Senior Services and Long-Term Care
City Of Toronto

CUMMER LODGE
ROOF AND ROOFTOP DUCKWORK INSULATION
REPAIR AND REPLACEMENT 2024

PROJECT MANUAL
VOLUME 1
(1 OF 2)

ISSUED FOR TENDER
May 2024

ISSUED FOR MLTC REVIEW
May 2024

MSA PROJECT NO: 21504.F04

MONTGOMERY SISAM ARCHITECTS INC. ARCHITECTURAL
CROSSEY ENGINEERING LTD. MECHANICAL

NO	1

DOCUMENT 0 - INTRODUCTORY INFORMATION
BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS

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 Demolition:
- .1 Roof: Demolition, salvage, and removals include precast pavers, insulation blocks, insulation, roof membrane, metal flashing and metal stair, expansion joints, and parapet flashing as required.
- .2 Salvage and reuse existing ballast, roof pavers, insulation, and filter fabric, stone, and additional items indicated on the drawings. Replace damaged components with new to match existing.
- .3 All work indicated by the drawings and specifications as required for a complete replacement.

.2 New roof work:
- .1 Installation of new fluid applied roof membrane, metal flashings, and expansion joint gasket.
- .2 Reinstallation of insulation, filter fabric, roof pavers and blocks, roof stair, sheet metal flashing and required Mechanical and Electrical Work as indicated on Drawings and Specifications for the Work. Provide additional new products as necessary for a compete installation.
- .3 Repair and replacement of duct and pipe insulations to match existing.
- .4 All work indicated by the drawings and specifications as required for a complete replacement.

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 theses 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 Subcontactors' 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 Work 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 Removal of existing roofing systems in preparation for new roof systems and new roof work.
- .2 Salvaging of roofing materials, stairs, and other items indicated on drawings and storing them in an approved location on site.
- .3 Removal of rubbish, debris, demolished fixtures, fitments and items not scheduled to remain the Owner's property, resulting from the demolition and preparatory work.
- .4 Remove abandoned services such as conduits, pipes, wiring, ducts, fixtures, equipment, etc. where required for the work or indicated on the drawings.
- .5 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.
- .6 Removal of existing electrical items including fixtures, etc. where required for the work or indicated on the drawings and not required to be relocated.
- .7 Dust control during the operations of the work of this Section.
- .8 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 Submittals to be in accordance with Section 01 00 00.

.2 Where required by Authorities having jurisdiction, submit a Fire Plan to local fire department for review and approval.

.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 Roof Removal: Conform the requirements of Canadian Roofing Contractors Association.

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.

.4 Do not remove existing roofing membrane when weather conditions threaten the integrity of the building contents or intended continued occupancy.

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. Salvaged materials shall not be chipped, cracked, split, stained or damaged. Do not overload existing roof structure with salvaged materials. Store items off of moist surfaces.

3 Execution

3.1 **GENERAL**

.1 Schedule work to coincide with commencement of new roofing system installation.

.2 Remove only enough existing roofing system materials that can be replaced with new roof system the same day of as the weather will permit in a day.

.3 Coordinate Work with removal and reinstallation of affected mechanical and electrical equipment and associated roof penetrations.

.4 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.

.5 Stockpiling of rubble, debris, and surplus Products on Site will not be permitted.

.6 Remove, handle and transport Products indicated to be salvaged and stored for future use. Do not overload existing roof structure with salvaged materials. Remove excess products from roof. Perform work to prevent any damage to salvaged Products during removal and during storage on Site. Products damaged during removal and storage, will be inspected by Consultant. Consultant will determine extent of damage and accept or refuse Products.

.7 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.

.8 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.

.2 Verify that existing roof surface is clear and ready for work of this section.

3.3 **PRESERVATION OF REFERENCES**

.1 Record location and designation of survey markers and monuments located within demolition area, prior to removal. Store and restore markers and monuments upon completion of Work or relocate as directed by Consultant.

3.4 **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, removal of excess salvaged materials, 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 Hang tarpaulins where debris, salvaged material, and other materials are lowered. Build in around openings with wood and plywood at locations used for removal of debris and materials.

.6 Prevent debris from blocking surface drainage system, elevators, mechanical, and electrical systems which are required to remain in operation.

.7 Pay particular attention to prevention of fire and elimination of fire hazards which would endanger Work or adjacent structures and premises.

.8 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.

.9 Close off access to areas where demolition is proceeding by barricades and post warning signs.

.10 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.

.11 Dust partitions:

- .1 Prior to demolition work proceeding in existing structures, temporarily enclose Work areas, access and supply and install dustproof. 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.

.12 Dust protection:
- .1 Perform dust control procedures in accordance with approved Dust Control Plan and work of this Section.
- .2 Clean water to be applied to hard and soft surfaces and on open excavation faces on Site daily to eliminate dust.
- .3 Roadways and sidewalks to be cleaned daily or as required.
- .4 A designated truck loading area on granular material or existing asphalt to be used to mitigate tracking of potentially contaminated soil and demolition debris off Site. Contaminated loading points to be cleaned or re-established.
- .5 Loaded vehicles leaving Site to be cleaned of loose soil and debris with power washing or alternative method.
- .6 Trucks loaded with indigenous soil or demolition debris to be covered by tarps or attached screens.

.13 Removed roof system:
- .1 Provide temporary protective sheeting over uncovered deck surfaces.
- .2 Turn sheeting up and over parapets and curbing. Retain sheeting in position with weights or temporary fasteners.
- .3 Provide for surface drainage from sheeting to existing drains.
- .4 Do not permit traffic over unprotected or repaired deck surface.

3.5 PREPARATION

.1 Disconnect and cap services as required for roof replacement work complete with supports and associated components.
- .1 Post warning signs on electrical lines and equipment which is required to remain energized.
- .2 All remedial work to be removed by qualified workers in accordance with requirements of authorities having jurisdiction.

.2 Disassemble and remove mechanical equipment, ductwork and piping complete with supports and associated components.

.3 Do not disrupt active or energized utilities designated to remain undisturbed.

.4 Perform rodent and vermin control to comply with health regulations.

3.6 CONCRETE CUTTING AND CORING

.1 Prior to cutting or coring any roof concrete slab, investigate by telemetrically scanning the element for presence of embedded services (piping, cabling, conduit, etc.), and for locations of reinforcing steel in suspended concrete slabs and beams.

.2 Acceptable telemetric scanning systems include:
- .1 X-Ray scanning of suspended slabs and for concrete beams.
- .2 (Ground-penetrating) radar for slab on grade, for suspended slabs and for concrete beams.

.3 Magnetic radio scanners not acceptable for telemetric scanning.

.4 The term x-rays include gamma ray methods, and procedures that use electrically generated x-rays.

.5 Where x-rays employed:
- .1 Provide Owner minimum 5 working days advance notice of scanning time in order to provide sufficient advance notice to personal that may be affected by the x-ray work.
- .2 Conform to Owner's radiation protection requirements prior to start of any x-ray work.

.6 Provide Owner and Consultant with inspection agency's written report, summarizing investigations and conclusions.

.7 Obtain Consultant's direction where investigations reveal that cutting or coring required in Contract would cut or damage embedded services, or cut or damage reinforcing steel in suspended concrete slabs or beams.

.8 Execute cutting and coring to prevent damage to all embedded services. Make good all damage arising from cutting embedded services.

.9 Execute cutting and coring to prevent damage (cutting in whole or in part) reinforcing steel in suspended concrete slabs with Consultant's prior authorization.

.10 Make good all damage arising from cutting reinforcing steel in suspended concrete slabs and beams.

3.7 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 and new roofing work as required by Work of this Project.

.5 Do not overload floor or wall with accumulations of material or debris or by other loads.

.6 Roof Areas as Indicated:
- .1 Completely remove roofing components to structural deck assembly, unless otherwise indicated.
- .2 Remove roofing membrane, insulation, ballast, flashings, pavers, and additional components as indicated and as required for roof removal work of this Project.

.3 If required, provide new reinforcing for openings created in existing roof under this Section.
.4 Repair existing deck surfaces to provide smooth, clean and compatible working surface for new roof systems.
.5 Clean surfaces to prepare for new roofing work as required.

.7 Coordinate removal of roof mounted mechanical equipment, and electrical equipment with relevant trades.

.8 Prior to removing roofing materials, temporarily plug drains to prevent any debris from entering the drainage system. Unplug at the end of each day and prior to rain.

.9 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.

.10 Do not sell or burn materials on Site.

.11 Remove existing equipment, services, stairs, and obstacles where required for refinishing or making good of existing surfaces, and replace as Work progresses.

.12 At end of day's work, leave Work in safe condition with no part in danger of toppling or falling.

.13 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.

.14 Concrete:
.1 Demolish concrete by methods which avoid impact loads on items which are not to be demolished.
.2 Where only part or parts of a concrete roof is to be demolished, use saw cuts to isolate areas which are to be demolished except where existing reinforcing steel is to be left in place. Prior to such isolating, install suitable support to prevent premature movement of area(s) being isolated and undesirable transfer of loads as cutting progresses. If necessary remove area(s) to be demolished by successively isolating small sections.
.3 Where reinforcing steel is to be left in place, use saw cuts from surface of concrete around perimeter(s) of area(s) to be demolished, chip concrete without damaging reinforcing steel. Retouch damaged epoxy coating of existing reinforcing steel.

.15 Cut openings through existing roofs as required. Establish exact location of steel reinforcing in existing concrete slabs before cutting. Be responsible for damage to existing steel reinforcing and be liable for structural failure. Make good surfaces disturbed with materials to match existing.

.16 Demolish all other items indicated or required.

3.8 **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.

3.9 **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 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 A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

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

.5 CISC/CPMA 1.73a, A Quick-Drying One-Coat Paint for Use on Structural Steel.

.6 CAN/CSA-G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels.

.7 CAN/CSA S16.1-M, Limit States Design of Steel Structures.

.8 CSA S136.1-M, Commentary on CAN/CSA S136-M, Cold Formed Steel Structural Members.

.9 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.10 CSA W48, Filler Metal and Allied Materials for Metal Arc Welding.

.11 CSA W59-M, Welded Steel Construction (Metal Arc Welding).

.12 CAN/CSA W117.2-M, Safety in Welding, Cutting and Allied Processes.

.13 CAN/CGSB 1.40-M, Primer, Structural Steel, Oil Alkyd Type.

.14 CGSB 85-GP-16M, Painting Galvanized Steel.

.15 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 pitts, 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.

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 Welding materials: CSA W48 and CSA W59-M.

.5 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.

.6 Primer paint: CAN/CGSB-1.40-M or CPMA 1.73a.

.7 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.

.8 Drilled inserts: Mega by ITW Construction Products or HSL by Hilti Inc. heavy-duty anchors, sizes as shown.

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.

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 metal fabrication items indicated below and items not indicated to be supplied under other Sections. The following items includes miscellaneous and metal fabrication including but not limited to the items listed below.

.4 Miscellaneous steel brackets, supports and angles

.1 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 Unless otherwise specified, prime paint for interior installation; galvanized finish for exterior installation.

2.4 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.

2.5 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.

.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.

2.6 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.

2.7 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/m^2 for 6 mm and heavier members 640 g/m^2.

.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 rough carpentry work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ASTM A325, Specification for Bolts Quenched/Tempered Steel Nominal Thread Diameter M16 - M36 For Structural Steel Joints.

.2 ASTM F1667, Driven Fasteners: Nails, Spikes and Staples.

.3 CAN/CSA O80 Series M, Wood Preservation.

.4 CSA O121-M, Douglas Fir Plywood.

.5 CAN/CSA O141, Softwood Lumber.

.6 CWC, Canadian Wood Council, Wood Reference Book.

.7 NLGA, Standard Grading Rules for Canadian Lumber, National Lumber Grades Authority

1.3 **QUALITY ASSURANCE**

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

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

.3 Lumber quality: Carefully select individual pieces so that knots and obvious defects will not interfere with placing bolts, proper nailing or making proper connections.

.4 Moisture Content of wood at time of construction shall be 19% maximum.

.5 Each piece of pressure treated lumber and fire retardant treated lumber shall be shop marked with the pressure treatment brand and ULC monogram respectively, in accordance with CAN/CSA O80-M.

.6 Dimensions of lumber shall conform to dressed sizes specified in CAN/CSA-0141 unless actual dimensions are otherwise indicated or specified.

.7 Dimensional references to lumber on Drawings and in Specifications are to nominal sizes unless actual dimensions are indicated. Such actual dimensions shall be dry size.

.8 Lumber defects: Discard wood with defects which will render a piece unable to serve its intended function. Lumber will be rejected by Consultant for excessive warp, twist, bow, crook, mildew, fungus, or mould, as well as for improper cutting and fitting, whether or not it has been installed.

1.4 **ENVIRONMENTAL REQUIREMENTS**

.1 When it is required that wood maintain dimensional stability and tolerances to ensure accurate installation of later work, store and install it only in dry areas, and where no further installation of moist materials is contemplated.

1.5 **PRODUCT DELIVERY, STORAGE AND HANDLING**

.1 Store materials in a dry area. Cover materials with tarpaulins or polyethylene sheets to prevent moisture absorption and impairment of structural and aesthetic properties. Vent to allow air movement. Tie covering to keep in place.

2 Products

2.1 **MATERIALS**

.1 General: All materials under work of this Section, including but not limited to, adhesives are to have low VOC content limits.

.2 Plywood: CSA O121-M, G1S unsanded, T & G, standard construction, laminated with waterproof adhesive, exterior grade, Thickness as indicated on drawings.

.3 Roof lumber: NLGA, Construction grade light framing, Jack Pine, S4S, pressure treated to CAN/CSA-O80 series using copper based waterborne preservative treatment, impregnated to a net retention of 4 kg/ m^3 of preservative unless otherwise specified by preservative manufacturer.

.4 Rough hardware: Conforming to ASTM F1667; Nails, bolts, screws, anchors, expansion shields, and other fastenings required to frame and fix rough carpentry as follows:

.1 Nails, spikes and staples: Spiral type.
.2 Bolts: ASTM A325; 12.7 mm diameter minimum with nuts and washers unless noted otherwise.
.3 Screws: Countersunk head, full thread type.
.4 Proprietary fasteners: Toggle bolts, expansion shields, lag bolts, screws, inorganic fibre plugs, recommended for purpose by manufacturer.
.5 Galvanize rough hardware used in fire treated wood and hardware exposed to the atmosphere.

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 Lay out work carefully and to accommodate work of others. Cut and fit accurately: erect in position indicated by Drawings.

.2 Install rough carpentry to allow for expansion and contraction of the materials.

.3 Cut work into lengths as long as practicable and with square ends. Align, level, square, plumb, and secure work permanently in place. Brace work temporarily as required. Join work only over solid backing.

.4 Bore holes true to line and to same size as bolts. Drive bolts into place for snug fit, and use plates or washers for bolthead and nut bearings. Turn up bolts and lag screws tightly when installed, and again just before concealed by other work or at completion of Work.

.5 Provide anchors, bolts, and inserts required for attachment of the work of this Section, to those performing the work of other Sections and who are responsible for their installation.

.6 Do not attach work by wood plugs or blocking in concrete or masonry. Use lead shields, expansion shields, or similar methods only as approved by Consultant.

3.3 **MISCELLANEOUS WOODWORK**

.1 Fit and install wood furring, strapping, grounds and blocking. Adequately size, correctly place and conceal members for finishes, fitments and for work under other Sections. Do not assume that Drawings show required work exactly or completely. Anchor wood members securely in place.

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

3.4 **ROOF WOODWORK**

.1 Install continuous wood nailers around roof perimeters, curbs and roof openings larger than 150 x 150 mm, and at edges of insulation as detailed. Install cut cant strips and continuous nailers on copings and curbs as detailed.

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

.3 Fasten roof woodwork at maximum 400 mm o.c. in staggered pattern unless noted otherwise.

3.5 **FASTENERS**

.1 Frame, anchor, fasten, tie and brace members for required strength and rigidity.

.2 Use hot dipped galvanized fasteners for exterior work and work below grade.

.3 Countersink bolts and bolt heads as required for clearance of other work.

.4 Size fasteners to penetrate base member by half of fastener length minimum. Minimize splitting of wood members by staggering nails in direction of grain.

.5 For plywood use spiral, annular or resin coated nails and staples.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

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

.2 Roofing Work shall consist of the following:
- .1 New cold fluid applied roof membrane and re-coating of existing hot rubberized roof with ne cold fluid applied roof membrane.
- .2 Removal and replacement of expansion joint gaskets where indicated.

1.2 **REFERENCES**

.1 CSA A231.1/A231.2, Precast Concrete Paving Slabs/Precast Concrete Pavers.

.2 CRCA Roofing Manual, Canadian Roofing Contractors Association.

.3 OIRCA, Ontario Industrial Roofing Contractors Association.

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit copies of manufacturer's product data in accordance with Section 01 00 00 indicating:
  - .1 Systems, materials, components and methods of installation proposed for use.
  - .2 Certify compliance of each component with applicable standards.
  - .3 Submit cold weather construction procedures and methods of protection which will be initiated, installed and maintained when ambient temperature falls below 0°C.

.2 Shop Drawings: Submit Shop Drawings in accordance with Section 01 00 00 indicating roof layout, sections, details, materials, flashings and membrane terminations, perimeter securement, membrane penetrations and expansion joints.

.3 Samples:
- .1 Submit following samples in accordance with Section 01 00 00.
  - .1 Fluid applied roofing membranes.
  - .2 Flashings.
  - .3 Expansion joint gasket.

.4 Reports:
- .1 Submit copy of membership in good standing of OIRCA.
- .2 Submit Pre-Installation Notice (PIN): Copy to show that manufacturer’s required Pre-Installation Notice (PIN) has been accepted and approved by the manufacturer.

.3 Submit project specific report, issued by certified material testing laboratory, indicating uplift pressures for field of roof, perimeter of roof and corners of roof.

.4 Submit written inspection reports in duplicate from manufacturer, stating that materials proposed for use on this project meet criteria specified and are compatible with each other.

.5 Close-out submittals:

.1 Submit close-out submittals in accordance with Section 01 00 00.

.2 Submit standard OIRCA warranty and extended warranty.

.3 Maintenance requirements and procedures for roofing system.

1.4 QUALITY ASSURANCE

.1 Installers/applicators performing Work shall be an OIRCA member in good standing for minimum 10 years.

.2 Roofing companies must be in business for at least 25 years.

.3 Roofing companies must hold COR certification.

.4 Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor for each site with a minimum of three years' experience installing products similar to those specified, able to communicate verbally with Contractor, Architect, and employees, and the following:

.1 Qualified by the manufacturer to install manufacturer's product and furnish warranty of type specified.

.5 Other Quality Assurance requirements from your specification - mock-ups/ pre-installation meetings/CRCA/CAN/ULC S-107 Class C classification etc.

.6 Inspections: Manufacturer's Technical (non-sales) Representative must inspect roof installation every day and report progress to Owner's representative. Provide progress photos for application of operation of roofing system. In addition to regular inspections, Manufacturer's Technical (non-sales) Representative shall be present for start of roof work.

.7 Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:

.1 An authorized full-time technical employee of the manufacturer.

.2 If manufacturer does not employ full time technical personnel, then an independent party certified as a Registered Roof Observer by the Roof Consultants Institute, retained by the Contractor or the Manufacturer and approved by the Manufacturer.

.8 Manufacturer Inspection and Preventive Maintenance Requirement: By manufacturer's technical representative, to report maintenance responsibilities to Owner necessary for preservation of Owner's warranty rights. The cost of manufacturer's annual inspections and preventive maintenance is included in the Contract Sum. Inspections to occur in Years 2, 5, and 10 following completion.

1.5 **DELIVERY, STORAGE, AND HANDLING**

.1 Deliver Products in original containers and keep in protective storage until used.

.2 Indicate on containers or wrappings of Products:
- .1 Manufacturer's name and brand.
- .2 Compliance with applicable standard.
- .3 Mass where applicable.

.3 Handle and store Products to prevent damage. Keep manufacturer's labels and seals intact. Store adhesive containers in upright position and roofing rolls on end to prevent flattening. Ensure that shelf life of Products has not expired.

.4 Protect Products from inclement weather. Keep insulation and roofing materials dry. Remove from storage only as much Products as can be applied, made weathertight, and covered with roofing in same day. Do not install Products which are damp at time of installation or showing evidence of having been damp or exposed to moisture.

.5 Store adhesive and sealants at temperature above 5°C.

.6 Do not store insulation or roofing membrane on roof. Store them under cover while roofing Work is not in progress.

.7 Place 19 mm thick plywood runways over Work to enable movement of Product and other traffic. Place 19 mm thick plywood over minimum 25 mm thick rigid insulation for protection over Work being constructed.

.8 Where hoisting occurs adjacent to construction, hang tarpaulins to protect walls and other surfaces.

.9 Have a minimum 9 kg. dry chemical fire extinguisher fully charged and in operable condition on the roof.

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

.11 Clean off drips and smears of adhesive immediately.

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

.13 At end of each day's Work or when stoppage occurs due to inclement weather, protect completed Work and Products.

1.6 SITE CONDITIONS

.1 Install roofing on dry deck, free of snow and ice, use only dry Products and apply only during weather that will not introduce moisture into roofing system.

.2 Comply with manufacturer's recommendations for minimum and maximum temperatures and humidity during application.

.3 Do not install Products when temperatures are below -10°C.

.4 Consider effects of wind chill on adhesives, and ensure they will not prematurely set before proper adhesion takes place.

.5 Keep water-based Products from freezing. Do not apply water-based Products if temperatures are below 5°C.

1.7 EXTENDED WARRANTY

.1 At completion of this work, provide a signed OIRCA warranty to the Owner covering defects of workmanship for a period of 2 years commencing from date of Substantial Performance. Agree to make good promptly any defects which occur or become apparent within the warranty period in conjunction with the membrane manufacture's warranty. Defects shall include but not be limited to leakage, failure to stay in place, lifting, and deformation.

.2 Manufacturer's Warranty for roofing work: Written warranty in which Manufacturer agrees to repair roof installations that fail due to defects in materials or workmanship within specified warranty period.

- .1 Failures include, but are not limited to, the following:
  - .1 Rehabilitated membrane failures including rupturing or cracking due to a manufacturing or installation defect.
  - .2 Deterioration of applied roofing materials beyond normal weathering.
- .2 Limit of Warranty Coverage for Repair of Roof System: Not to exceed original purchase price of manufacturer's roofing materials, except that manufacturer may elect to apply the limit amount toward the following:
  - .1 Purchase of a new replacement roof within the first five years following completion of roofing work.
- .3 Qualified Installer Warranty Requirement: Installer must meet requirements of Quality Assurance Article.
- .4 Installation Inspection Warranty Requirement: By Roofing Inspector in accordance with requirements of Part 3 Field Quality Control Article.
- .5 Warranty Period: 20 years from date of completion of roofing work.

2 Products

2.1 **MATERIALS**

.1 General:
- .1 All materials under work of this Section, including but not limited to, adhesives and primers are to have low VOC content limits.
- .2 Provide all components and accessories as required for complete, air and water tight roofing installations and that are compatible with one another.

.2 Polyurethane Elastomeric Fluid-Applied System:
- .1 Two-coat reinforced fluid-applied roofing membrane formulated for application over prepared existing substrates.
- .2 Base coat: Two-part catalyzed low-odor modified polyurethane methacrylate waterproofing base coating. Conforming to the following properties:
  - .1 Tensile strength; ASTM D412: 1292 psi.
  - .2 Tear resistance; ASTM D5147: 216 lbf.
  - .3 Hardness; ASTM D2240: 88 Shore A.
  - .4 Water vapour transmission; ASTM E96(A): 0.3 perms.
  - .5 Rate of burning; .09 in/min.
  - .6 Percent solids: 100%.
  - .7 Volatile Organic Compounds (VOC); ASTM D3960: 0.9 g/L max.
  - .8 Basis of Design Product: ‘AlphaGuard PUMA Base Coat’ by Tremco Inc. or approved alternative by Henry.
- .3 Top coat: Two-part catalyzed low-odour polyurethane methacrylate waterproofing top coating. Conforming to the following properties:
  - .1 Tensile strength; ASTM D412: 1062 psi.
  - .2 Tear resistance; ASTM D5147: 216 lbf.
  - .3 Hardness; ASTM D2240: 88 Shore A.
  - .4 Water vapour transmission; ASTM E96(A): 0.3 perms.
  - .5 Rate of burning; .09 in/min.
  - .6 Percent solids: 100%.
  - .7 Volatile Organic Compounds (VOC); ASTM D3960: 0 g/L max.
  - .8 Basis of Design Product: ‘AlphaGuard PUMA Top Coat’ by Tremco Inc. or approved alternative by Henry.
- .4 Reinforcing Fabric for Fluid Applied Membranes and Flashings:
  - .1 Heavy weight, polyester mat formulated for use as a rapid wetting reinforcing mesh.
  - .2 Basis of Design Product: ‘Permafab MAX’ by Tremco Inc. or approved alternative by Henry.
- .5 Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with substrate and existing roofing system.

.3 Insulation: Reuse existing. If existing is not sufficient use; CAN/ULC-S701, Type 4; Extruded polystyrene, ship-lapped edges. Thickness: To match existing.

.4 Fabric Ballast Reducer Sheet: Reuse existing. If existing is not sufficient use; High density polyethylene filter fabric with UV inhibitors; ‘Fabrene VIIE9' by PGI-Fabrene Inc. or approved alternative.

.5 Ballast: Reuse existing. If existing is not sufficient use; new 38 mm diameter clear, screened, river gravel, free from fines or stones smaller than 19 mm or larger than 50 mm.

.6 Joint Sealant: Single component, high solids, moisture curing polyurethane sealant recommended by coating manufacturer.

.7 Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

.8 Precast Pavers and pedestalls: Reuse existing. If existing is not sufficient use provide new pavers to match existing.

.9 Expansion joint gasket:
- .1 Pre-compressed, self-expanding, high-density polyurethane foam.
- .2 Basis of Design Product: 'Willseal 150' by Tremco Inc. or approved alternative.

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 Have manufacturer's authorized representative verify that conditions are acceptable for installation of roofing membrane.

3.2 PREPARATION

.1 Prior to commencement of Work ensure:
- .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, swept clean of dust and debris and properly graded to outlets.
- .2 Wood blockings and curbs are installed and correct. Do not install roofing over such items if method of attachment is inadequate to withstand stresses imposed by thermal movement of roofing components.

.2 Supply to trades concerned in ample time, inserts, reglets and accessories to be built into Work. Assist in setting such items.

.3 Cooperate with respective trades to determine methods and procedures to ensure watertight junctions to items passing through roof.

.4 Prohibit traffic, on prepared areas to be roofed, until work of this Section is completed.

.5 Supply and install temporary protection to adjacent surfaces to prevent damage resulting from work of this Section.

.6 Remove existing expansion joint gaskets in location indicated in accordance with manufacturer's written instructions.

3.3 **PRIMING**

.1 Prime substrate surfaces in accordance with manufacturer's instructions.

.2 All surfaces, which have been primed, must be clean and free of dirt, grease, oil and other foreign matter, which could prevent proper adhesion of fluid applied roof coating.

3.4 **MEMBRANE APPLICATION**

.1 Base coat: Apply base coat to field of membrane in accordance with manufacturer's written instructions.
- .1 Mix membrane and catalyst as per Manufacturer's recommendations.
- .2 Apply base coat on prepared and primed surfaces and spread coating evenly.
- .3 Back roll to achieve minimum wet mil coating thickness of 64 mils unless otherwise recommended by manufacturer; verify thickness of base coat as work progresses.
- .4 Fabric Reinforcement:
- .5 Place fabric reinforcement onto wet base coat. Lap adjacent flashing pieces of fabric minimum 75 mm along edges and 150 mm at end laps.
- .6 Apply second base coat over installed fabric reinforcement and back roll to achieve not less than minimum coating thickness indicated in Part 2 product listing, unless greater thickness is recommended by manufacturer. Verify application thickness as work progresses.
- .7 Allow base coat to cure prior to application of top coat.
- .8 Following curing of base coat and prior to application of top coat, sand raised or exposed edges of fabric reinforcement.

.2 Top coat: Apply top coat to field of membrane and flashings uniformly in a complete, continuous installation.
- .1 Mix the entirety of Part B into Part A with a Jiffy mixer attachment on a power drill for a minimum of 2 minutes.
- .2 Prime base coat prior to application of top coat if top coat is not applied within 72 hours of the base coat application, using manufacturer's recommended primer.
- .3 Apply top coat extending coating up vertical surfaces and out onto horizontal surfaces. Install top coat over field base coat and spread coating evenly.
- .4 Back roll to achieve wet mil thickness of 32 mils unless otherwise recommended by manufacturer.
- .5 Avoid foot traffic on new fluid-applied membrane for a minimum of 24 hours.

3.5 INSULATION

.1 Install insulation loosely laid over roofing membrane in a staggered manner and tightly butted together. Maximum acceptable gap between insulation boards is 9.5 mm. Insulation must be installed within 13 mm of all projections and penetrations.

.2 In multi-layer insulation applications, bottom layer of insulation shall be the thickest layer, minimum 50 mm. Install all layers unadhered to each other and all joints in relation to underlying layers staggered.

3.6 BALLAST REDUCING FABRIC

.1 Position the fabric over the insulation, black side up, as follows:
- .1 Overlap all edges a minimum of 300 mm.
- .2 Install the fabric so that no joints will exist between the sheets parallel to and within 1800 mm of the roof perimeter.
- .3 Extend the fabric to 50 mm - 75 mm above the ballast at the perimeter and penetrations.
- .4 Extend the fabric to drain bases or bonnets, but to not cover drains or restrict water flow to the drain.
- .5 Install fabric around all penetrations in order to prevent stone entry into the space between the penetration and the insulation.

3.7 BALLAST

.1 Install ballast progressively as membrane, insulation, and fabric is laid. Carefully spread ballast to an even thickness over entire roof. Weight of ballast installed to be in accordance with reviewed shop drawings and manufacturer's written requirements.

.2 Any ballast displaced by a pavers should be distributed around the paver, to maintain the specified average ballast rate.

.3 Roof pavers: Install pavers on pedestals, one at each corner, in locations shown butted tightly, maximum 6 mm gap. Adjust or Shim up as required to obtain smooth surface transition from slab to slab.

3.8 ROOF ACCESSORIES

.1 Be responsible for making watertight joints to items projecting through or located on the roof, to acceptance of Consultant.

3.9 EXPANSION JOINT GASKET REPLACEMENT

.1 Reinstall expansion joint gasket in accordance with reviewed shop drawings and manufacturer's written instructions.

3.10 FIELD QUALITY CONTROL

.1 Coordinate inspection and testing of roofing system with Roofing Manufacturer.

.2 Manufacturer's Field Service: Arrange for Roofing Manufacturer's to regularly inspect the roofing application (minimum twice per week) and confirm that the roofing system installation is in strict accordance with manufacturer's recommendations.

3.11 CLEANING

.1 Clean roofing, metal, masonry, and similar items of dirt, cuttings, stains and foreign matter upon completion of Work.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for flashing and sheet metal 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 C920, Specification for Elastomeric Joint Sealants.

.3 OIRCA, Ontario Industrial Roofing Contractors Association.

1.3 **SUBMITTALS**

.1 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 00 00 indicating:
  - .1 Proposed method of shaping, forming, jointing.
  - .2 Fastening, and application of flashing and sheet metal work.

.2 Samples:
- .1 Submit following samples in accordance with Section 01 00 00:
  - .1 50 x 50 mm samples of sheet metal material, colour and finish.
  - .2 Representative sample section of prepainted metal flashing illustrating S locking jointing method, minimum 600 mm long.

2 Products

2.1 **MATERIALS**

.1 All materials under work of this Section, including but not limited to, sealants and paints are to have low VOC content limits.

.2 Prepainted sheet steel: ASTM A653/A653M; Classification LFQ, Grade A, Z275 zinc coating designation, 0.60 mm minimum base steel thickness, commercial quality, prefinished with Perspectra Series coating system by ArcelorMittal Dofasco, or WeatherX by Vicwest Steel. Custom colour to match existing building colour unless otherwise indicated.

.3 Plastic cement: Trowel grade asphalt mastic.

.4 Sealant: ASTM C920, Type S, Grade NS, Class 25; High-performance, medium-modulus, one-part, neutral-cure silicone sealant. ‘CWS’ by Dow Corning or approved alternative.

.5 Cleats and starter strips: Starter strips to be continuous, of same material as flashing used, 1.2 mm thick.

.6 Fasteners: Flat head roofing nails of length, type and thickness suitable for metal flashing application.

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

.8 Touch-up paint: Same colour and material as prepainted sheet steel, as recommended by prefinished coating manufacturer.

2.2 **FABRICATION**

.1 Fabricate copings, flashings, curb counter flashings, starter strips, and miscellaneous flashings in accordance with OIRCA and to details shown.

.2 Form prepainted sheet material at shop to shapes shown. Make end joints where adjacent lengths of metal flashing meet, in accordance with jointing method specified.

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

.4 Hem exposed edges 13 mm minimum on underside for appearance and stiffness. Mitre and seal corners with sealant.

.5 Reglets and Cap flashing: Form flashings of as detailed and in accordance with OIRCA. Provide slotted fixing holes and steel/plastic washer fasteners.

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 **INSTALLATION**

.1 Install coping flashings, curb counter flashings, starter strips, and miscellaneous flashings to details shown on the Contract Drawings and in accordance with OIRCA.

.2 Use concealed fasteners. Exposed fasteners such as pop rivets are not allowed.

.3 Apply isolation coating to metal surfaces in contact with concrete or mortar.

.4 Install continuous starter strips to present a true, non-waving, leading edge. Anchor to back-up for a rigid, secure installation.

.5 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips.

.6 Make end joints using an S lock joint. Execute by inserting end coping length in 25 mm deep S lock formed in end of adjacent length. Extend concealed portion of S lock 25 mm outwards and nail to substrate. Face nailing of joints will not be permitted.

.7 Seal where necessary to form weathertight seal between flashing and adjoining surfaces and between flashing and other work. Sealing work consists of bedding between members where possible. Tool sealant to concave profile where exposed.

.8 Insert metal flashing under cap flashing to form weathertight junction.

.9 Caulk flashing at cap flashing with sealant.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for the removal of existing sealant and installation of new sealant in accordance with the Contract Documents.

.2 Work of this Section does not include sealant work identified in individual specification sections.

1.2 **REFERENCES**

.1 ASTM C919, Standard Practice for Use of Sealants in Acoustical Applications.

.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.

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 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.

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:
- .1 Regular use: ASTM C920, Type S, Grade NS, Class 50; One component, medium modulus, non-sag type, polyurethane sealant, in standard colours selected. Basis of design; ‘TremSEAL Pro' by Tremco or approved alternative.
- .2 Large gaps at stone parapet: ASTM C920, Type S, Grade NS, Class 50; One-part, low-modulus, non-sag type, silicone sealant, in standard colours selected. Basis of design; ‘Spectrem 3' by Tremco or approved alternative.

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 of this Section means acceptance of existing conditions.

3.2 INSPECTION

.1 Verify that joint sealants, backing, and other materials containing hazardous materials have been removed.

.2 Verify that joint substrates and adjoining materials are structurally sound.

.3 Verify that joints to be renovated can be satisfactorily repaired with the specified methods and materials.

3.3 PREPARATION

.1 Protect adjacent exposed surfaces to prevent smearing, staining or other damage, by masking or other means, prior to performing work. Make good any damage caused by sealant application. Remove protection upon completion and clean adjacent, exposed surfaces of any compound deposited upon such surfaces.

.2 Remove all existing sealant, loose rust and mill scale by hand cutting, power grinding or wire brushing. Completely remove sealant build up in all joints. Remove any loose particles by blowing joint out with compressed air.

.3 Clean substrate surfaces so that they are free from caulking, dust, grease, soiling, or extraneous matter, which are detrimental to the adhesion of the sealant.

.4 Chemically clean all non-porous surfaces, such as aluminum and glass, by solvent wipe and drying with a clean cloth.

.5 Patch, repair, and smooth minor substrate defects and deficiencies. Clean porous surfaces such as masonry and concrete by mechanical abrading.

.6 Where existing fasteners are loose, tighten or replace as required.

.7 Substrate moisture tests:
- .1 Test for moisture content over areas where sealant is to be applied.
- .2 If any test registers above 10% allow entire substrate surfaces, within the plane, to dry further before sealant system application. Install temporary drying fans if necessary.
- .3 After drying of the substrate, re-test employing same criteria.

.8 Mildew removal: Scrub with solution of TSP and rinse with water, and allow to dry completely.

.9 Erect scaffolding and rigging required to perform sealant work in accordance with reviewed Shop Drawings.

.10 Ensure that all materials in contact with sealant are compatible. Test substrate for adhesion.

.11 Depth of recess: Maintain depth to ½ 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.

.12 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.

.13 Prime sides of recess, in accordance with sealant manufacturer's instructions.

.14 Condition products for use in accordance with manufacturer’s recommendations.

3.4 **INSTALLATION**

.1 Apply sealant at stone copings in accordance with manufacturers written instruction.

.2 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.

.3 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.

.4 Make sealant bead uniform in colour.

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

.6 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.

.7 Clean recesses and re-apply sealant.

.8 Remove masking tape immediately after joints have been sealed and tooled.

3.5 **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.

END OF SECTION

1 General

1.1 **SECTION INCLUDES**

.1 Design, labour, Products, equipment and services necessary for fall protection systems work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 ANSI, H35.1M Alloy and Temper Designation Systems for Aluminum (Metric).

.2 ASTM A276, Specification for Stainless and Heat-Resisting Steel Bars and Shapes.

.3 ASTM B221M, Specification for Aluminum-Alloy Extruded Bars, Rods, Wires, Shapes and Tubes.

.4 CAN/CSA-G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels.

.5 CAN/CSA G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles.

.6 CAN/CSA S16.1-M, Limit States Design of Steel Structures.

.7 CSA S136.1-M, Commentary on CAN/CSA S136-M, Cold Formed Steel Structural Members.

.8 CSA S157-M, Strength Design in Aluminum.

.9 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.10 CSA W47.2-M, Certification of Companies for Fusion Welding of Aluminum.

.11 CSA W48.1-M, Carbon Steel Covered Electrodes for Shielded Metal Arc Welding.

.12 CSA W59-M, Welded Steel Construction (Metal Arc Welding).

.13 CAN/CSA W117.2-M, Safety in Welding, Cutting and Allied Processes.

.14 CAN/CSA-Z91, Health and Safety Code for Suspended Equipment Operations.

.14 CSA Z271, Design of Suspended Access Equipment.

1.3 **DESIGN REQUIREMENTS**

.1 Design fall protection system in accordance with the Occupational Health & Safety Act and Regulations; Ont. Reg. 859/90, CAN/CSA-Z91, and CSA Z271. Comply with the “Guidelines for Multi-Point Suspended Scaffolds (MPSS)” issued by the Ontario Ministry of Labour.

.2 Design fall protection system in accordance with Occupational Health & Safety Act, CAN/CSA-Z91, CSA Z271, and to withstand live, dead, seismic, imposed and other loads, and which meets proper and current window washing practices.

.3 Design structural members with 4:1 safety factor based on ultimate strength and normal operating conditions or with limit states design as specified in referenced standards.

.4 Design fall protection system to ensure building surfaces and finishes will not be marred or otherwise damaged during normal operation of equipment.

.5 Design all anchor components to provide an adequate attachment means suited to current window washing practices and compatible with industry standard equipment.

.6 As a minimum, design shall comply with CSA S16.1, CSA S136, and CAN3 S157-M.

1.4 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 00 00 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, and limitations, and trouble-shooting protocol.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 00 00 indicating:
  - .1 Elevations, sections, details, materials, operating components, dimensions, gauges, finishes and relationship to adjacent construction.
  - .2 Complete layout and configuration of complete fall protection system, including locations and all other components and accessories.
  - .3 Clearly indicate design and fabrication details, window drops, hardware and installation details.
  - .4 Include all necessary Restrictive and Non Restrictive Working Usage Notes and General Safety Notes.
  - .5 Complete engineering design data confirming that Products meet design criteria specified.
  - .6 Name and proof of CWB Certification or welding fabricator.

.3 Reports/Certificates/letters:
- .1 Provide all necessary and required test reports and certificates to comply with the relevant codes and regulations of jurisdictional authorities.
- .2 Submit test data from an independent testing laboratory to show that all anchors which are to be used in this project meet the loading requirements of CAN/CSA-Z91-M. Anchors are to be tested after installation to loads specified in design standard in Design Requirements.

.3 Submit inspection reports within 5 days of inspection.
.4 Submit certified proof of product liability insurance.
.5 Submit a letter from the Engineer certifying that fall protection system meets the performance requirements of the Ministry of Labour and standards specified in Design Requirements.

.4 Closeout submittals:
.1 Provide at each roof entrance a reduced plastic laminated as-built shop drawing showing anchor locations and details, in accordance with requirements of jurisdictional authorities. Drawings shall be metal framed with clear polycarbonate scratch resistant cover and securely screwed to wall.
.2 Complete inspection log book, to certify fall protection system is ready for use in accordance with requirements of jurisdictional authority and for yearly inspections.
.3 Submit following for each Product incorporation into Operations and Maintenance Manuals in accordance with Section 01 00 00:
.1 Identification: Manufacturing name, type, year, serial number, number of units, capacity, and identification of related systems.
.2 Functional description detailing operation and control of components.
.3 Performance criteria and maintenance data.
.4 Operating instructions and precautions.
.5 Safety precautions.

1.5 QUALITY ASSURANCE

.1 Manufacturer's qualifications:
.1 Execute work of this Section only by a Subcontractor specializing in the design, fabrication and installation of fall protection systems and who is also known to have been responsible for satisfactory installations similar to that specified during a period of at least the immediate past five years.
.2 Manufacturers shall carry specific liability insurance (products and completed operations insurance in the amount of $ 5,000,000.00). This insurance must cover the failure of equipment and anchors.

.2 Installers qualifications: Perform work of this Section by a company that is employed by, and under direct supervision of component manufacturer and has a minimum of five years proven experience in the installation of fall protection systems of a similar size and nature.

.3 Retain a Professional Engineer, licensed in Province of Ontario, with experience in fall protection systems work of comparable complexity and scope, to perform following services as part of work of this Section:
.1 Design of fall protection system.
.2 Review, stamp, and sign fabrication, shop drawings, and design calculations.
.3 Provide letter of confirmation that structure has been designed and constructed to handle applied test loads prior to anchor testing.

.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.

.4 Execute welding by firms certified in accordance with CSA W47.1 Division 1 or 2.1 and CSA W47.2-M. Ensure welding operators are licensed per CSA W47.1 and CSA W47.2-M for types of welding required by work.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

.1 Specified manufacturer's products of Pro-Bel Enterprises Limited; Thaler Industries Ltd.; or Ankor Exterior Access Corporation establish minimum acceptable standards for work of this Section. Equipment of other manufacturers shall meet or exceed specified manufacturer's standard. Conform to the requirements for equivalent products specified in Division 1.

2.2 **MATERIALS**

.1 Structural shapes, plates, and similar items: CAN/CSA-G40.20/G40.21-M, Grade 350W.

.2 Aluminum: ASTM B221 and ANSI H35.1 AA6063 alloy, T6 temper.

.3 Stainless steel: ASTM A276, Type 304.

.4 Welding materials: CSA W48.1-M and CSA W59-M.

.5 Surface mounted recessed roof anchor (single stainless steel stud): stainless steel threaded rod welded to back plate with lock washer and hex nut. Complete with galvanized gravel stop box and aluminum cover, anchored to existing concrete slab.

2.3 **FABRICATION**

.1 Verify dimensions of existing work before commencing fabrications and report discrepancies to Consultant.

.2 Fabricate work in accordance with reviewed shop drawings.

.3 Fabricate work free from defects impairing function, strength and durability.

.4 Accurately cut, machine and fit joints, corners, copes and mitres so that junctions between components fit together tightly and in true planes. Cap open ends of sections exposed to view.

.5 Fabricate work with materials and component sizes, metal gauges, reinforcing, anchors, and fastenings of adequate strength to ensure that it will remain free of

warping, buckling, opening of joints and seams, and distortion within limits of intended and specified use and with allowable design factors imposed by jurisdictional authorities.

.6 Weld all connections, unless otherwise indicated. Cleanly and smoothly finish exposed edges of materials including holes.

.7 Steel pipe uprights:
- .1 Fill steel pipe uprights with urethane foam insulation or other accepted filler.
- .2 Size uprights for a minimum 200 mm exposure above roof membrane in accordance with good roofing practices.

2.4 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 W48.1-M - 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.

.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 painted.

.4 Test welds for conformance and remove work not meeting specified standards and replace to Consultant's acceptance.

2.5 HOT DIP GALVANIZING

.1 After fabrication, hot dip galvanize steel items that will be exposed to the elements and 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 CAN/CSA G164-M and 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/m^2 for 6 mm and heavier members 640 g/m^2.
- .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 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.

.2 Take site measurements of construction to which work of this Section must conform, and through which access must be made, before work is delivered to site, to ensure that adaptation is not required which would result in construction delay.

3.2 **INSTALLATION**

.1 Install work in accordance with reviewed shop drawings and manufacturer's recommended specifications, true, tightly fitted, and level or flush to adjacent surfaces, as suitable for installation.

.2 Provide anchorage information, roughing-in dimensions, templates, and service requirements for installation of work of this Section, and assist or supervise, or both, the setting of anchorage devices, and construction of other work incorporated with work specified in this Section in order that they function as intended.

.3 Assemble components delivered in sections. Use only fastenings suitable for materials.

.4 Work shall include rough hardware, fastenings, and other items necessary for secure installation.

.5 Install work straight, plumb, level, and secured to prevent distortion or displacement, or both.

.6 Secure components to building structure or construction as required to maintain it permanently in place, and so that it functions properly with no damaging vibration to the building or itself.

.7 Insulate between dissimilar metals, to prevent electrolysis.

3.3 **REPAIR**

.1 Refinish damaged or defective work so that no variation in surface appearance is discernible.

3.4 **FINAL TESTING AND INSPECTION**

.1 Verify under work of this Section that installed products function properly, and adjust them accordingly to ensure satisfactory operation.

.2 Fall protection roof anchors shall be inspected and tested by an independent inspection and testing body approved by jurisdictional authorities to ensure conformance to field test requirements of CSA Z271, before being used for the first time. Independent and inspection and testing body shall fill out log book in accordance with jurisdictional authority requirements.

.3 Complete the inspection log book to certify system for use.

END OF SECTION