applied finishes shall include complete removal to substrate including adhesive. Take adequate care to prevent damage to substrate.
- .14 Remove existing floor finishes, include mortar bed, adhesives, underlayment or other cleavage membranes, underpad, base, floor moulding and transition strips.

15. Demolish all other items indicated or required.

3.6 DISPOSAL OF MATERIALS

- .1 Remove from Site, rubble, debris, and other materials resulting from demolition and removals Work in accordance with Authorities having Jurisdiction, except where specified or indicated on Contract Drawings to be reused.
- .2 Conform to requirements of municipality's Works Department regarding disposal of waste materials.
- .3 Materials prohibited from municipality waste management facilities shall be removed from Site and dispose of at recycling companies specializing in recyclable materials.

3.7 RESTORATION

- .1 Where demolition removed a structure or installation, rough grade and restore area in accordance with Authorities having Jurisdiction.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for concrete work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM C156, Test Method For Water Retention by Concrete Curing Materials.
- .2 ASTM C260, Specification For Air-Entraining Admixtures For Concrete.
- .3 ASTM C494, Specification For Chemical Admixtures For Concrete.
- .4 CAN/CSA A23.1/A23.2-M, Concrete Materials and Methods of Concrete Construction/Methods of Tests For Concrete.
- .5 CAN/CSA A3000, Cementitious Materials Compendium.
- .6 CSA G30.15-M, Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
- .7 CAN/CSA G30.18-M, Billet-Steel Bars for Concrete Reinforcement.
- .8 CSA O121-M, Douglas Fir Plywood.
- .9 CAN/CSA S269.1, Falsework for Construction Purposes.
- .10 CAN/CSA S269.3-M, Concrete Formwork.

1.3 **DESIGN REQUIREMENTS**

- .1 Design formwork, reinforcing, and concrete in accordance with CAN/CSA A23.1/A23.2-M, CAN/CSA S269.3-M, and to withstand live, dead, lateral, seismic loads, and imposed loads.
- .2 Concrete: 32 Mpa unless otherwise indicated on drawings. Exterior concrete to have 5-7% entrained air.
- .3 Design concrete so that material will not segregate and excessive bleeding will not occur.

1.4 **QUALITY ASSURANCE**

- .1 Inspection and testing:
 - .1 Materials: CAN/CSA A23.1/A23.2-M; Inspect and test for conformance to requirements of this Standard and to Specifications.
 - .2 Tests will be made in accordance with CAN/CSA A23.2-M.

- .3 Remove defective materials and completed Work which do not conform to the Contract Documents.

- .2 Certificates:

- .1 Submit certification that plant, equipment, and materials to be used in reinforced concrete work comply with requirements of CAN/CSA A23.1/A23.2-M.
 - .2 Ready mix concrete supplier: Member in good standing of Ready Mix Concrete Association of Ontario (RMCAO). Batching plant facilities are required to maintain RMCAO special seal of quality.

1.5 **DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver and store materials on Site in accordance with CAN/CSA A23.1/A23.2-M.

1.6 **SITE CONDITIONS**

- .1 Conform to CAN/CSA A23.1/A23.2-M.

2 Products

2.1 **MATERIALS**

- .1 Falsework materials: CSA S269.1.
- .2 Forms: Plywood to CSA O121-M, G1S; Douglas Fir plywood, sheets as large as practical, minimum 19 mm thick, seven ply, exterior grade, waterproof glue, edges sealed with oil based sealer.
- .3 Form release agent: Chemically active, non-staining, VOC compliant, release agents containing compounds that react with free lime present in concrete forming water insoluble soaps, preventing concrete from sticking to forms.
- .4 Reinforcing steel: CAN/CSA G30.18-M; Billet-steel bars, deformed unless indicated otherwise, Grade 400R.
- .5 Chairs, bolsters, supports, spacers: CAN/CSA A23.1-M with sufficient strength to rigidly support weight of reinforcement and construction loads. Manufactured by NCA/Acrow - Richmond or Dayton Superior.
- .6 Cement: CAN/CSA A3000; Portland, Type GU.
- .7 Coarse and fine aggregate: CAN/CSA A23.1/A23.2-M.
- .8 Water: CAN/CSA A23.1/A23.2-M.
- .9 Water reducing admixture: ASTM C494, Type A.

- .10 Set retarding admixture: ASTM C494, Type D.
- .11 Set accelerating admixture: ASTM C494, Type C.
- .12 Air entraining admixture: CAN/CSA A23.1/A23.2-M and ASTM C260.
- .13 Curing compound: ASTM C309, Type 2, Class B; Clear for interior concrete. White pigmented for exterior work.

2.2 CONCRETE MIXES

- .1 Provide minimum 32 Mpa concrete unless otherwise indicated on the drawings and in accordance with the Contract Documents.
- .2 Acceptance of any concrete mix proportion or material, does not preclude its future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unacceptable.
- .3 Mix concrete and concrete proportions in accordance with CAN/CSA A23.1/A23.2-M.
- .4 When combinations of Portland cement and supplementary cementing materials are used, prove to acceptance of Consultant that concrete will withstand exposure conditions outlined in Contract Documents

2.3 ADMIXTURES

- .1 Use admixtures for concrete from single manufacturer, unless otherwise acceptable to Consultant.
- .2 Have manufacturer certify that admixtures are compatible.
- .3 Add admixtures to concrete mix in accordance with manufacturer's recommendations.
- .4 Except as specified otherwise, comply with requirements of CAN/CSA A23.1/A23.2-M.
- .5 Use of calcium chloride or additional admixtures, other than those specified, is not acceptable.

3 Execution

3.1 EXAMINATION

- .1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 GENERAL

- .1 Give Consultant at least 2 working days notice prior to placement of concrete to permit a review of placement of formwork, reinforcing steel, and associated items embedded in concrete for conformance to reviewed shop drawings and Contract Documents.
- .2 Do not place concrete on surfaces which contain frost, water or debris.
- .3 Ensure that reinforcement and associated items embedded in concrete are not disturbed during placement of concrete.
- .4 Ensure concrete cover over reinforcing steel is as indicated on Contract Drawings.

3.3 FORMWORK

- .1 Construct falsework in accordance with CSA S269.1.
- .2 Construct formwork in accordance with CAN/CSA S269.3-M to produce finished concrete conforming to shape, dimensions, locations and elevations indicated with tolerances specified herein.
- .3 Take particular care in forming corners and openings. Ensure formwork is tight and braced so no movement occurs.
- .4 Align form joints and make watertight. Keep form joints to a minimum. Ensure no visible defects appear on exposed finished Work.
- .5 Apply release agent by spray in accordance with manufacturer's recommendations. Ensure form surfaces receive a uniform coating.

3.4 REINFORCING PLACING

- .1 Place reinforcing steel as shown on reviewed shop drawings and in accordance with CAN/CSA A23.1-M. Make bars as long as possible.
- .2 Make splices in locations shown on Drawings. Lap lengths in accordance with CSA A23.3 unless otherwise shown.
- .3 Lap ends and sides of wire fabric not less than 150 mm.

3.5 PLACING OF CONCRETE

- .1 Place concrete in accordance with CAN/CSA A23.1/A23.2-M.
- .2 Slope concrete to levels shown on Contract Drawings.

- .3 Do not place concrete at such a rate as to endanger formwork or to prevent proper compaction.
- .4 Place concrete to prevent cold joints and segregation and vibrate sufficiently to ensure thorough compaction, maximum density in accordance to CAN/CSA A23.1/A23.2-M
- .5 Check work frequently with accurate instruments during placing of concrete.

3.6 **CONSOLIDATING**

- .1 Consolidate concrete in accordance with CAN/CSA A23.1/A23.2-M
- .2 Work concrete into complete contact with forms and embedded items. Consolidate concrete adjacent to side forms and along entire length of forms to ensure a smooth surface finish after stripping of formwork.

3.7 **CURING AND PROTECTION**

- .1 Cure and protect concrete in accordance with CAN/CSA A23.1/A23.2-M.
- .2 Apply curing compound after finishing operations have been completed, at rate recommended by compound manufacturer. Ensure compound application is uniform and continuous over entire area being cured.

3.8 **FINISHING**

- .1 Treat and finish exposed formed surfaces in accordance with CAN/CSA A23.1/A23.2-M.

3.9 **REMOVAL OF FORMS**

- .1 Do not disturb forms until concrete has hardened and developed sufficient strength to safely support its own weight and load on it.
- .2 Strip formwork in accordance with CAN/CSA A23.1-M.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for masonry Work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM A1064/A1064-M, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- .2 CAN/CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction, Methods of Test and Standard Practices for Concrete.
- .3 CSA A165 Series, CSA Standards on Concrete Masonry Units.
- .4 CSA A179, Mortar and Grout for Unit Masonry.
- .5 CSA A370, Connectors for Masonry.
- .6 CSA A371, Masonry Construction for Buildings.
- .7 CAN/CSA A3000, Cementitious Materials Compendium.
- .8 CSA G30.18, Carbon Steel Bars for Concrete Reinforcement.
- .9 CSA S304.1, Design of Masonry Structures.

1.3 **SUBMITTALS**

- .1 Shop drawings: Submit shop drawings in accordance with Section 01 00 00 indicating wall sections and details, reinforcing and anchors, special detailing, patterning and locations of control joints.
- .2 Quality control submittals: Submit manufacturer's certificates stating that materials supplied are in accordance with this Specification.

1.4 **QUALITY ASSURANCE**

- .1 Provide plain and reinforced masonry in accordance with CSA A370, CSA A371, and CSA S304.1.

1.5 **DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver, store and handle Products in accordance with the Conditions of the Contract and as specified herein.

- .2 Remove unacceptable materials from Site and replace to acceptance of Consultant. Store materials off ground protected from wetting by rain, snow or ground water, or inter-mixture with earth or other materials. Store metal ties and reinforcement to prevent corrosion.
- .3 Do not concentrate storage of materials on any part of structure beyond design load, take particular care not to overload unsupported portions of structure which may have not attained their full design strength.
- .4 Comply with CSA A371. Do not use salt or calcium-chloride to remove ice from masonry surfaces.
- .5 Deliver mortar materials in original unbroken and undamaged packages with the maker's name and brand distinctly marked thereon. Prevent damage to units.
- .6 Keep masonry materials free from ice and frost. Keep units protected from concrete, mortar and other materials which could cause staining.

2 Products

2.1 MASONRY UNITS

- .1 Concrete block units: Lightweight units, CSA A165 Series, 200 mm thick unless otherwise indicated, classifications as follows:
 - .1 H/15/D/M.
 - .2 S/15/D/M.
 - .3 Sc/15/D/M.
- .2 Concrete block units: Normalweight units, CSA A165 Series, 200 mm thick unless otherwise indicated, classifications as follows:
 - .1 H/15/A/M.
 - .2 S/15/A/M.
 - .3 Sc/15/A/M.
- .3 Special shapes:
 - .1 Unless indicated otherwise, supply and install corner returns, bull-nosed or double bull-nosed units for exposed and external corners, bond beams, sash blocks for control joints, concrete block lintels over openings in concrete block walls and any additional special shapes as indicated.
 - .2 Provide solid masonry units where required for mechanically fastening of blocking, furring, mechanically applied finishes or where noted.
- .4 Obtain each masonry unit type from same manufacturer. Supply and install units of uniform texture and colour for each kind required.
- .5 Supply masonry units with exposed surfaces free of cracks, chips, blemishes, and broken corners.

2.2 ACCESSORIES

- .1 Reinforcement: CSA A370, CSA A371, and ASTM A1064/A1064-M, all components to be hot dip galvanized unless otherwise specified:
 - .1 This specification is based on products manufactured by Blok-Lok Limited. Products by Dur-O-Wal Ltd. and Fero Corporation are approved alternatives.
 - .2 Type 1 (single wythe): Truss type; 'Blok-Trus BL30'.
 - .3 Type 2 (double wythe): Truss type; 'Blok-Trus BL32'.
 - .4 Connectors: CSA A370 and CSA S304.1.
 - .5 Reinforcing steel: CSA G30.18, Grade 400, refer to Contract Drawings for number, size, and location.
- .2 Loose steel lintels and lateral support angles: Supplied as part of Work of Section 05 50 00.
- .3 Dampproof course and flashing: Reinforced SBS rubberized asphalt compound laminated to cross-laminated polyethylene film, 40 mils thick; 'Airshield Thru Wall Flashing' by W.R. Meadows or approved alternative, complete with primer and adhesive recommended by flashing manufacturer.
- .4 Compressible filler: 75 x 6 mm thick preformed, polyurethane foam; 25V by Emseal Joint Systems Ltd.
- .5 Control joint filler: Prefabricated extruded rubber joint to suit wall thickness; RS Series Rubber Control Joint by Blok-Lok or approved alternative.

2.3 MORTAR MATERIALS

- .1 Loadbearing masonry: CSA A179, Type S, proportion method.
- .2 Interior non-loadbearing masonry: CSA A179, Type N, proportion method.
- .3 Cement: CAN/CSA A3000, normal Portland, Type GU.
- .4 Masonry aggregate: CSA A179. Provide white aggregate where required for white or light coloured mortars.
- .5 Hydrated lime: ASTM C207, Type S.
- .6 Water: Clean potable, free from deleterious elements and free from salts that can cause efflorescence.
- .7 Concrete fill and grout: 20 Mpa concrete in accordance with CAN/CSA A23.1/A23.2.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **PROTECTION**

- .1 Supply and install temporary waterproof, non-staining coverings, secured against displacement, to extend over walls and down sides to protect masonry Work from snow and wind driven rain, and from drying too quickly, until masonry Work is completed and protected by flashings or other permanent construction.
- .2 Supply and install non-staining, protective coverings on horizontal and vertical surfaces to protect Work of this Section from damage, staining, marking, and mortar droppings.

3.3 **WORKMANSHIP**

- .1 Perform masonry Work in accordance with CSA A371 and as indicated .
- .2 Supply and install masonry Work plumb, level and true to line, with vertical joints in alignment and horizontal courses level, uniform, and straight.

3.4 **MASONRY - GENERAL INSTALLATION**

- .1 Construct masonry work as required by jurisdictional authorities.
- .2 Before commencing masonry work, verify required limitations for wall heights, wall thicknesses, openings, bond, anchorage, lateral support, and compressive strengths of masonry units and mortars.
- .3 Construct masonry fire protection and fire separations of the thickness indicated on Drawings for the fire resistant ratings as noted on Drawings, and conforming to the Fire-Performance Ratings, Appendix 'D' to the National Building Code of Canada.
- .4 Fire Separations and Fire Separations with Fire Resistance Ratings: Construct walls tightly to construction above and at perimeter, and without openings or voids. Do not reduce the thickness of walls to less than the thickness indicated on the Drawings or for the required fire resistance rating where required.
- .5 Do not butter corner units, throw mortar droppings into joints, or excessively furrow bed joints. Do not shift or tap units after mortar has taken initial set. If adjustment is necessary after mortar has started to set, remove and replace with fresh mortar.
- .6 Do not use admixtures without Consultant's written acceptance.

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- .7 Tool mortar joints slightly concave with non-staining tools unless indicated otherwise. Strike joints flush in non exposed areas or where shown on Contract Drawings. Use sufficient force to press mortar tight against masonry units on both sides of joints. Remove excess, remaining mortar material and burrs.
 - .8 Install masonry walls 25 mm clear of underside of steel building frames, roof or floor deck. Install masonry with a 19 mm space beneath shelf angles and install compressible filler.
 - .9 Cut masonry units with a wet saw to obtain straight, clean, even, unchipped edges. Cut units as required to fit adjoining work neatly or for flush mounted electrical outlets, grilles, pipes, conduit, leaving 3 mm maximum clearance. Use full-size units without cutting wherever possible.
 - .10 Reinforce block walls with continuous wire reinforcement in every second block course. Supply and install prefabricated L and T sections. Cut, bend and lap reinforcing units as per manufacturer's printed directions for continuity at returns, offsets, pipe enclosures, and other special conditions. Bending of masonry reinforcement is not permitted.
 - .11 Reinforce masonry walls with reinforcing steel as indicated on Drawings. Vertical reinforcing shall be fully grouted in masonry cores with grout.
 - .12 At openings in block walls install extra reinforcement, so that first and second courses above and below openings are reinforced. Extend extra reinforcement 600 mm beyond opening in each direction.
 - .13 Reinforce joint corners and intersections with strap anchors 400 mm o.c.
 - .14 Do not place reinforcement across masonry wythes at control joints.
 - .15 Install masonry with 10 mm thick joints unless indicated otherwise. Make vertical and horizontal joints equal and of uniform thickness.
 - .16 Build control joints in masonry walls at intervals and in locations shown. Form joints for block walls using sash block units in accordance with details shown.
 - .17 Install control joints in masonry walls where indicated on drawings and at projections and changes in direction. Where control joints have not been indicated provide joints at 6100 mm o.c. for exterior walls and 9150 mm o.c. for interior walls.
 - .18 If required, provide movement joints, similar to building control joints, installed between areas with different support conditions.
 - .19 Supply and install solid block or metal lath under block, and fill block cells solid for lintel bearing and as required to secure built-in anchor bolts and/or anchors shown.
 - .20 Do not tooth intersections of walls except as otherwise indicated.

- .21 Coordinate installation of masonry with installation of air barrier and vapour retarder to ensure continuity of these systems.

3.5 **DAMPPROOF COURSES**

- .1 Install dampproof courses beneath first masonry bearing course on slabs-on-grade. Trim dampproofing to conceal it.
- .2 Lap dampproofing and flashing 150 mm and seal in accordance with manufacturer's instructions.
- .3 Before masonry work begins, place specified dampproofing under first course of masonry. Install continuous dampproofing with ends lapped and cut flush with exterior face of wall. Place similar dampproofing over top course.

3.6 **MORTAR MIXING**

- .1 Thoroughly mix mortar ingredients in proper quantities needed for immediate use to requirements of CSA A179.
- .2 Measure and batch mortar materials either by volume or weight, to accurately control and maintain proportions. Do not measure materials by shovel.
- .3 Mix mortar with maximum amount of water consistent with workability for maximum tensile bond strength within capacity of mortar.
- .4 Do not use mortar which has begun to set. Use mortar within 2 hours after initial mixing. Re-temper mortar during 2 hour period only as required to restore workability.

3.7 **BLOCK INSTALLATION AND PATCHING**

- .1 Lay blocks in running bond except as indicated otherwise. Align block webs vertically and install thicker ends of face shells up.
- .2 Install a full bed of mortar for first courses of masonry, for masonry units 100 mm thick and less, and between solid units. For remaining courses bed face shells, including vertical end joints, fully in mortar.
- .3 Install special shaped and sized concrete block units as indicated and as required for a complete and coordinated assembly and to minimize cut units.
- .4 Supply and install two courses of solid block beneath lintel bearing.
- .5 Stagger end joints in every course. Align joints plumb over each other in every other course.
- .6 Bond intersecting block walls in alternate courses. Where block work abuts concrete, anchor each block course to concrete.

3.8 LINTELS

- .1 Install concrete block lintels over openings in masonry except where steel lintels are indicated.
- .2 Set lintels with minimum of 200 mm uniformly distributed bearing at each end. Provide bond breaker under bearing ends.
- .3 Install reinforcing steel and concrete fill in block lintels.
- .4 Install loose steel lintels, as indicated in Contract Drawings. Centre over opening width.

3.9 LATERAL SUPPORT ANGLES

- .1 Where non load bearing unit masonry partitions meet structural elements at top of partitions, provide lateral supports as required by the Ontario Building Code and in accordance with Structural details. In areas where ceilings are scheduled, use 150 mm lengths of steel angle located each side of partition at 1200 mm and staggered.

3.10 BUILT-IN ITEMS

- .1 Coordinate and locate build-in items required to be built into masonry or supplied under Work of other Sections including hollow metal doors, windows, lintels, sleeves, inserts, etc. Build-in items to present a neat, rigid, true and plumb installation.
- .2 Build wall openings, slots, and recesses required for ducts, grilles, pipes and other items.
- .3 Coordinate installation of conduit, outlet boxes and other mechanical and electrical built-ins with Work of Divisions 21, 22, 23 and 26.
- .4 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as Work progresses.
- .5 Brace door jambs to maintain plumbness. Set anchors between metal frames and masonry and fill voids between hollow metal frames and masonry walls with mortar.

3.11 INSTALLATION TOLERANCES

- .1 Install masonry Work to a plane flatness and exposed end tolerance of 3 mm in 2400 mm.
- .2 Variation in Alignment from Unit to Adjacent Unit: 1.5 mm maximum.
- .3 Plumb within 6 mm in 3 m, or in 6 mm in 6 m at external corners, expansion joints, or other conspicuous lines.

- .4 Located from position shown, and from related position of columns, walls, and partitions within 12 mm in any bay or 6 m maximum distance, and 19 mm in 12 m or more.
- .5 Opening sizes within 6 mm of designated dimension.
- .6 Column and wall cross-section dimensions within minus 6 mm and plus 12 mm.
- .7 Joint widths to dimensions indicated or specified herein, but in no case greater than 12 mm. Variation of Mortar Joint Thickness: 1 mm every metre.

3.12 REPAIR AND POINTING

- .1 Remove and replace masonry units which are loose, chipped, broken, cracked, marked, stained, discoloured, or otherwise damaged. Supply and install new units to match adjoining units and install in fresh mortar, and point to eliminate evidence of replacement.
- .2 During tooling of joints, enlarge any cracks, holes, or other defects, point and completely fill with mortar.
- .3 Point-up joints including corners, openings and adjacent Work for a neat, uniform appearance, properly prepared for application of sealant compounds.

3.13 CLEANING

- .1 Obtain and follow unit masonry manufacturer's written instructions for cleaning of masonry.
- .2 Clean exposed, masonry surfaces, removing excess mortar as work progresses. Allow mortar droppings to partially dry then dry brush with a stiff fibre brush.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 ASTM International
 - .1 ASTM A 123/A 123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A 653/A 653M-17, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 CSA Group
 - .1 CSA W47.1-09 R(2014), Certification of Companies for Fusion Welding of Steel Structures.
 - .2 CSA W55.3-08 (R2013), Certification of Companies for Resistance Welding of Steel and Aluminum.
 - .3 CSA W59-13, Welded Steel Construction (Metal Arc Welding) [Metric].
 - .4 CAN/CSA S136-16, North American Specification for the Design of Cold Formed Steel Structural Members.
- .3 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI 51-06, Lightweight Steel Framing Design Manual.
 - .2 CSSBI Fact Sheet #3 February 2006, Care and Maintenance of Prefinished Sheet Steel Building Products.
 - .3 CSSBI Technical Bulletin Vol. 7, No. 2 September 2011, Changing Standard Thicknesses for Canadian Lightweight Steel Framing Applications.
 - .4 CSSBI S5-11, Guide Specification for Wind Bearing Steel Studs.
- .4 Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for structural metal studs 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 Ontario, Canada.
 - .2 Indicate design loads, member sizes, materials, design thickness exclusive of coatings, coating specifications, connection and bracing details, screw sizes and spacing, and anchors.
 - .3 Indicate locations, dimensions, openings and requirements of related work.
 - .4 Indicate welds by welding symbols as defined in CSA W59.
- .4 Samples: Submit samples of framing components for review including fasteners.

1.3 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Manufacturer Reports: Submit manufacturer's written report, within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect structural metal studs from nicks, scratches, and blemishes.
 - .3 Protect steel studs during transportation, site storage and installation in accordance with CSSBI Sheet Steel Facts #3.
 - .4 Handle and protect galvanized materials from damage to zinc coating.
 - .5 Replace defective or damaged materials with new.

Part 2 Products**2.1 MATERIALS**

- .1 Steel: to CAN/CSA S136, fabricated from ASTM A653/A653M, Grade 230 steel.
- .2 Zinc coated steel sheet: quality to ASTM A653/A653M, with Z275 designation coating.
- .3 Welding materials: to CSAW59 and certified by Canadian Welding Bureau.
- .4 Screws: low profile head, self-drilling, self-tapping sheet metal screws, corrosion protected with minimum zinc coating thickness of 0.008 mm, length to suit application.
- .5 Anchors: concrete expansion anchors or other suitable drilled type fasteners.
- .6 Bolts, nuts, washers: hot dipped galvanized to ASTM A123/A123M, 600 g/m² zinc coating.
- .7 Touch up primer: zinc rich, to 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 CAN/CSA S136, fabricated from metallic coated steel, depth as indicated.
 - .1 Minimum steel thickness of 1.09 mm.
- .2 Stud tracks: fabricated from same material and finish as steel studs, depth to suit.
 - .1 Bottom track: single piece.

- .2 Top track: 2 piece telescoping.
- .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.

2.4 SOURCE QUALITY CONTROL

- .1 Mill reports for material properties reviewed by Consultant.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts acceptable for structural metal stud in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Consultant.
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions remedied [and after receipt of written approval to proceed from Consultant.

3.2 GENERAL

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

3.3 ERECTION

- .1 Erect components to requirements of reviewed shop drawings.
- .2 Anchor tracks securely to structure at 800 mm on centre maximum, unless lesser spacing prescribed on shop drawings.
- .3 Erect studs plumb, aligned and welded in accordance with manufacturer's recommendations or securely attached with 2 screws minimum.
- .4 Seat studs into bottom tracks and 2 piece telescoping top track.
- .5 Install 50 mm minimum telescoping track at top of walls where required to accommodate vertical deflection.
 - .1 Nest top track into deflection channel minimum of 30 mm and maximum of 40 mm.
 - .2 Do not fasten tracks together.
 - .3 Stagger joints.
- .6 Install studs at maximum 50 mm from abutting walls, openings, and each side of corners and terminations with dissimilar materials.
- .7 Brace steel studs with horizontal internal bridging at 1200 mm maximum.

- .1 Fasten bridging to steel clips fastened to steel studs with screws or by welding.
- .8 Frame openings in stud walls to adequately carry loads by use of additional framing members and bracing as detailed on shop drawings.
- .9 Touch up welds with coat of zinc rich primer.
- .10 Erection Tolerances
 - .1 Plumb: maximum 1/500th of member length.
 - .2 Camber: maximum 1/1000th of member length.
 - .3 Spacing: maximum +/- 3 mm from design spacing.
 - .4 Gap between end of stud and track web: maximum 4 mm.

.11 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 maximum 300 mm.

3.4 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer's verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - QUALITY ASSURANCE.
 - .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 follows.
 - .1 After delivery and storage of products, and when preparatory Work complete but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning 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 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste Management: Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal and the Waste Reduction Workplan.

3.6 PROTECTION

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

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Design, labour, Products, equipment and services necessary for the miscellaneous and metal fabrication Work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM A123, Specification for Zinc (Hot Dip Galvanized) Coatings on Iron & Steel Products.
- .2 ASTM A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .3 ASTM A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
- .4 ASTM A276, Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
- .5 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- .6 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
- .7 CISC/CPMA 1.73a, A Quick-Drying One-Coat Paint for Use on Structural Steel.
- .8 CAN/CSA-G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels.
- .9 CAN/CSA S16.1-M, Limit States Design of Steel Structures.
- .10 CSA S136.1-M, Commentary on CAN/CSA S136-M, Cold Formed Steel Structural Members.
- .11 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.
- .12 CSA W48, Filler Metal and Allied Materials for Metal Arc Welding.
- .13 CSA W59-M, Welded Steel Construction (Metal Arc Welding).
- .14 CAN/CSA W117.2-M, Safety in Welding, Cutting and Allied Processes.
- .15 CAN/CGSB 1.40-M, Primer, Structural Steel, Oil Alkyd Type.
- .16 CGSB 85-GP-16M, Painting Galvanized Steel.
- .17 NAAMM, The National Association of Architectural Metal Manufacturers.

- .18 Steel Structures Painting Council (SSPC), Steel Structures Painting Manual, Vol. 2.

1.3 DESIGN REQUIREMENTS

- .1 Design details and connections, where not shown on Drawings, in accordance with CAN/CSA-S16.1 and CSA S136.1.

1.4 SUBMITTALS

- .1 Shop drawings:
 - .1 Submit shop drawings for fabrication and erection of miscellaneous and metal items in accordance with Section 01 00 00 indicating:
 - .1 Materials, core thicknesses, class of finish (AMP 555), connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
 - .2 Ensure shop drawings are of one uniform size and based on field measurements.

1.5 QUALITY ASSURANCE

- .1 Retain a Professional Engineer, licensed in the Province of Ontario, with experience in Work of comparable complexity and scope, to perform the following services as part of the Work of this Section:
 - .1 Design metal fabrication items that are required to resist live, dead, lateral, wind, or seismic loads.
 - .2 Review, stamp, date and sign shop drawings.
- .2 Workmanship: Fabricate Work of this Section to meet the required class of workmanship indicated below in accordance with AMP 555, Section 8.
 - .1 Class 1: for use on direct exposed to view fabricated items:
 - .1 Exposed surfaces are finished smooth with pits, mill marks, nicks, burrs, sharp edges, and scratches filled or ground off. Defects should not show when painted, polished, or finished.
 - .2 Welds should be concealed where possible. Exposed welds are ground to small radius with uniform sized cove unless otherwise noted.
 - .3 Distortions should not be visible to the eye.
 - .4 Exposed joints are fitted to a hairline finish.
- .3 Execute welding by firms certified in accordance with CSA W47.1 Division 1 or 2.1. Ensure welding operators are licensed per CSA W47.1 for types of welding required by Work.
- .4 Perform stainless steel work in accordance with NAAMM, Code of Standard Practice for the Metal Industry, Workmanship, Class 1.

2 Products

2.1 **MATERIALS**

.1 General:

- .1 All materials under Work of this Section, including but not limited to, primers and paints are to have low VOC content limits.
 - .2 Unless detailed or specified herein, standard products will be acceptable if construction details and installation meet intent of Drawings and Specifications.
 - .3 Include all materials, products, accessories, and supplementary parts necessary to complete assembly and installation of Work of this Section.
 - .4 Incorporate only metals that are free from defects which impair strength or durability, or which are visible. Install only new metals of best quality, and free from rust or waves and buckles, and that are clean, straight, and with sharp defined profiles.
- .2 Structural shapes, plates, and similar items: CAN/CSA-G40.20/G40.21-M, Grade 350W. Hollow structural sections: CAN/CSA-G40.20/G40.21-M, Grade 350W, Class H.
- .3 Galvanized sheet steel: ASTM A653/A653M Grade A, Z275 Commercial Quality zinc coating, size and shape as shown.
- .4 Stainless steel sheet and plate: ASTM A167, Type 304, finish to AISI No. 4. Size as shown.
- .5 Stainless steel shapes: ASTM A276, Type 304, finish to AISI No. 4 or X-L Blend S as indicated. Sizes and shapes as shown.
- .6 Welding materials: CSA W48 and CSA W59-M.
- .7 Fasteners: Conforming to ASTM A307, Grade A, in areas not exposed to view, use unfinished bolts with hexagon heads and nuts. In areas exposed to view, use bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws and machine bolts Z275 zinc coated in accordance with ASTM A653/A653M. Supply bolts of lengths required to suit thickness of material being joined, but not projecting more than 6 mm beyond nut, without the use of washers.
- .8 Primer paint: CAN/CGSB-1.40-M or CPMA 1.73a.
- .9 Galvanized primer paint: Inorganic zinc rich primer. For use on galvanized fabrications where touch up is to remain unpainted in finished work; Carbozinc 11WB by Carboline Company, Catha-Coat 305 by Devoe Coatings or Zinc Clad XI by Sherwin Williams.
- .10 Drilled inserts: Mega by ITW Construction Products or HSL by Hilti Inc. heavy-duty anchors, sizes as shown.

MISCELLANEOUS AND METAL FABRICATIONSPage 4

2.2 FABRICATION

- .1 Verify dimensions of existing Work before commencing fabrications and report any discrepancies to the Consultant.
- .2 Fit and assemble Work in shop where possible. Execute Work in accordance with details and reviewed shop drawings.
- .3 Use self-tapping shake-proof screws on items requiring assembly by screws or as indicated. Use screws for interior metal work. Use welded connections for exterior metal Work unless otherwise found acceptable by the Consultant.
- .4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush. Seal exterior steel fabrications against corrosion in accordance with CAN/CSA S16.1-M.
- .5 Execute shop welding to requirements specified .
- .6 Carefully make and fit details. Take special care with exposed finished Work to produce a neat and correct appearance to the Consultant's acceptance.
- .7 Assemble members without twists or open joints.
- .8 Correctly size holes for connecting Work of other trades where such can be determined prior to fabrication. Where possible, show holes on shop drawings. Place holes not to cause appreciable reduction in strength of member.
- .9 Draw mechanical joints to hairline tightness and seal countersunk screw and access holes for locking screws with metal filler where these occur on exposed surfaces.
- .10 All interior steel to be shop primed unless otherwise indicated. All exterior steel or steel exposed to the exterior elements to be hot dipped galvanized.

2.3 FABRICATED ITEMS

- .1 Refer to Drawings for details of metal fabrication work and related items not specifically listed in this Section.
- .2 Where work is required to be built into work of other Sections supply such members to respective Sections.
- .3 Provide miscellaneous and metal fabrication items indicated on drawings and details and items not indicated to be supplied under other Sections.
- .4 Miscellaneous steel brackets, supports and angles: Supply and install or supply for installation by trades responsible, all loose steel brackets, supports and angles where indicated, except where such brackets, supports and angles are specified under work of other Sections. Drill for countersunk screws, expansion anchors and anchor bolts.

2.4 STAINLESS STEEL WORK

- .1 Take all necessary precautions to safeguard against latent surface discolouration due to disturbance of the natural protective oxide coating of the material or to contamination from other sources.
- .2 Workmanship shall be the best standard practice for this type of work. Execute stainless steel work in accordance with the applicable instructions set forth in Atlas Stainless Steels' "Technical Data" handbook on stainless steel.
- .3 Do all stainless steel fabrication in clean shops, located away from areas where carbon steel is burnt, ground, or cut with abrasive wheels to ensure that carbon steel dust will not be embedded into the stainless steel, and as follows:
 - .1 In fabrication of stainless steel do not use tools and dies which have been used on carbon steels.
 - .2 Ensure tools and dies use for forming and cutting stainless steel are free of nicks and other damage.
 - .3 Do not use carbon grits and grinding wheels which will imbed foreign particles into stainless steel surfaces. Use only stainless steel wool when wool polishing is required.
 - .4 Stainless steel items, on which rust stains appear, shall be replaced with new fabricated material.

2.5 ANCHORS AND FASTENING

- .1 Use weld studs of size not larger than 10 mm for attaching miscellaneous materials and equipment to building steel. If weight of item requires larger fasteners use clips or brackets and secure by welding or through bolting.
- .2 Use self drilling expansion type concrete anchors for attaching to masonry and concrete
- .3 Do not secure items to steel deck.
- .4 Use steel beam clamps of two bolt design to transmit load to beam web. Do not use C and I clamps.

2.6 WELDING

- .1 Perform welding by electric arc process.
- .2 Execute welding to avoid damage or distortion to Work. Execute welding in accordance with following standards:
 - .1 CSA W48 - for Electrodes. If rods are used, only coated rods are allowed.
 - .2 CSA W59-M and CSA W59S1-M for design of connections and workmanship.
 - .3 CAN/CSA W117.2-M - for safety.

MISCELLANEOUS AND METAL FABRICATIONSPage 6

- .3 Thoroughly clean welded joints and expose steel for a sufficient distance to perform welding operations. Finish welds smooth. Supply continuous and ground welds which will be exposed to view and finish paint.
- .4 Test welds for conformance and remove Work not meeting specified standards and replace to Consultant's acceptance.

2.7 SHOP PAINTING

- .1 Clean steel to SSPC SP6 and remove loose mill scale, weld flux and splatter.
- .2 Shop prime steel with one coat of primer paint to dry film thickness of 0.07 mm. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 deg C. Paint items under cover and leave under cover until primer is dry. Follow paint manufacturer's recommendations regarding application methods, equipment, temperature, and humidity conditions.
- .3 Shop prime galvanized steel in accordance with CGSB 85-GP-16M.
- .4 Clean but do not paint surfaces being welded in field.
- .5 Do not paint surfaces embedded in concrete, but clean as if they were to be primed.
- .6 Do not prime steel to be fireproofed or to receive intumescent paint coating.
- .7 Do not prime machine finished surfaces, but apply an effective anti-rust compound.
- .8 Take precautions to avoid damage to adjacent surfaces.

2.8 HOT DIP GALVANIZING

- .1 After fabrication, hot dip galvanize specific miscellaneous steel items as indicated. After galvanizing, plug relief vents air tight with appropriate aluminum plugs as suitable and required for intended metal fabricated item. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with zinc rich primer in accordance with manufacturer's printed directions.
- .2 Hot-dip galvanize members in accordance with requirements of the following ASTM, with minimum coating weights or thicknesses as follows:
 - .1 Rolled, pressed and forged steel shapes, plates, bars and strips: ASTM A123; average weight of zinc coating per square/metre of actual surface, for 4.8 mm and less thickness members 600 g/m² for 6 mm and heavier members 640 g/m².
 - .2 Iron and steel hardware: ASTM A153; minimum weight of zinc coating, in ounces per square foot of surface, in accordance with ASTM A153, Table 1 for the various classes of materials used in the Work.

3 Execution

3.1 **EXAMINATION**

- .1 Examine previously installed Work, upon which this Section depends, verify dimensions and condition of existing Work, and coordinate repairs, alterations, and rectification if necessary. Commencement of Work of this Section is deemed to signify acceptance of existing, prior conditions.
- .2 Obtain Consultant's written approval prior to field cutting or altering of structural members.

3.2 **ERECTION**

- .1 Install metal fabrications in accordance with reviewed shop drawings and manufacturer's written instructions.
- .2 Fit joints and intersecting members accurately. Make Work in true planes with adequate fastenings. Build and erect Work plumb, true, square, straight, level and accurate to sizes detailed, free from distortion or defects detrimental to appearance or performance.
- .3 Perform drilling of concrete and steel as required to fasten Work of this Section.

3.3 **TOUCH UPS**

- .1 Paint bolt heads, washers, nuts, field welds and previously unpainted items. Touch up shop primer damaged during transit and installation, with primer to match shop primer.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for firestopping and smoke seals Work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM E814, Test Method for Fire Tests of Through-Penetration Fire Stops.
- .2 CAN/CGSB 19.13, Sealing Compound, One Component, Elastomeric, Chemical Curing.
- .3 CAN/ULC S102, Surface Burning Characteristics of Building Materials and Assemblies.
- .4 CAN/ULC S115, Standard Method of Fire Tests of Firestop Systems.
- .5 CAN/ULC S702, Thermal Insulation, Mineral Fibre for Buildings.

1.3 **SUBMITTALS**

- .1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 00 00 indicating:
- .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
- .2 Product transportation, storage, handling and installation requirements.
- .3 Submit firestop and smoke seal manufacturer's Product data for materials and prefabricated devices, including manufacturer's printed installation instructions.
- .2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 00 00 indicating:
- .1 Fire rated and smoke sealed systems for each typical application.
- .2 Construction details, accurately reflecting actual job conditions.
- .3 ULC or Intertek Testing assembly listing.
- .3 Certification:
- .1 Submit certified documentation from manufacturer for each worker performing Work of this Section.
- .2 Submit installer's and Product manufacturer's certification verifying compliance with the Contract Documents and conformance with ASTM E814 and CAN/ULC S115.

1.4 **QUALITY ASSURANCE**

- .1 Perform Work of this Section by manufacturer-approved, skilled, qualified, and experienced workers trained in installation of Work of this Section.

1.5 **SITE CONDITIONS**

- .1 Conform to manufacturer's requirements and maintain a minimum temperature of 5° C for a minimum period of 24 h before application, during, and until application is fully cured.
- .2 Maintain sealant at a minimum 18° C for best workability.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

- .1 Acceptable manufacturers of rated systems include:
 - .1 AD Fire Protection Systems Inc.
 - .2 Hilti Canada Corporation.
 - .3 3M Canada Inc.
 - .4 Tremco Ltd.

2.2 **MATERIALS**

- .1 All materials under Work of this Section, including but not limited to, primers and sealants are to have low VOC content limits.
- .2 Firestop sealant: single component, low modulus, silicone rubber, moisture curing, ULC labelled to CAN/CGSB 19.13-M and CAN/ULC S115.
- .3 Firestop insulation: to CAN/ULC-S702, Type 2; mineral fibre manufactured from rock or slag, suitable for manual application.
 - .1 Density: Minimum 64 kg/m³ when tested to ASTM C303.
 - .2 Combustibility: Noncombustible to CAN/ULC S114.
 - .3 Melt temperature: >1175 degrees C.
 - .4 Surface burning characteristics: to CAN/ULC S102, maximum flame spread of 0, smoke developed of 0.
 - .5 Moisture Absorption: 0.04 percent when tested to ASTM C1104.
 - .6 Smoulder Resistance: 0.01 percent when tested to CAN/ULC S129.
- .4 Damming, back-up, supports, and anchorage: In accordance with manufacturer's fire rated systems and to acceptance of authorities having jurisdiction.
- .5 Primer: As recommended by firestopping sealant manufacturer.

2.3 SYSTEMS

- .1 Firestopping and smoke seals: ULC or Intertek Testing Services listed Products and systems in accordance with CAN/ULC S115 suitable to actual application and installation conditions.
- .2 Do not use Products containing asbestos.
- .3 Firestopping components shall not contain volatile solvents or require special application to protect plastic pipe from firestopping compound.

3 Execution**3.1 EXAMINATION**

- .1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.
- .2 Verify that substrates and surfaces to receive firestopping and smoke seals are clean, dry, and frost free.

3.2 FIRESTOP AND SMOKE SEAL LOCATIONS AND RATINGS

- .1 Install ULC firestop and smoke seal system rated to match fire resistance ratings and smoke seal ratings of assemblies into which they are installed.
- .2 Install firestop and smoke seal systems. Use systems with required fire and smoke ratings at following typical locations, including but not limited to:
 - .1 Gaps at intersections of fire-resistance rated partitions.
 - .2 Control and sway joints in fire-resistance rated walls and partitions.
 - .3 Gaps at top of fire-resistance rated partitions.
 - .4 Penetrations through fire-resistance rated walls and partitions including mechanical and electrical services and openings and sleeves for future use.
 - .5 Penetrations through fire-resistance rated floor slabs, ceilings, and roofs.
 - .6 Perimeter of retaining angles on rigid ducts greater than 0.012 m², firestopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.
 - .7 At non-rated assemblies that require a smoke seal.
 - .8 Where required by Ontario Building Code.

3.3 PREPARATION

- .1 Prepare, modify, and adjust void sizes, proportions, and conditions to conform to fire rated and smoke sealed assembly requirements such as assembly opening size and dimensional restrictions.

- .2 Mask adjacent surfaces to avoid spillage and over-coating of adjacent surfaces.
Remove stains from adjacent surfaces.

3.4 **INSTALLATION**

- .1 Install firestopping and smoke seal systems in accordance with manufacturer's instructions and fire rated assembly to establish continuity and integrity of fire separations.
- .2 Install firestop insulation in compacted thicknesses required by ULC design.
Compress insulation approximately 50 percent.
- .3 Install primers as recommended by firestop and smoke seal Product manufacturers.
- .4 Install temporary forming, damming, back-up as required, remove after materials have achieved initial cure and will resist displacement.
- .5 Install firestop and smoke seal filler in horizontal joints providing 25% compression fit.
- .6 Use resilient, elastomeric firestopping and smoke seal systems in following locations:
 - .1 Openings and sleeves for future use.
 - .2 Penetration systems subject to vibration or thermal movement.
 - .3 Penetration systems in acoustical containment enclosures.
- .7 Trowel and tool exposed firestop and smoke seal Product surfaces to uniform, smooth finish.
- .8 Repair damaged firestopped and smoke sealed surfaces to acceptance of Consultant.
- .9 Identify each firestop and smoke seal penetration assembly with permanent label listing following:
 - .1 Assembly and rating in hours.
 - .2 Date of installation.
 - .3 Installing company's name and telephone number.
- .10 Do not cover materials until full cure has taken place.

3.5 **CLEAN-UP**

- .1 Remove excess materials and debris and clean adjacent surfaces immediately after application.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Labour, Products, equipment and services necessary for sealant Work in accordance with the Contract Documents.
- .2 Work of this Section does not include sealants in firestopping and smoke sealed assemblies.
- .3 Work of this Section does not include sealant work identified in individual specification sections.

1.2 **REFERENCES**

- .1 ASTM C834, Specification for Latex Sealants.
- .2 ASTM C920, Specification for Elastomeric Joint Sealants.
- .3 ASTM C1330, Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

1.3 **SUBMITTALS**

- .1 Product data: Submit copies of Product data in accordance with Section 01 00 00 describing type, composition and recommendations or directions for surface preparation, material preparation and material installation.
- .2 Samples:
 - .1 Submit following samples in accordance with Section 01 00 00.
 - .1 Two samples of sealant/caulking, for colour selection.
 - .2 Two samples of back-up material and primer for physical characteristics.

1.4 **QUALITY ASSURANCE**

- .1 Qualifications: Work of this Section shall be executed by trained applicators approved by sealant manufacturer and having a minimum of 5 years proven experience.
- .2 Mock-up:
 - .1 Construct one 1200 mm long mock-up of each sealant type in location acceptable to Consultant.
 - .2 Demonstrate joint preparation, sealant application and tooling.
 - .3 Arrange for Consultant's review and acceptance.
 - .4 Mock-up may remain as part of Work if accepted by Consultant. Remove and dispose of mock-ups which do not form part of Work.

SEALANTSPage 2

- .5 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

- .3 Pre-installation meetings: Arrange with manufacturer's representative and Consultant to inspect substrates, and to review installation procedures 48 hours in advance of installation.

1.5 SITE CONDITIONS

- .1 Do not install materials when ambient air temperature is less than 5°C, when recesses are wet or damp, or to manufacturer's recommendations.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Arrange delivery of materials in original, unopened packages with labels intact, including batch number, and ensure that on-site storage is kept to a minimum. Do not store materials on site where there exists any danger of damage from moisture, direct sunlight, freezing and other contaminants.

1.7 EXTENDED WARRANTY

- .1 Submit a extended warranty for Sealant Work in accordance with General Conditions, except that warranty period is extended to 2 years from date of Substantial Performance of the Work.
 - .1 Warrant against leakage, cracking, crumbling, melting, shrinkage, running, loss of adhesion and staining adjacent surfaces.
 - .2 Coverage: Complete replacement including affected adjacent Work.

2 Products**2.1 MATERIALS**

- .1 General:
 - .1 All materials under Work of this Section, including but not limited to, primers and sealants are to have low VOC content limits.
 - .2 Use materials as received from manufacturers, without additives or adulterations. Use one manufacturer's Product for each kind of Product specified.
- .2 Sealant **Type A**: ASTM C920, Type S, Grade NS, Class 25; One-part, non-sag type, silicone sealant, in standard colours selected.
 - .1 'DC CWS' by Dow Corning Inc.
 - .2 'Sikasil 305CN' by Sika.
 - .3 'Tremsil 400' by Tremco.

- .3 Sealant **Type B:** ASTM C920, Type S, Grade NS; One-part mildew-resistant silicone, in standard colours selected.
 - .1 '786 Mildew Resistant Silicone Sealant' by Dow Corning Inc.
 - .2 'Sikasil GP Mildew Resistant' by Sika.
 - .3 'Tremsil 200 Silicone Sealant' by Tremco Ltd.
- .4 Sealant **Type C:** ASTM C834; Pure acrylic siliconized sealant; in standard white colour (paintable).
 - .1 '950A Siliconized Acrylic Latex Caulk' by Sherwin Williams.
 - .2 'Tremflex 834 Silconized Sealant' by Tremco Ltd.

2.2 ACCESSORIES

- .1 Primers: Type recommended by material manufacturers for various substrates, primers to prevent staining of adjacent surfaces encountered on project.
- .2 Joint backing: ASTM C1330; Round, solid section, closed cell, skinned surface, soft polyethylene foam gasket stock, compatible with primer and sealant materials, 30 to 50% oversized, Shore A hardness of 20, tensile strength 140 to 200 kPa. Bond breaker type surface.
- .3 Bond breaker: Type recommended by material manufacturers.
- .4 Void filler around the window frames to be one part expanding polyurethane foam.
- .5 Cleaning agents: As recommended by material manufacturer, non-staining, harmless to substrates and adjacent finished surfaces.

2.3 MIXING

- .1 Follow manufacturers instructions on mixing, shelf and pot life.

3 Execution

3.1 EXAMINATION

- .1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 PREPARATION

- .1 Prepare joints to receive sealants to manufacturer's instructions. Ensure that joints are clean and dry and ferrous surfaces are free from rust and oil.
- .2 Clean recesses to receive sealant, to be free of dirt, dust, loose material, oil, grease, form release agents and other substances detrimental to sealant's performance.

SEALANTSPage 4

- .1 Remove lacquer or other protective coatings from metal surfaces, without damaging metal finish, using oil-free solvents. Remove rust, mill scale and coatings from ferrous metals by wire brush, grinding or sand blasting.
- .2 Ensure recess is dry.
- .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings. Remove incompatible coatings as required.
- .3 Ensure that all materials in contact with sealant are compatible. Test substrate for adhesion.
- .4 Depth of recess: Maintain depth to $\frac{1}{2}$ joint width up to a maximum of 13 mm and not less than 6 mm at centre of joint. For greater depth, use joint backing under. Where recess is less than specified depth, cut back surface of recess to specified recess depth.
- .5 Install polyethylene backing rod in joints 6 mm or more in width. Roll backing rod into joint. Do not stretch or bend backing rod. Install bond breaker to back of recess.
- .6 Prime sides of recess, in accordance with sealant manufacturer's instructions.
- .7 Condition products for use in accordance with manufacturer's recommendations.

3.3**INSTALLATION**

- .1 Apply sealant immediately after adjoining Work is in condition to receive such Work. Apply sealant in continuous bead using gun with correctly sized nozzle. Use sufficient pressure to evenly fill joint.
- .2 Ensure sealant has full uniform contact with, and adhesion to, side surfaces of recess. Superficial painting with skin bead is not acceptable. Tool sealant to smooth surface, free from ridges, wrinkles, sags, air pockets, embedded impurities, dirt, stains or other defects.
 - .1 At recesses in angular surfaces, finish sealant with flat profile, flush with face of material at each side.
 - .2 At recesses in flush surfaces, finish compound with concave face, flush with face of material at each side.
- .3 Make sealant bead uniform in colour.
- .4 Cure sealants in accordance with sealant manufacturer's instructions. Do not cover up sealants until proper curing has taken place.
- .5 Immediately remove excess compound or droppings which would set up or become difficult to remove from adjacent finished surfaces, using recommended cleaners, as work progresses. Do not use scrapers, chemicals or other tools which could damage finished surfaces. Remove defective sealant.

- .6 Clean recesses and re-apply sealant.
- .7 Remove masking tape immediately after joints have been sealed and tooled.

3.4 **CLEANING**

- .1 Clean surfaces adjacent to joints, remove sealant smears or other soiling resulting from application of sealants. At metal surfaces, remove residue. Do not mar or damage finishes on materials adjacent to joints. Repair or replace marred or damaged materials.

3.5 **SCHEDULE OF LOCATIONS**

- .1 Following sealant location schedule is included for convenience and may not be complete. Examine Contract Drawings and other specification sections and determine entire extent of Work of this Section. Generally seal following locations:
 - .1 Concrete, masonry, wood and stone to metal.
 - .2 Wood to masonry, concrete and stone.
 - .3 Metal to metal.
 - .4 All dissimilar materials.
 - .5 Where 'sealant' or 'caulking' is indicated on drawings.
- .2 Sealant **Type A**:
 - .1 Control joints, except in floors .
 - .2 Door frames, interior and exterior side.
 - .3 Protrusions through walls and floors, except where fire rated seals are required.
 - .4 Seal thresholds.
- .3 Sealant **Type B**:
 - .1 Control joints in tiled areas.
 - .2 Between vanity and tile.
 - .3 Between vanity and mechanical fixtures/fittings.
 - .4 Between access panels and tile.
 - .5 Between tiles and adjacent materials.
- .4 Sealant **Type C**:
 - .1 Perimeter of kitchen counters.
 - .2 Junction between drywall and masonry.

END OF SECTION

1 General

1.1 SECTION INCLUDES

- .1 Design, labour, Products, equipment and services necessary for gypsum board Work.

1.2 REFERENCES

- .1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
- .2 ASTM C475, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .3 ASTM C645, Specification for Nonstructural Steel Framing Members.
- .4 ASTM C665, Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- .5 ASTM C754, Specification for Steel Framing Members to Receive Screw-Attached Gypsum Board.
- .6 ASTM C834, Standard Specification for Latex Sealants.
- .7 ASTM C840, Specification for Application and Finishing of Gypsum Board.
- .8 ASTM C1002, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- .9 ASTM C1177, Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .10 ASTM C1396, Specification for Gypsum Board.
- .11 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 DESIGN REQUIREMENTS

- .1 Design ceiling suspension system in accordance with manufacturer's printed directions and ASTM C754.
- .2 Design ceiling system for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.
- .3 Design hanger anchor and entire suspension system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.

- .4 Design suspension system to support weight of mechanical and electrical items such as air handling boots and lighting fixtures, and with adequate support to allow rotation/relocation of light fixtures.
- .5 Design subframing as necessary to accommodate, and to circumvent, conflicts and interferences where ducts or other equipment prevent the regular spacing of hangers.
- .6 Design steel stud framing system for wall assemblies with a height greater than 3000 mm and those assemblies incorporating non-standard gypsum board assemblies including, but not limited to, abuse resistant gypsum board, cement board, and at large format tile applications.

1.4 REGULATORY REQUIREMENTS

- 1. Provide fire separations and fire protection exactly as specified in test design specification that validates the specified rating. Verify that work specified in other Sections, as a part of the entire assembly, meets applicable validating test design specification.

1.5 SUBMITTALS

- .1 Product data:
 - .1 Submit copies of manufacturer's Product data in accordance with Section 01 00 00 indicating:
 - .1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.
 - .2 Product transportation, storage, handling and installation requirements.
- .2 Shop Drawings: Submit Shop Drawings in accordance with Section 01 00 00 indicating wall assemblies, suspension systems, adjacent construction, elevations, sections and details, dimensions, thickness, finishes and relationship to adjacent construction.
- .3 Certifications: Submit written certification stating that suspended ceiling system is designed for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

1.6 QUALITY ASSURANCE

- .1 Qualifications: Execute the Work of this Section by skilled, qualified, and experienced workers trained in the installation of the Work of this Section.
- .2 Retain a Professional Engineer, licensed in Province of Ontario, with experience in Work of comparable complexity and scope, to perform following services as part of Work of this Section:

- .1 Design of wall systems with height greater than 3000 mm and at non-standard gypsum board assemblies including, but not limited to, assemblies incorporating abuse resistant gypsum board, cement board, and large format tile applications.
- .2 Design of suspended gypsum board assemblies.
- .3 Review, stamp, and sign Shop Drawings and design calculations.
- .4 Conduct shop and on-site inspections, prepare and submit written inspection reports verifying that this part of Work is in accordance with Contract Documents and reviewed Shop Drawings.

1.7 SITE CONDITIONS

- .1 Do not begin Work of this Section until:
 - .1 Mechanical and electrical Work above the ceiling is complete.
 - .2 Substrate and ambient temperature is above 15°C.
 - .3 Relative humidity is below 80 %.
 - .4 Ventilation is adequate to remove excess moisture.
- .2 Install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements 24 h before, during, and 24 h after installation.

2 Products

2.1 MATERIALS

- .1 General: All materials under Work of this Section, including but not limited to, sealants, adhesives, and primers are to have low VOC content limits.
- .2 Steel framing: ASTM C754; ASTM A653/A653-M, Z275; cold rolled, galvanized steel sheet.
 - .1 Bailey Metal Products Limited
 - .2 Corus Metal Profiles
- .3 Steel studs and track runners: ASTM C645; Galvanized steel studs and runners, 32 mm wide x depth as indicated on Contract Drawings. Formed from galvanized steel sheet, thicknesses as follows:
 - .1 Less than 3000 mm: Minimum 0.53 mm (25 ga.).
 - .2 Greater than 3000 mm and non-standard assemblies: Minimum 0.91 mm (20 ga.), unless otherwise required to accommodate intended condition.
- .4 Sheet steel blocking: Galvanized sheet steel: ASTM A653/A653M Grade A, Z275 Commercial Quality zinc coating. 0.91 mm thick (20 ga.) thick for use as sheet blocking.
- .5 Main carrying channels: ASTM C645; Formed from galvanized steel sheet, 38 x 19 mm cold rolled, channels.

- .6 Resilient channel: ASTM C645; 0.5 mm thick galvanized metal, 57 mm wide x 12 mm deep for walls and ceiling to reduce sound transmission.
- .7 Furring channels: ASTM C645; Formed from galvanized steel sheet, 22 mm winged flange type, cold rolled.
- .8 Furring channels (hat type): ASTM C645; 0.5 mm base steel thickness, galvanized. 70 mm wide x 22 mm deep hat shaped channel.
- .9 Heavy duty furring channels: ASTM C645; 0.9 mm steel thickness, galvanized hat shaped channel with a wider and deeper size as required by manufacturers.
- .10 Hanger wires: 4.1 mm minimum diameter galvanized pencil rod.
- .11 Tie wire: 1.6 mm thick minimum diameter, soft annealed, galvanized steel wire.
- .12 Corner bead, casing bead, and special shapes: Formed from 0.6 mm thick minimum, galvanized steel sheet, designed to be concealed by joint compound.
- .13 Deflection track: ASTM C 645 top runner with 50.8-mm- deep flanges, in thickness indicated for studs and in width to accommodate depth of studs.
- .14 Ceiling clips: Hot dip galvanized partition attachment clips, in square and reveal edge; 'PAC 15 Series' to match grid system by CGC Inc. or approved alternative.
- .15 Control joint strip: Roll formed from galvanized steel sheet, with a tape protected recess, 6 mm wide x 11 mm deep.
- .16 Screw fasteners: ASTM C1002 Type S; Corrosion resistant.
- .17 Concrete anchors: tie wire sleeve anchors, 'Redi-Drive Anchors' by ITW Red Head or approved alternative.
- .18 Acoustic/Fire insulation: ASTM C665, Paperless, semi-rigid, spun mineral fibre mats, of thickness as indicated on Contract Drawings, 'Sustainable Insulation, NoiseReducer' by CertainTeed, 'EcoTouch Quiet Zone Pink Fiberglas Acoustic Insulation' by Owens Corning Inc. or 'Roxul AFB' by Roxul Inc.
- .19 Acoustical sealant:
 - .1 Non-rated assemblies: ASTM C834; Acrylic, mould resistant sealant, paintable. 'Smoke and Acoustic Sealant CP506' by Hilti or approved alternative.
 - .2 Fire-rated assemblies: ASTM E84; Acrylic based firestop sealant, colour: red or white as selected by Consultant. 'Flexible Firestop Sealant CP606' by Hilti or approved alternative.
- .20 Gypsum board: ASTM C1396; thickness as indicated of maximum practical lengths to minimize end joints. Furnish Board by CertainTeed Gypsum Canada, CGC Inc., or Georgia-Pacific Canada LP.

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- .21 Fire rated gypsum board: ASTM C1396; minimum 15.9 mm thick of maximum practical lengths to minimize end joints, unless indicated otherwise. Furnish Type X Board by Certainteed Gypsum Canada, CGC Inc., or Georgia-Pacific Canada LP.
 - .22 Abuse Resistant Panels: ASTM C1396; thickness as indicated; 'Abuse Resistant' by Certainteed Gypsum Canada, 'Sheetrock AR' by CGC Inc. or 'ToughRock' by Georgia-Pacific Canada LP.
 - .23. Cementitious Board: ASTM C1177, thickness as indicated, high strength portland cement building panel with self adhesive glass tape; provide board with heavier mesh reinforcement for suspended applications. 'Durock Cement Board Next Gen.' by CGC Inc., or approved alternative by Certainteed Gypsum
 - .24 Moisture and mould resistant board: thickness as indicated of maximum practical lengths to minimize end joints, unless indicated otherwise; 'M2Tech Moisture and Mould Resistant' by Certainteed Gypsum Canada, 'Sheetrock Mold Tough' by CGC Inc. or 'DensArmor Plus High Performance Interior Panel' by Georgia-Pacific Canada LP.
 - .26. Latex Fortified Mortar: Of type recommended by cementitious board manufacturer to suit application.
 - .27 Joint reinforcing tape:
 - 1. Standard gypsum board: ASTM C475; 50 mm wide x 0.25 mm thick, perforated paper, with chamfered edges.
 - .2 Moisture resistant and tile backer boards: ASTM C475; fibreglass mat joint tape as recommended by board manufacturer to suit location.
 - 3. Cement Board: Mesh reinforcing tape recommended by cement board manufacturer.
 - .28 Joint and patching compound: ASTM C475; Asbestos-free, supplied by manufacturer of gypsum board used.
 - .29 Fast setting patching compound: ASTM C475; Asbestos-free, Sheetrock or Durabond by CGC Inc., 'Moisture and Mold Resistant Setting Compound with M2Tech' by Certainteed Gypsum Canada or approved alternative.

- .30 Access doors: Supplied by other Sections for installation as part of the Work of this Section.

3 Execution

3.1 EXAMINATION

- .1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 SUSPENSION FRAMING

- .1 Install ceiling systems in accordance with reviewed Shop Drawings and manufacturer's written instructions.
- .2 Install hanger wires plumb and securely anchored to the building structural framing, independent of walls, pipes, ducts, and metal deck; install additional framing and hangers to bridge interference items.
- .3 Install hanger wires at 1200 mm maximum centres along carrying channels, not less than 25 mm, and not more than 150 mm from channel ends.
- .4 Install additional hangers at lighting fixture and ductwork locations. Do not attach hanger wires to mechanical or electrical equipment. Do not support mechanical and electrical fixtures and fitting on ceiling without the ceiling manufacturer's written acceptance.
- .5 Install main carrying channels transverse to structural framing members. Lap main carrying channels 200 mm minimum at splices and wire each end with two loops and prevent clustering or lining-up of splices.
- .6 Install furring channels at 400 mm o.c., not less than 25 mm, and not more than 150 mm from perimeter walls, at openings, at interruptions in ceiling continuity, and at change in plane. Install furring channels to a tolerance of 3 mm maximum in 3600 mm.
- .7 Install additional main carrying and furring channels to frame and to reinforce openings such as recessed lighting fixtures, access hatches, ceiling grilles, outlet boxes, ventilating outlets and similar items.

3.3 STEEL STUDS AND FURRING

- .1 Install steel studs and furring in accordance with reviewed Shop Drawings and manufacturer's written instructions.
- .2 Provide 20 ga. thick galvanized sheet blocking for locations as indicated on Contract Drawings.

- .3 Install steel stud partitions to underside of structure unless indicated otherwise.
- .4 Install track runners at floors, ceilings, and underside of structure; align track runners accurately and secure to structure at 600 mm centres maximum.
- .5 Install double top track runner assembly to prevent the transmission of structural loads to steel studs.
- .6 Install steel studs vertically at 400 mm o.c., unless otherwise indicated, and not more than 50 mm from abutting walls, at openings, and at each side of corners. Install studs securely to track runners.
- .7 Schedule and coordinate steel framing installation with mechanical and electrical services installation.
- .8 Install full height, double studs at door and service openings, fastened together and stiffened back to the structure to prevent vibration when doors close.
- .9 Provide double studs boxed together at all openings, sill, head and jambs and at door jambs, fastened together and stiffened back to the structure to prevent vibration. At each opening exceeding 900 mm in width, double studs shall be 20 ga. extending to structure above, and adequately anchored at each end. Provide steel studs above and below openings spaced at 400 mm oc maximum. All metal stud partitions above doors and screens over 1220 mm wide shall be secured to structure over and reinforced with sway bracing to stabilize walls to prevent lateral movement.
- .10 Erect three studs at corner and intermediate intersections of partitions. Space 50 mm apart and brace together with wired 19 mm channels.
- .11 Stiffen partitions over 2440 mm high or 3000 mm long, or both, with horizontal bracing extended for full length of partitions. Provide one line of bracing in partitions. Space lines to provide equal unbraced panels. Provide bracing for portions of partitions over door openings in partitions over 3000 mm high, and bracing both above and below openings in partitions located no greater than 150 mm from top and bottom of opening, and extending two stud spaces beyond each edge of opening for both doors and windows. Wire tie or weld bracing to studs.
- .12 Frame control joints using back to back double studs at abutting structural elements, at dissimilar backup interface, at dissimilar walls and ceilings, at structural expansion and control joints, at door and other openings, and at 9000 mm maximum spacing in continuous runs. Install control joint strips and secure in place.
- .13 Install additional support framing at openings and cutouts for built-in equipment, upper cabinet support, access panels and similar items.

- .14 Attach to framing adequate steel reinforcing members or an 18 ga. steel stud mounted horizontally and notched around furring members to support the load of, and to withstand the withdrawal and shear forces imposed by, items installed upon the work of this Section. Such items include, but are not restricted to, coat hooks, washroom accessories, handrail anchors, rub rails, grab bars, guards, wall-hung cabinets and fitments, shelving, curtain and drape tracks; Owner supplied equipment; and minor mechanical and electrical work. Heavy mechanical and electrical equipment shall be self-supporting in Divisions 21, 22, 23 and 26.
- .15 Provide for support and incorporation of flush-mounted and recessed mechanical and electrical equipment and fixtures only after consultation and verification of methods with those performing the work of Divisions 21, 22, 23 and 26.
- .16 Install cross bracing in accordance with the steel stud manufacturer's recommendations.

3.4 FIRE RATED ASSEMBLIES

- .1 Install Products in fire rated assemblies in strict accordance with applicable ULC tested and approved designs.
- .2 Stiffen fire rated walls over 3.66 m high, where linear length of wall is greater than 2.44 m between perpendicular wall supports, with diagonal bracing above the ceiling extending perpendicular to wall at a 45° angle to structure above. Locate diagonal bracing at maximum 2.44 m o.c.
- .3 Where double layers of gypsum board are shown, and required for fire rating, screw first layer to studs and furring and laminate the second layer to the first using joint filler as an adhesive. Stagger joints between first and second layers.

3.5 ACOUSTICAL INSULATION

- .1 Install acoustic insulation in partitions, between steel studs, and as indicated on Contract Drawings and in accordance with the manufacturer's instructions. Fill stud cavities to full height of partitions and carefully cut and fit acoustic insulation around services and protrusions.

3.6 ACOUSTICAL SEALANT

- .1 Install acoustical sealant to acoustically insulated partitions in accordance with the manufacturer's instructions and Contract Drawings.
- .2 Install acoustical sealant under floor runner track, at partition perimeter both sides and at openings, cut-outs, and penetrations, concealed from view in the final installation.
- .3 Install firestop fill material behind fire rated acoustical sealant and provide firestop identification tag.

- .4 Smooth acoustical sealant with trowel prior to skin forming.

3.7 GYPSUM BOARD

- .1 Comply with ASTM C840. Install gypsum board in accordance with reviewed Shop Drawings and manufacturer's written instructions.
- .2 Install gypsum board vertically or horizontally, whichever results in fewer end joints. Locate end joints over supporting members.
- .3 Install gypsum board in lightly butted contact at edges and ends and with 1.6 mm maximum open space between boards; do not force gypsum board into place. Do not install imperfect, damaged or damp boards.
- .4 Install gypsum board butting paired tapered edge joints, and mill-cut or field-cut end joints; do not place tapered edges against cut edges or ends.
- .5 Install vertical joints minimum 300 mm from the jamb lines of openings and stagger vertical joints over different studs on opposite sides of partitions.
- .6 Do not locate joints within 200 mm of corners or openings, except where control joints occur at jamb lines or where openings occur adjacent to corners. Where necessary, place a single vertical joint over the centre of wide openings.
- .7 Cut, drill and patch gypsum board as may be necessary to accommodate the Work of other trades.
- 8. Fire Separations:
 - 1. Construct gypsum board assemblies, where located, in accordance with tested assemblies to obtain required or indicated fire rated assemblies. As a minimum fire separations shall consist of metal framing covered on both sides by fire-rated gypsum board.
 - 2. Install assemblies tightly to enclosing constructions to maintain integrity of the separations. Install casing beads at all perimeter edges.

3.8 CEMENT BOARD

- .1 Apply cementitious board to framing, with screw fasteners and taped joints in accordance with manufacturers instructions.
- .2 Pre-cut board to required sizes and make necessary cutouts. Fit ends and edges closely but not forced together.
- .3 Fasten board to steel framing with rust proof self-drilling, self-threading case hardened screws at 200 mm oc for walls and 150 mm oc for suspended applications.
- .4 Apply mesh tape centred over all joints and corners but not overlapped.

- .5 Apply 3 mm minimum thick skim coat of latex fortified mortar uniformly over entire cementitious board surfaces. Leave surface smooth and flat to receive subsequent finish.

3.9 CORNER, CASING BEADS AND TRIM

- .1 Corner reinforcing bead: Install along all external angles, erect plumb, level and with a minimum of joints. Secure with screws at 225 mm o.c. apply filler over flanges flush with nose of the bead and extending at least 75 mm onto surface of board each side of corner. When filler dries, apply a thin coat of topping cement and blend onto adjoining surfaces.

- .2 Casing bead: Install where wallboard butts against a surface having no trim concealing the juncture and where shown on drawings. Erect casing beads plumb or level, with minimum joints, and secure with screws at 300 mm o.c. apply filler over flange flush with bead and extending at least 75 mm onto surface of board. When dry, apply a thin coat of topping cement and blend onto adjoining surfaces.
- .3 Recess channels and trim: Install recess channels and special metal trim where shown. Secure to substrate. Provide casing beads full height on wallboard edges at recess channels and metal trim.

3.10 JOINT TAPING AND FINISHING

- .1 Install reinforcing tape and a minimum of 3 coats of joint compound over gypsum board joints, metal trim and accessories, and screw fasteners in accordance with the gypsum board manufacturer's instructions.
- .2 Fill gaps between ,and any imperfections in, gypsum boards with joint compound, allow to dry, and sand smooth ready for painting.
- .3 Install finished gypsum board Work smooth, seamless, plumb, true, flush, and with square, plumb, and neat corners.
- .4 Finish gypsum board in accordance with ASTM C840 to the following grades:
 - 1. Level 0: No taping, finishing, or accessories required. Use above suspended ceilings and within other concealed spaces, unless the assembly is fire rated, sound rated, sound or smoke controlled, or unless the space serves as an air plenum.
 - 2. Level 1: At joints and interior angles embed tape in joint compound. Leave surface free of excess joint compound. Tool marks and ridges are acceptable. Use above suspended ceilings and within other concealed spaces if the gypsum board assembly is fire rated, sound rated, sound or smoke controlled, or the space serves as an air plenum.
 - 3. Level 2: At joints and interior angles embed tape in joint compound with one separate coat of joint compound applied over joints, angles, fastener heads, and accessories. Use for water resistant gypsum board indicated for use as a substrate for ceramic tile.
 - 4. Level 3: At joints and interior angles embed tape in joint compound with two separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply joint compound smooth and free of tool marks and ridges. Use where heavy grade wall coverings are the final decoration.
 - 5. Level 4: At joints and interior angles embed tape in joint compound with three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply joint compound smooth and free of tool marks and ridges. Use for all locations except those indicated for other finish levels.

6. Level 5: At joints and interior angles embed tape in joint compound with three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. Apply a thin skim coat of joint compound, or a material manufactured especially for this purpose, to the entire surface. Leave surface smooth and free of tool marks and ridges. Use where semi-gloss or gloss finish coatings are the final decoration.

3.12 ACCESS DOORS

- .1 Install access doors, supplied as part of other parts of the Work, in accordance with manufacturer's written instructions.

3.13 SITE TOLERANCES

- .1 Install metal support systems to ensure that, within a tolerance of +3 mm and -1.5 mm for plaster thickness, finish surfaces will be flat within 3 mm under a 3 m straightedge, and with no variation greater than 1.5 mm in any running 300 mm, and that surface planes shall be within 3 mm of dimensioned location.

3.14 WORK IN EXISTING AREAS

- .1 In existing areas, where existing gypsum board work has been demolished and/or damaged and repair work is required, provide new gypsum board finish.
- .2 Thoroughly prepare areas to be repaired. Provide neat, clean and straight cuts.
- .3 Finish all repair work as specified for new work.
- .4 In existing areas where existing openings are to be filled in with gypsum board, provide new gypsum board wall and ceiling construction. Ensure new board faces are flush with faces of abutting existing walls and ceilings.

3.15 REPAIR

1. Make good cut-outs for services and other work, fill in defective joints, holes and other depressions with joint compound.
2. Make good defective work, and ensure that surfaces are smooth, evenly textured and within specified tolerances to receive finish treatments.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

- .1 Design, labour, Products, equipment and services necessary for acoustical ceilings
Work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
- .2 ASTM C635, Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- .3 ASTM C636, Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
- .4 ASTM C645, Specification for Non-Load Bearing (Axial) Steel Studs, Runners (Tracks), and Rigid Furring Channels for Screw Application of Gypsum Board.

1.3 **DESIGN REQUIREMENTS**

- .1 Design ceiling suspension systems in accordance with ASTM C636 and manufacturer's printed directions.
- .2 Design tile ceiling system for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority. Acoustic panel system is not designed to carry the weight of electrical equipment.
- .3 Design hanger anchor and entire suspension system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.
- .4 Design tile suspension system to support weight of mechanical and electrical items such as air handling boots and lighting fixtures, and with adequate support to allow rotation/relocation of light fixtures. Acoustic panel system is not designed to carry the weight of mechanical and electrical equipment.
- .5 Design subframing as necessary to accommodate, to avoid conflicts and interferences where ducts or equipment prevent regular spacing of hangers.

1.4 **SUBMITTALS**

- .1 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 00 00 indicating:
- .1 Suspension system layout including hangers and supports for acoustic tile system.

- .2 Acoustic panel system including suspension system, hangers, supports and panel sizes and locations.
 - .3 Conditions at abutting, intersecting, and penetrating construction.
 - .4 Dimensioned locations of lighting fixtures, diffusers, sprinkler heads and other items that pierce the ceiling plane.
- .2 Samples:
 - .1 Submit following samples in accordance with Section 01 00 00:
 - .1 One full-size sample of each type of tile panels to be used.
 - .2 One of each type of suspension system members.
- .3 Certificates: Submit written certification stating that suspended ceiling system is designed for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

1.5 SITE CONDITIONS

- .1 Do not install the Work of this Section until:
 - .1 Mechanical and electrical Work above the ceiling is complete.
 - .2 Relative humidity is below 80 %.
 - .3 Ventilation is adequate to remove excess moisture.
 - .4 Areas are closed and protected against weather, and maintained at no less than 10 °C.
- .2 Install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements 24 h before, during, and after installation.

1.6 MAINTENANCE

- .1 Submit extra acoustic ceilings amounting to 2% of gross ceiling area, allowing proportionately for each pattern and type specified to nearest full carton. Submit Products which are part of same production run as installed Products. Store maintenance Products as directed by Consultant.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Transport, handle and store material in manner to prevent warp, twist, damage to panel edges and surfaces in accordance with Manufacturer's recommendations.
- .2 Any warped and/or damaged panels and trim shall be rejected and be replaced by new, straight, undamaged and acceptable material at no cost to Owner.
- .3 Bent, twisted or otherwise damaged Tee grid suspension components shall not be used under any circumstances. Replace such damaged items with new undamaged material at no additional cost to Owner.
- .4 Store material in warm, dry place away from water and the elements. Protect against undue loading stresses and shock.
- .5 All packaged material shall be delivered in original manufacturers wrappers and containers with labels and seals intact. All cartons shall bear U.L. label.

2 Products**2.1 MATERIALS**

- .1 Galvanized steel sheet: ASTM A653/A653-M, Z275; cold rolled, galvanized steel sheet.
- .2 Main carrying channels: ASTM C645; Channels formed from galvanized steel sheet, 38 x 19 mm cold rolled.
- .3 Subframing: ASTM C645; Channels formed from galvanized steel sheet, dimensions and spans as required.
- .4 Hangers: 2.6 mm minimum diameter, galvanized steel wire.
- .5 Tie wire: 1.6 mm minimum diameter, soft annealed galvanized steel wire.
- .6 Concrete anchors: tie wire sleeve anchors, 'Redi-Drive Anchors' by ITW Red Head or approved alternative.
- .7 Wall mouldings and accessories, including but not limited to, corner caps, edge mouldings, panel hold over clip, metal closures, and trim. Finish and colour: same as main tees.

- .8 Exposed main, cross tees, and relocatable cross tees: ASTM C635, 38 mm high steel, bulb tee design double steel web, rectangular single spans without exceeding a deflection of 1/360 of the span. Splices to be integral and reversible; cross tee interlocking into main tee. Grid type indicated in room finish schedule. Colour and finish: Manufacturer's standard white.
- .9 Acoustic tile: As indicated in room finish schedule.
- .10 Wall mouldings: To match acoustical ceiling suspension system.

3 Execution

3.1 EXAMINATION

- .1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 SUSPENSION SYSTEM

- .1 Coordinate locations and openings of mechanical and electrical services support, and penetration through the acoustical ceilings. Coordinate field conditions, clearances, measurements, and mechanical and electrical services testing and commissioning, above the acoustical ceilings.
- .2 Install hanger wires plumb and securely anchored to the building structural framing, independent of walls, pipes, ducts, and metal deck; install additional framing and hangers to bridge interference items.
- .3 Install acoustical ceiling systems in accordance with manufacturer's written instructions, reviewed shop drawings, and ASTM C636, listed in order of precedence.
- .4 Install hanger wires at 1200 mm maximum centres along carrying channels, not less than 25 mm, and not more than 150 mm from channel ends.
- .5 Install additional hangers at lighting fixture and air distribution ductwork locations. Do not attach hanger wires to mechanical or electrical equipment. Do not support mechanical and electrical fixtures and fitting on ceiling without the ceiling manufacturer's written acceptance.
- .6 Install acoustical ceiling suspension system to a tolerance of 1:1200 of span and 0.4 mm maximum between adjacent metal members. Tolerances are not cumulative. Refer to Electrical Contract Drawings for fixture layout.
- .7 Do not bend or twist hangers as a means of levelling. Form double loops tightly and lock to prevent vertical movement or rotation within the loop.
- .8 Install edge moulding at intersection of ceiling and vertical surfaces or match existing trim.

- .9 Centre acoustical ceiling suspension systems on room axis; install equal border pieces. Install hangers onto the ends of main tee runners at not more than 150 mm from ends of runners, adjacent and perpendicular to walls.
- .10 Support the suspension system independently of walls, columns, ducts, pipes and conduits.
- .11 Install main runners in maximum available lengths. Layout joints in suspension members to avoid the perimeters of recessed fixtures. Lock grid members to form a rigid assembly. Install additional tee, suspension system framing around recessed fixtures, diffusers, grilles and other items for a complete assembly.

3.3 ACOUSTIC LAY-IN TILES

- .1 Install acoustic tile in grid system openings supported by bottom flanges of members. Provide special shapes and sizes to provide a complete installation by cutting tile to fit into openings. Fit tile moderately tight between upright legs of members.
- .2 Carefully cut and trim acoustic tiles to accommodate items piercing the finished ceiling plane.
- .3 Remove and replace acoustic tiles with broken edges, or damaged, marked, discoloured, soiled, or stained faces.

3.4 ADJUSTMENTS AND CLEANING

- .1 Clean soiled or discoloured surfaces of exposed work on completion of work.
- .2 Replace components which are visibly damaged, marred or uncleanable.

END OF SECTION

-
- 1 General
- 1.1 **SECTION INCLUDES**
- .1 Labour, Products, equipment and services necessary for painting Work in accordance with the Contract Documents.
- 1.2 **REFERENCES**
- .1 CAN/CGSB 85.10, Protective Coatings for Metals.
- .2 CAN/CGSB-85.100, Painting.
- .3 Master Painters Institute (MPI), Painting Specification Manual.
- .4 SSPC Steel Structures Painting Council, Standards.
- 1.3 **SUBMITTALS**
- .1 Product data:
- .1 Submit copies of manufacturer's Product data in accordance with Section 01 00 00 indicating:
- .1 Performance criteria, compliance with appropriate reference standard, characteristics, limitations.
- .2 Product transportation, storage, handling and installation requirements.
- .2 Submit listing of manufacturer's Product types, Product codes, and Product names, number of coats, and dry film thicknesses, corresponding to each Painting Schedule code; submit listing minimum of 8 weeks before materials are required.
- .2 Samples:
- .1 Submit following samples in accordance with Section 01 00 00.
- .1 Three 300 x 150 mm draw downs of each colour minimum 4 weeks before paints are required.
- .2 Identify each sample with Contract number and title, colour reference, sheen, date, and name of applicator.
- .3 Certificates:
- .1 Submit certification from paint manufacturer, on company letterhead, indicating each product proposed for use is Manufacture's premium grade, first line Product.
- .2 Submit certified documentation to confirm each airless spray painter has minimum of 5 years experience on applications of similar complexity and scope.
- .3 Submit certified documentation to confirm each worker has Provincial Tradesman Qualification certificate of proficiency.

PAINTINGPage 2

- .4 Reports:
 - .1 Submit written field inspection and test report results after each inspection.
 - .2 Submit Field Quality Control test result reports for alkali content, substrate moisture, and dry film thickness.
 - .3 Submit electronic moisture meter manufacturer's specifications including tolerances. Submit record of latest meter calibration to meet manufacturer's recommendations.

1.4 QUALITY ASSURANCE

- .1 Finishing Work: Perform work to MPI requirements for premium grade.
- .2 Supervision: Have Work supervised by a full-time qualified foreperson who has 10 years minimum experience on Contracts of similar complexity and scope.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Install correct, safe temporary storage for paint, thinner, solvents, and other volatile, corrosive, hazardous, and explosive materials in accordance with requirements of authorities having jurisdiction.
- .2 Post hazard warning signage in areas of storage and mixing. Install and maintain sufficient CO₂ fire extinguishers of minimum 9 kg capacity, accessible in each storage mixing and storage areas.
- .3 Maintain storage enclosures at minimum 10°C ambient temperature and to manufacturer's instructions.

1.6 SITE CONDITIONS

- .1 Apply coatings under the following conditions:
 - .1 Exterior coatings (except Latex): 5° C minimum.
 - .2 Exterior latex coatings: 10°C minimum.
 - .3 24 hours minimum after rain, frost, condensation, or dew.
 - .4 When no condensation is possible (unless specifically formulated against condensation).
 - .5 Interior coatings: 7°C minimum.
 - .6 Relative humidity: 85% maximum.
 - .7 Not in direct exposure to sun light.

- .2 Maintain temperature conditions indicated above for 24 hours before, during and 24 hours after painting.
- .3 Install clean plywood sheets to protect floors and walls in storage and mixing areas, from paint drips, spatters, and spills.
- .4 Apply sufficient masking, clean drop cloths, and protective coverings for full protection of Work not being painted including, but not limited to, the following:
 - .1 Light fixtures, fire and smoke detectors.
 - .2 Sprinkler heads.
 - .3 Prepainted diffusers and registers.
 - .4 Prepainted equipment.
 - .5 Fire rating labels and equipment specification plates.
 - .6 Finished surfaces.

1.7 ENVIRONMENTAL PERFORMANCE REQUIREMENTS

- 1. Provide paint products meeting MPI "Green Performance Standard GPS-1-05".

1.8 MAINTENANCE

- 1. Deliver to Owner's place of storage on completion of work, sealed containers of each finish painting material applied, and in each colour. Label each container as for original, including mixing formula. Provide the following:
 - .1 1 L of extra materials when less than 50 L are used for Project;
 - .2 3.78 L of extra stock when 50 to 200 L are used;
 - .3 7.57 L of extra stock when over 200 L are used.

2 Products

2.1 MATERIALS

- .1 Paint:
 - .1 All materials under Work of this Section, including but not limited to, primers, stains, and paints are to have low VOC content limits.
 - .2 Products in accordance with the MPI Painting Specification Manual, Exterior and Interior Systems;
 - .1 For each MPI paint code, manufacture's premium grade, first line Products is to be use.
 - .2 Uniform dispersion of pigment in a homogeneous mixture.
 - .3 Ready-mixed and tinted whenever possible.
 - .3 Products within each MPI paint system code: From single manufacturer.
 - .4 Acceptable manufacturers:
 - .1 Benjamin Moore.
 - .2 Dulux Paints/PPG.
 - .3 Para Painting & Coatings.
 - .4 Sherwin Williams.

PAINTING

Page 4

2.2 COLOUR SCHEDULE

- .1 Consultant will select choice of colours and gloss when compiling a Colour Schedule after award of Contract; allow for colour selection beyond paint manufacturer's standard colour range.
- .2 Conform to gloss reflectance definitions listed in MPI Specification Manual.

2.3 PAINTING AND FINISHING SCHEDULE

- .1 Refer to Table 1, MPI Painting and Finishing Schedule coded systems, comply with MPI Painting Specification Manual.

Table 1: Painting and Finishing Schedule				
EXTERIOR SUBSTRATES	Typical substrates (Including but not limited to)	MPI Manual Ref.	MPI Finish System Code	Topcoat
Metal fabrications		EXT 5.1	EXT 5.1D	Alkyd
Galvanized steel	HM doors & frames, handrails, bollards, pipes, etc.	EXT 5.3	EXT 5.3B	Alkyd
INTERIOR SUBSTRATES	Typical substrates (Including but not limited to)	MPI Manual Ref.	MPI Finish System Code	Topcoat
Concrete walls and ceilings		INT 3.1	INT 3.1A	Latex
Concrete block masonry		INT 4.2	INT 4.2A	Latex
Metal Fabrications (Factory primed)	Steel stairs, ladders, etc.	INT 5.1	INT 5.1R	High performance latex
Galvanized steel	Ducts, pipes, metal deck	INT 5.3	INT 5.3A	Latex
Galvanized metal	HM doors & door frames, handrails	INT 5.3	INT 5.3B	WB light industrial coating

Table 1: Painting and Finishing Schedule				
Dressed lumber	Doors and frames requiring paint finish	INT 6.3	INT 6.3A	High performance latex
Dressed lumber	Doors and frames requiring stain finish	INT 6.3	INT 6.3D	Alkyd varnish
Gypsum board,	Drywall, walls, ceilings	INT 9.2	INT 9.2B	High performance latex
Gypsum board,	Wet areas	INT 9.2	INT 9.2F	Epoxy-modified latex

3 Execution

3.1 EXAMINATION

- .1 Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 PREPARATION

- .1 General:
- .1 Clean substrate surfaces free from, dust, grease, soiling, or extraneous matter, which are detrimental to finish.
 - .2 Patch, repair, and smoothen minor substrate defects and deficiencies e.g. machine, tool and sand paper marks, shallow gouges, marks, and nibs.
 - .3 Clean, sweep, and vacuum floors and surfaces to be painted, debris and dust-free prior to painting.
 - .4 Refer to MPI Painting Specification Manual for surface preparation requirements of substrates not listed here.
- .2 Where finish hardware has been installed remove, store, re-install finish hardware, to accommodate painting. Do not clean hardware with solvent that will remove permanent lacquer finishes.
- .3 Alkali Content tests and neutralization:
- .1 Test for ph level using litmus paper on dampened substrate.

PAINTING

Page 6

- .2 Neutralize surfaces over 8.5 ph with 4% solution of Zinc Sulphate for solvent based systems and tetrapotassium pyrophosphate for latex based systems, to below 8.0 ph, and allow to dry.
- .3 Brush-off any residual Zinc Sulphate crystals.
- .4 Coordinate paint system primer / sealer to be alkali-resistant.
- .4 Substrate moisture tests:
 - .1 Test for moisture content over entire surface to be painted, minimum one test/ 2 m² in field areas and one test/600 mm along inside corners including at ceiling to wall juncture.
 - .2 If any test registers above 10% allow entire substrate surfaces, within the plane, to dry further before paint system application. Install temporary drying fans if necessary.
 - .3 Re-test employing same criteria.
- .5 Mildew removal: Scrub with solution of trisodium phosphate and sodium hypochlorite (Javex) bleach, rinse with water, and allow to dry completely.
- .6 Cementitious and masonry (existing): Clean existing surfaces by pressure washing where indicated on drawings with a TSP solution and pressure range of 1500 - 4000 PSI at 6 - 12". Rinse areas with clean water and allow to thoroughly dry. Provide for collection and disposal of water.
- .7 Cementitious and masonry (Concrete, block, brick, cement rendering):
 - .1 Allow 28 days cure before painting.
 - .2 Coordinate repair of protrusion-chipping and grinding, and honeycomb filling with responsible trades.
 - .3 Remove dirt, loose mortar, scale, powder, efflorescence, and other foreign matter.
 - .4 Remove form oil and grease with trisodium phosphate, rinse, and allow to dry thoroughly.
 - .5 Prepare surfaces in accordance with CAN/CGSB-85.100.
 - .6 Remove rust stains with solution of sodium metasilicate after thorough wetting; allow to dry thoroughly.
- .8 Metal Fabrications (existing): Scrape and either hand or power wire brush surfaces to remove mill and scale.

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- .9 Structural steel and miscellaneous metal fabrications:
 - .1 Coordinate the following with the responsible trades:
 - .1 Rust, mars, mill scale, and weld-burn touch-ups.
 - .2 Oil, grease, weld flux and other residue removal.
 - .2 Prime paint items, not otherwise indicated to be primed as part of another Section.
 - .3 Touch-up damaged galvanized areas with organic zinc rich primer.
 - .10 Wood and Millwork:
 - .1 Wood surfaces to be clean and dry with a moisture content of less than 15%.
 - .2 Remove foreign matter prior to prime coat; spot coat knots, pitch streaks and sappy sections with sealer.
 - .3 Fill nail holes and fine cracks after primer has dried.
 - .4 Backprime interior and exterior woodwork.
 - .11 Factory primed surfaces:
 - .1 Touch up damaged areas.
 - .2 Clean as required for top coat.
 - .12 Gypsum board (existing):
 - .1 Remove dust, dirt, oil, grease, glue and all foreign material. Clean with stiff fibre brush prior to applying primer coat.
 - .2 Coordinate repairs and touch-ups with the responsible trade.
 - .3 Lightly sand surface to smooth out ridges and provide neat smooth surface.
 - .13 Gypsum board:
 - .1 Apply primer/sealer paint to reveal defects and deficiencies and to equalize absorption areas.
 - .2 Coordinate repairs and touch-ups with the responsible trade.
 - .3 Re-prime repairs.

- .14 Coordinate with other trades to prevent:
 - .1 Damage, and inadvertent activation of fire and smoke detectors.
 - .2 Odour and dust distribution by permanent HVAC systems including fouling of ducts and filters.
- .15 Field-mix Products in accordance with manufacturer's written instructions.

3.3 APPLICATION

- .1 Apply painting systems in accordance with the MPI Painting Specification Manual. Apply each Product to manufacturer's recommended dry film thickness.
- .2 Painting systems listed are required minima, apply additional coats if necessary to obtain substrate hiding acceptable to the Consultant.
- .3 Tint intermediate coats lighter than final top coats for identification of each succeeding coat and to facilitate inspections. Include only manufacturer's recommended reducing and tinting accessories. Do not add adulterants.
- .4 Primer to be specialized primer coating system as required by manufacturer for selected colour. Standard primer being tinted shall be tinted to a maximum of 1.5% by volume.
- .5 Sand lightly between coats to achieve a tooth or anchor for subsequent coats.
- .6 Apply paint uniformly in thickness, colour, texture, and gloss, as determined by the Consultant under adequate illumination and viewed at a distance of 1500 mm. Apply finishes free of defects in materials and application which, in the opinion of the Consultant, affect appearance and performance. Defects include, but are not limited to:
 - .1 Improper cleaning and preparation of surfaces.
 - .2 Entrapped dust, dirt, rust.
 - .3 Alligatoring, blisters, peeling.
 - .4 Scratches, blemishes.
 - .5 Uneven coverage, misses, drips, runs, and poor cutting in.
- .7 Do not apply coatings on substrates which are not sufficiently dry. Unless indicated otherwise, allow each painting system coat to cure dry and hard before following coats are applied.
- .8 Repaint entire areas of damaged or incompletely covered surfaces, to the nearest inside or outside corner; patching will not be permitted.
- .9 Miscellaneous painting requirements:
 - .1 Paint projecting ledges, and tops, bottoms and sides of doors both above and below sight lines to match adjacent surfaces.
 - .2 Paint door frames, access doors and frames, door grilles, prime coated butts, and prime coated door closers to match surface in which they occur.
 - .3 Finish closets and alcoves as specified for adjoining rooms.

- .4 Paint light coves white whether a light lense is installed or not, unless otherwise indicated.
 - .5 Paint interior columns to match walls of room.
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- .10 Mechanical, electrical and other painting coordination:
 - .1 Paint mechanical services in accordance with Mechanical Identification Division 21, 22 and 23.
 - .2 Coordinate painting of pipes, ducts, and coverings with the Work of Division 21, 22 and 23 to precede pipe colour banding, flow arrows, and other pipe identification labeling installation.
 - .3 Paint exposed conduit, pipes, hangers, ductwork, grilles, gratings, louvres, access panels, fire hose cabinets, registers, convector and radiator covers, enclosures, and other mechanical and electrical equipment including services concealed inside cupboard and cabinet Work; apply colour and sheen to match adjacent surfaces, except as noted otherwise.
 - .4 Paint portions of surfaces such as duct interiors, piping, ductwork, hangers, insulation, walls, and similar items, visible through grilles, louvres, convector covers etc., matte black in colour.
 - .5 Remove the following to accommodate painting, carefully store, clean, then re-install on completion of each area and when dry:
 - .1 Switch and receptacle plates, fittings and fastenings, grilles, gratings, louvres, access panels, convector covers, and enclosures.

3.4 FIELD QUALITY CONTROL

- .1 Dry film thickness tests:
 - .1 Test for film thickness over entire surface to be painted, minimum one test/2 m² in field areas and one test/600 mm along inside corners including at ceiling to wall juncture.
 - .2 If any test registers below specified thickness, re-apply paint to entire surface to nearest inside and outside corners.
 - .3 If test registers more than 50% above specified thickness, consult with paint manufacturer, determine if problem exists, offer solutions to Consultant, and repair as directed.
 - .4 Re-test employing same criteria after repair.

3.5 CLEANING

- .1 Remove spilled, splashed, and spattered paint promptly as Work proceeds and on completion of Work. Clean surfaces soiled by paint spillage and paint spatters. Repair or replace damaged Work, as directed by Consultant.

3.6 PROTECTION

- .1 Post Wet Paint signs during drying and restrict or prevent traffic where necessary.

PAINTING

Page 10

- .2 Post sign, after Consultant's inspection and acceptance of each room, reading:
PAINTING COMPLETE - NO ADMITTANCE WITHOUT CONTRACTOR'S
PERMISSION.

END OF SECTION