Request for Tender # T-1013-2024

for

Accessibility ramp replacement and New Elevator at 327 Kellett Street, Port Perry, ON

Appendix D, D-1 and D-2
The Deliverables and Material Disclosures

Document 4 of 4
Electronic submission required

The Regional Municipality of Durham
Works Department
605 Rossland Road East, Whitby ON, L1N 6A3

Accessibility Ramp Replacement and New Elevator Installation at
327 Kellett Street, Port Perry, ON

TAK Engineering Limited
2392 Delkus Crescent, Mississauga, ON, L5A 1K7

These specifications (Divisions 00-32) were prepared under the supervision of the following registered coordinating professionals:

Written by: _____ **Date:** _____

Checked by: _____ **Date:** _____
(Consultant Project Manager)

Architectural	Electrical	
ONTARIO ASSOCIATION OF ARCHITECTS DANIEL KARPINSKI LICENCE 5200	LICENSED PROFESSIONAL ENGINEER 6.06.2023 TOMASZ ZENIUK Tom Zeniuk, P.Eng. PROVINCE OF ONTARIO	

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1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

.1 Surety bonds

.2 Insurance

.3 Warranty security holdback

.4 Basis of payment

1.2 Surety bonds

.1 Provide a performance bond in an amount equal to fifty per cent (50%) of the tendered price for the faithful performance of the Contract, including all obligations during the warranty period. The warranty period will be extended if known deficiencies are incomplete upon expiration of the two (2) year period. In any case, the performance bond shall continue until the final acceptance certificate has been issued by the Owner in accordance with General Conditions.

.2 Provide a labour and material payment bond in an amount equal to fifty per cent (50%) of the tendered price for the faithful payment of all labour and materials related to this Contract.

.3 Bonds forms shall be as specified in Appendix B – Supplementary Conditions to CCDC 2-2020.

.4 Bonds shall not be extended to cover any work beyond the original scope of the Work unless explicitly requested by the Owner. The Contractor shall not be entitled to claim for bonding on such additional work unless such additional bonding is requested by the Owner.

.5 The Owner accepts that all additional work performed by Change Order is not covered by the bonds. The Owner shall not be entitled to a credit related to the bonds if a change in the Work results in a reduction of the Contract Price.

.6 Any contract progress reports issued by the Contractor’s surety company must be issued directly to the Owner or Consultant at the address provided.

1.3 Insurance

.1 Provide insurance as required by GC 11.1 of the CCDC 2-2020, as amended by Appendix B – Supplementary Conditions to CCDC 2-2020.

1.4 Warranty security holdback

.1 A warranty security holdback will be retained progressively, commencing on the first payment certificate, from monies that would otherwise be payable to the Contractor, up to a maximum value of **$13,000.00**

.2 The maximum Warranty Security Holdback will be held commencing on the Substantial Performance Payment Certificate.

.3 The Warranty Security Holdback withheld on progress payments prior to the Substantial Performance Payment Certificate will be based on the percentage of work completed up to the end of the payment period for the respective progress payment.

.1 For this purpose, the “percentage of work completed” will be calculated based on the original tendered scope of work.

.2 Change Orders will not be considered in the calculation of this “percentage of work completed”.

.4 The retained amount is strictly to be used as a warranty security and is in addition to the regular holdback and finishing holdback retained in accordance with the Construction Act, the Contractor's performance bond and any monies withheld due to known incomplete and/or deficient work.

.5 Where Change Orders are issued which increase the final Contract Price, the Owner reserves the right to withhold additional warranty security at the same rate (as is determined by dividing the specified maximum warranty security by the awarded Contract Price) on the value of such additional work. The Owner will notify the Contractor if the Owner intends to invoke this right on any Change Order and payment for any carrying costs on additional warranty security shall be deemed to be included in the respective Change Order.

.6 Except as otherwise provided hereunder, the warranty security, less any deductions made therefrom as provided for in the Contract, shall be released to the Contractor following the issuance by the Owner of the Final Acceptance Certificate at the end of the warranty period.

.7 No substitute form of security will be permitted.

1.5 Basis of payment

.1 Payment for bonds and insurance shall be included in the monthly payment certificate after submission of satisfactory documents.

.2 Payment for all carrying costs associated with the warranty security holdback, including interest thereon, shall be made under this Section on the appropriate line item in the payment certificate. No other compensation for warranty security holdbacks will be considered. Progress payments will be made as follows:

- 25% on the first progress payment certificate;
- 25% on the Substantial Performance Payment Certificate;
- 50% on the Final Payment Certificate, together with the release of the warranty security holdback at the end of the warranty period, as may be extended in accordance with the Contract.

.3 The sum of prices bid for bonds, insurance and warranty security holdback carrying costs shall not exceed 2% of the lump sum tendered price.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 This Section specifies requirements for an extension of the Contract warranty period.

1.2 Extension of warranty period

.1 Provide extension of warranty period for 1 additional year (for a total of 2 years) according to Appendix B – Supplementary Conditions to CCDC 2-2020.

1.3 Basis of payment

.1 Payment for this Section shall be made on the Substantial Performance Payment Certificate.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Work of this project

.1 Work of the Project, of which Work of this Contract is a part, comprises the following:

.1 Demolition and replacement of various retaining concrete segmental retaining (block) walls and concrete steps, removal and repair asphalt, construction of new elevator shaft and elevator, cutting of curb and provide paving to temporary entrance at rear of building (common room), replacing landscape and underground service locates at 327 Kellett Street, Port Perry. ON.

.2 The materials and/or services shall be delivered FOB Destination(s), Prepaid.

1.2 Contract delivery method

.1 Preform Work of this Contract under one Contract, by way of an of the Agreement between Owner and Contractor, using the following Contract delivery method:

.1 Canadian Standard Construction Document, CCDC 2-2020, Stipulated Price Contract; As amended by Appendix B - Supplementary Conditions to CCDC 2-2020.

.2 Contract Documents were prepared by the Consultant for the Owner. Any use which a third party makes of the Contract Documents, or any reliance on or decisions to be made based on them, are the responsibility of such third parties.

.1 The Owner accepts no responsibility for damages, suffered by any third party as a result of decisions made or actions based in the Contract Documents.

1.3 Work performed under separate contracts

.1 Work not to be included in the Contract, as noted "NIC" on the Drawings.

1.4 Specifications language, definitions and writing style

.1 These specifications are written in the imperative mood and in streamlined form. The imperative language is directed to Contractor, unless stated otherwise.

.2 Complete sentences by reading "shall", " Contractor shall", "shall be", and similar phrases by inference. Where a colon (:) is used within sentences and phrases, read the words "shall be" by inference.

.3 Fulfill and perform all indicated requirements whether stated imperatively or otherwise.

.4 When used in the context of a Product, read the word “provide” to mean “supply and install to result in a complete installation ready for its intended use”.

.5 When used in the context of the Contract Documents, read the word “Contractor” to mean “General Contractor” and/or “Construction Manager”, and the word “Subcontractor” to mean “Subcontractor” and/or “Subtrade”.

.6 When used in the context of the Contract Documents, the words “Consultant”, “Owner” and “Working Day” are modified by Appendix B – Supplementary Conditions.

.7 When used in the context of the Contract Documents, read the word “building” to mean “all the buildings included in the Contract”.

.8 When used in the context of the Contract Documents, the words "approval", "approved", "direction", "directed", "selection", "selected", "request", "requested", "report", and similar words are used, such approvals, directions, selections, requests and reports shall be given by the Consultant in writing unless specifically stated otherwise.

.9 Wherever in the Contract Documents it is specified that work is “to proceed” or to “meet approval, direction, selection or request” of “authorities having jurisdiction” or others, such approval, direction, selection or request shall be in writing.

.10 When used in the context of the Contract Documents, read the word "supply" to mean “the work specified to be supplied includes delivery to site and unloading at location directed”.

.11 When used in the context of the Contract Documents, read the word “installed” to mean “that the work specified for installation includes uncrating, unpacking, etc; moving from stored location to place of installation; and installing to meet specified requirements”.

.12 Wherever in the Contract Documents or as directed by the Consultant it is specified that work shall be repaired, made good or replaced, it shall be performed without any additional cost to the Owner.

.13 When used in the context of the Contract Documents, the term "and/or" is used, the Contractor shall decide which of the possible meanings, to be derived at from the sentence where this term occurs shall govern.

1.5 Dimensions

.1 Do not scale directly from Drawings. Obtain clarification from the Consultant if there is ambiguity or lack of information.

.2 Details and measurements of any Work which is to fit or to conform with Work installed shall be taken at the Place of the Work.

.3 Verify dimensions at the Place of the Work before commencing Shop Drawings or other submittals. Before fabrication commences report discrepancies to the Consultant in writing. Incorporate accepted variances on Shop Drawings and as-built records.

.4 In areas where equipment is scheduled to be installed, check dimensional data on equipment to ensure that the area and equipment, including future known equipment are compatible with necessary access and clearances provided. Equipment supplied shall be dimensionally suitable for space allocation.

.5 Verify that the Work is executed in accordance with dimensions and positions indicated which maintain levels and clearances to adjacent Work, as set out in accordance with the requirements of the Contract Documents and ensure that Work installed in error is rectified at Contractor’s expense before construction continues.

.6 Owner will accept no claims for extra expense on the part of the Contractor for non-compliance.

1.6 References

.1 Refer to and acknowledge other words, terms, and definitions in CCDC 2-2020 Definitions.

1.7 Construction documents for construction purposes

.1 The Owner will supply Contractor with a complete set of Contract Documents in electronic form before commencement of the Work. Contractor may print hard copies for construction purposes as required.

.2 Drawings, Specifications, and schedules are complementary each to the other and what is called for by one to be binding as if called for by all. Should any discrepancy appear between documents which leave doubt as to the intent or meaning, abide by Precedence of Documents article below or obtain direction from the Consultant.

.3 Drawings indicate general location and route of conduit and wire/conductors. Install conduit or wiring/conductors and plumbing piping not shown or indicated diagrammatically in schematic or riser diagrams to provide an operational assembly or system.

.4 Install components to physically conserve headroom, to minimize furring spaces, or obstructions.

.5 Locate devices with primary regard for convenience of operation and usage.

.6 Examine all discipline Drawings, Specifications, and schedules and related Work to ensure that Work can be satisfactorily executed. Conflicts or additional work beyond work described to be brought to attention of Consultant.

1.8 Division of the work

.1 Division of the Work among Subcontractors, Suppliers and vendors is solely the Contractor's responsibility. Neither the Owner nor Consultant assumes any responsibility to act as an arbiter to establish subcontract terms between sectors or disciplines of work.

.2 Refer to the Contract Documents for the required Work.

.3 Division 01 General Requirements, of the Specification generally specify work and coordination of the work that is the direct responsibility of the

Contractor but shall not be interpreted to define absolutely the limits of responsibility that must be established between the Contractor and their Subcontractors by their separate agreements.

.4 Ensure that Subcontractors understand that the General Conditions of the Contract as amended by the Supplementary Conditions, and Division 01 General Requirements, apply to Sections of the Specification governing their work.

.5 Ensure that the work includes all labour, equipment and products required, necessary or normally recognized as necessary for the proper and complete execution of the work of each trade.

.6 The Work also includes the examination of the site, submission of samples, scheduling and coordination, project meetings, protection of the existing facility, repair and preparation of surfaces, quality control, inspection reports, project cleanliness, maintenance of data, preparation of as-built drawings, final cleaning and warranty.

1.9 Construction schedule

.1 Refer to Appendix B – Supplementary Conditions to CCDC 2-2020; Article A-1 – The Work, for the following milestone dates:

.1 Number of weeks required to attain Ready-for-Takeover milestone;

.2 Number of weeks required to attain completion.

1.10 Coordination with other disciplines work

.1 Coordination of the installation of systems specified by Mechanical and Electrical Engineers, including the interrelating operation and functioning between components of a system and between systems, is the responsibility of those performing the work, with final coordination the responsibility of the Contractor.

.2 Provide interference drawings as herein specified to ensure proper co-ordination of subtrade work. No extras will be considered for work not properly coordinated prior to installation.

.3 Ensure that service poles, pipes, conduit, wires, fill-pipes, vents, regulators, meters and similar Project service work is located in

inconspicuous locations. If not indicated on Drawings, verify location of service work with Consultant before commencing installation.

1.11 Discrepancies and clarifications

.1 Advise Consultant of discrepancies discovered in requirements of the Contract Documents and request clarification from Consultant in written form.

.2 Advise Consultant when clarifications are required pertaining to meaning or intent of requirements of Contract Documents and request clarification from Consultant in written form.

.3 Do not proceed with related work until written clarification is provided by Consultant.

.4 Failure to notify Consultant shall result in Contractor incurring responsibility for resulting deficiencies and expense at no additional cost to the Owner.

.5 Written instructions issued by Consultant for clarification, implicitly supersede applicable and relevant aspects of the Contract Documents irrespective of whether these documents are explicitly or specifically cited in clarification requests or clarification instructions.

1.12 Standards and codes

.1 Contract forms, codes, specifications, standards, manuals and installation, application and maintenance instructions referred to in these specifications, unless otherwise specified, amended or date suffixed, shall be latest published editions at Contract date.

1.13 Documents at the site

.1 Keep the following documents at Place of the Work, stored securely and in good order and available to Owner and Consultant in electronic form (Hard copy forms are an acceptable equivalent to electronic forms):

.1 Current Contract Documents, including Drawings, Specifications, and Addenda;

.2 Change Orders, Change Directives, and Supplementary Instructions;

.3 Reviewed Shop Drawings, product data and samples;

.4 Field test reports and records;

.5 Construction progress schedule;

.6 Meeting minutes;

.7 Manufacturer's certifications;

.8 Permits, inspection certificates, and other documents required by authorities having jurisdiction;

.9 Contractor's health and safety policy;

.10 Ministry of Labour Notice of Project;

.11 Building permit;

.12 Current as-built drawings;

.13 Safety Data Sheets (SDS) for all controlled Products.

1.14 Superintendence

.1 Provide superintendent and necessary supporting staff personnel who shall be in attendance at the Place of the Work while Work is being performed, with proven experience in erecting, supervising, testing and adjusting projects of comparable nature and complexity.

.2 The Contractor shall appoint a superintendent at the Place of the Work who shall have overall authority at the Place of the Work and shall speak for the Contractor and represent the Contractor's interest and responsibilities at meetings at the Place of the Work and in dealings with the Consultant and the Owner.

.3 Supervise, direct, manage and control the Work of all forces carrying out the Work, including Subcontractors and Suppliers. Carry out daily inspections to ensure compliance with the Contract Documents and the maintenance of quality standards. Ensure that the supervisory staff includes personnel competent in supervising all Sections of Work required.

.4 Arrange for sufficient number of qualified assistants to the supervisor as required for the proper and efficient execution of the Work.

.5 Maintain good order and discipline among workers engaged on the project.

1.15 Trademark and labels

.1 Trademarks and labels, including applied labels, shall not be visible in finished work in finished areas, unless otherwise accepted or indicated by Consultant.

1.16 Work by Owner

.1 Permit the Owner and/or their Other Contractors to inspect the work at any reasonable time, and to perform such work and install such equipment as the Owner may require.

1.17 Basis of payment

.1 **There shall be no payment for this Section as no actual Work is specified herein.**

.2 All payment for the Work of the Contract shall be included, properly balanced, in other Sections in Appendix C – Pricing Form as agreed by the Owner prior to commencing the Work.

1.18 Qualifications of Contractor

.1 The Contractor for this Contract shall have the following experience:

.1 Substantially performed at least three (3) projects of similar and related scope, as indicated in the Contract Documents, in the past five (5) years.

.2 Acted in the role of Contractor on two of the three referenced projects.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

- .1 Restrictions on use of premises
- .2 Work sequence
- .3 Owner occupancy of spaces outside of this Contract
- .4 Partial owner occupancy of spaces under this Contract
- .5 Interruption of existing services / utilities
- .6 Site access by the Contractor
- .7 Working hours
- .8 Restricted hours of Work – Special requirements
- .9 Contact for after-hours or emergency services
- .10 Maintaining life safety systems in occupied facilities
- .11 Cold weather construction
- .12 Security and protection of construction site and equipment
- .13 Police record check / non-disclosure agreement (NDA)

1.2 Restrictions on use of premises

.1 Limit use of premises for Work and storage required to complete the Project, and to allow the following:

- .1 Partial Owner occupancy.
- .2 Work by Other Contractors.
- .3 Tenant usage.

.2 Coordinate use of premises under direction of the Consultant.

1.3 Work sequence

.1 Schedule and construct Work in stages to accommodate Owner's continued use of premises during construction.

.2 Schedule and construct Work in stages to provide for continuous public usage. Do not close off public usage of facilities until use of one stage of Work will provide alternate usage.

.3 Required stages:

.1 Refer to drawings for details.

.2 Stage 1: Completion of paving for temporary access for tenants/visitors/Region at south of building at Common Room.

.3 Stage 2: Closure of main building entrance at SE of building and east exterior door near stairwell for ramp and elevator work.

.4 Stage 3: Completion of ramp and elevator installation.

.5 Stage 4: Reopen front entrance to building.

1.4 Owner occupancy of spaces outside of this Contract

.1 The building and parking areas, which are not immediately affected by the Work, will remain occupied by the Owner during the Work. Cooperate with Owner in scheduling operations to minimize disruptions and to facilitate Owner usage.

.2 Maintain continuation of fire protection in existing building.

.3 Maintain existing exits and ensure that proper and safe means of egress from all parts of existing building to open spaces are provided at all times to the approval of authorities having jurisdiction. Locate and install exit lights, and illuminate temporary means of egress, where required.

.4 Maintain access to service and delivery entrances.

.5 Maintain security of existing building during the Work.

1.5 Partial owner occupancy of spaces under this Contract

.1 Schedule designated portions of Work for Owner's use prior to Ready-for-Takeover.

1.6 Interruption of existing services / utilities

.1 Notify Owner and Consultant and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Owner and Consultant a minimum forty-eight (48) hours of notice for necessary interruption of mechanical or electrical service throughout course of work.

.3 Keep duration of interruptions minimum. In no case shall service interruptions affect the total existing building.

.4 Do not interrupt mechanical or electrical services of the existing building except for temporary close-downs to make connections to new work, and as approved by prior arrangements.

.5 Carry out interruptions after regular working hours of occupants, preferably on weekends, unless Owner's prior written approval is obtained.

.6 Protect and maintain existing active services. Record location of services, including depth, on as-built drawings. Have all utilities located and staked out and provide the Owner with all cable locations supplied by the utilities prior to commencing any excavation or demolition.

.7 Contact the local municipality, utilities or any other agencies for further information regarding the exact location of all existing utilities, to exercise the necessary care in excavation and demolition operations, and to take such precautions necessary to safeguard the utilities from damage.

.8 Arrange with mechanical and electrical Subcontractors to immediately cut off and cap decommissioned services, previously concealed but uncovered during work.

.9 All utilities located within the limits of proposed excavations shall be exposed by hand excavation and carefully supported and protected by the Contractor.

.10 Removal, relocation, or supporting of existing utilities shall be carried out in consultation with the respective authorities:

- .1 Elexicon Energy / Hydro One Connections
- .2 Bell Canada
- .3 Enbridge Gas
- .4 Rogers Cable
- .5 any other utility/Contractor as required.

.11 Should existing services be accidentally uncovered and disrupted, make complete restoration immediately, and ensure adequate protection to avoid further disruption until alternative means of providing permanent continuation of the services are made.

.1 Make restorations to uncovered or disrupted mechanical or electrical services where such services pose a potential health or safety risk.

.2 Restorations shall be an extra to the Contract only where such work could not have been reasonably foreseen by examination at the time of bidding in the sole opinion of the Owner.

.12 Be responsible for paying charges by the Utilities or Agencies for locating cables and pay any charges for repairs and lost revenue if utility equipment, cables, pipes or other assets are damaged and is responsible to make good any ground and surface damages as well.

.13 Make payment for work specified in the foregoing at no additional cost to the Owner if, in the opinion of the Consultant, such work could have been reasonably foreseen by examination at time of bidding and which has been caused by lack of proper care and protection.

.14 Prior to the commencement of demolition, provide a sign-off sheet from the existing water, gas, electrical, telephone, and sewer service providers.

.15 Verify that services are cut off, capped, diverted and/or removed as required by local regulating authorities. Ensure all services are in the proper state prior to commencing work.

.16 Ensure all utilities are capped off at the property line and identify the termination locations on reference drawings.

.17 Unless otherwise specified, restore services on which work is performed to original condition.

.18 No claims will be considered which are based on delays or inconvenience resulting from the removal or relocation of services not being completed before the start of this Contract.

.19 Construct or erect barriers in accordance with Section 01 56 00 as required to protect pedestrian and vehicular traffic.

1.7 Site access by Contractor

.1 Unless stated otherwise, the Contractor will be permitted access to the site from start of construction until Substantial Performance of the Contract.

.2 Access Roads and Walks:

.1 Maintain roads and walks, removing dirt, mud, debris, ice, snow and other obstructions during use.

.2 Provide for access of emergency vehicles at all times.

.3 After Substantial Performance of the Contract, the Contractor shall not enter the facility without prior written authorization from the Owner and the Contractor's activities shall be restricted to the work duly authorized by the Owner, including modifications and rectification of deficiencies. If the Contractor proposes to perform additional work other than the authorized work, further written approval must be obtained by the Contractor from the Owner prior to proceeding with such additional work.

.4 Workers employed on the site shall sign a "Daily Register" provided showing "IN" and "OUT" times and number of hours worked on each shift. Times shall be recorded in 24-hour time (i.e. 00:00 to 23:59).

.5 All Contractor’s workers employed on site shall be orientated by the facility operator prior to start of work.

1.8 Working hours

.1 Carry out Work between the hours of 8:30 a.m. and 4:30 p.m. local time, Monday through Friday except statutory holidays.

.2 If the Contractor wishes to complete any work outside of these regular hours, obtain permission from the facility operator through the Owner at least forty-eight (48) hours prior.

.3 The Owner will not be responsible for additional costs associated with working after regular hours unless such after-hours work is ordered by the Owner and not specified as a requirement in the Contract Documents.

.4 The Owner will not be responsible for additional costs associated with working after regular hours if such after-hours work is required for the Contractor to return to the agreed upon construction schedule.

1.9 Restricted hours of work – Special requirements

.1 Perform “odour-generating work” at Owner-occupied areas:

.1 From Monday to Friday from 8:30 a.m. to 4:30 p.m. only.

.2 On Saturdays, Sundays, and statutory holidays to Owner approval.

.2 Schedule “excessively noisy work” to avoid disturbance to building occupants, as follows:

.1 Monday to Friday from 9:00 p.m. to 5:00 a.m.

.2 On Saturdays, Sundays, and statutory holidays to Owner approval.

.3 Major noise emitting activities shall include activities that generate noise levels above those normally generated by construction activities, such as pile driving, demolition, and the like.

.4 Notify owners and representatives of occupied buildings adjacent to the Place of the Work, as well as the Consultant and the Owner, a minimum of 48 hours prior to undertaking major noise emitting activities, including a description of the nature and extent of such activities. Owner shall provide contact information for representatives of adjacent occupied buildings to the Contractor.

.5 Owner has the right to request immediate cessation of noise or vibration generating activities where occupant safety is in immediate jeopardy.

.6 Use powder actuated devices only with Consultant’s written permission.

.7 Submit schedule of special requirements or disruptions in accordance with Section 01 33 00.

1.10 Contact for after-hours or emergency services

.1 When after-hours work is permitted by the Owner, provide an after-hours phone number to respond to emergencies or requirements that arise when offices are closed.

1.11 Maintaining life safety systems in occupied facilities

.1 Maintain operational life safety systems and public access to exits in occupied areas during all stages of the Work.

.2 Determine nature and exact locations of existing fire and smoke sensors prior to the commencement of the Work. Avoid direct or indirect jarring while working in adjacent areas and exercise caution to avoid triggering these devices.

.3 Be responsible for costs incurred by Owner on account of false fire alarms activated as a result of the execution of the Work without adequate precautions.

1.12 Cold weather construction

.1 Cold weather construction is required.

.2 Commence work immediately upon receipt of the Owner's Order to Commence Work and continue full scale operations throughout the winter months and thereafter until the work is completed and accepted by the Consultant.

.3 Unless it is explicitly specified that a winter shutdown period is acceptable, it is understood that the Contract Price includes sufficient funds for the provision of temporary heating, temporary shelters, insulation and all other necessary cold weather measures to enable the Work to proceed without delay regardless of weather.

1.13 Security and protection of construction site and equipment

.1 Protect the construction site and equipment from damage. Repair any damage to the construction site or equipment to the satisfaction of the Owner.

.2 Take precautions to protect the site and equipment until Completion.

.3 The Owner shall not be responsible for damaged, lost or stolen materials and equipment. Contractor is responsible for all materials and equipment left on site until the work is complete. Provide for proper security or storage of any material or equipment left on site.

.4 When not at the Place of the Work, ensure that the work area is secured, and that all tools and materials are locked up.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

.1 Substitution procedures

.2 Submission requirements for proposed substitutions

.3 Incorporation of specified Products

1.2 Definition

.1 In this Section “substitution” means a Product, a manufacturer, or both, not originally specified in Contract Documents by proprietary name but proposed for use by Contractor in place of a Product, a manufacturer, or both, specified by proprietary name.

1.3 Substitution procedures

.1 Contractor may propose a substitution wherever a Product or manufacturer is specified by proprietary name(s), unless there is accompanying language indicating that substitutions will not be considered.

.2 Contractor may propose a substitution wherever a Product or manufacturer is specified by proprietary name(s) and accompanied by language such as “or approved equivalent”, or other similar words. Do not construe such language as an invitation to unilaterally provide a substitution without Consultant’s prior acceptance in writing. Do not order or install any substitution without a Supplemental Instruction or Change Order.

.3 Provided a proposed substitution submission includes all of the information specified in this Section under submission requirements for proposed substitutions, Consultant will promptly review and accept or reject the proposed substitution.

.4 Consultant may accept a substitution if satisfied that:

.1 The proposed substitute Product is the same type as, is capable of performing the same functions as, interfaces with adjacent work the same as, and meets or exceeds the standard of quality,

performance and, if applicable, appearance and maintenance considerations, of the specified Product;

.2 The proposed substitute manufacturer has capabilities comparable to the specified manufacturer, and;

.3 The substitution provides a benefit to Owner.

.5 If Contractor fails to order a specified Product or order a Product by a specified manufacturer in adequate time to meet Contractor's construction schedule, Consultant will not consider that a valid reason to accept a substitution.

.6 If Consultant accepts a substitution and subject to Owner's agreement, the change in the Work will be documented in the form of either a Supplemental Instruction or Change Order.

.1 The approval or rejection of a proposed substitution shall be at the discretion of the Consultant whose decision shall be final. Regardless of the Consultant's decision on a proposed substitution, the Owner reserves the right to assess to the Contractor all costs of the Consultant and the Owner related to their review of the proposed substitution.

.2 The Contractor's Tendered Price shall be based on the Products specified. No tender shall be based on a presumed acceptance by the Consultant of a substitute Product.

.7 If a substitution is accepted in the form of a Supplemental Instruction or Change Order, Contractor shall not revert to an originally specified Product or manufacturer without Consultant's prior written acceptance.

.8 The Contractor shall assume all responsibility for liabilities and additional costs that may subsequently arise as a result of their proposed substitution being accepted by the Consultant.

.9 Any design or construction changes necessitated by the use of substituted Products shall be at the expense of the Contractor. The Contractor shall be responsible for assuring the proper fit and matching of all substituted Products to the surrounding pipe, equipment or materials.

.10 Owner is under no obligation to accept proposed substitute Products unless the Contractor can provide evidence satisfactory to the Consultant

that such proposed substitute Product meets or exceeds the specified performance and other criteria.

1.4 Submission requirements for proposed substitutions

.1 Include with each proposed substitution the following information:

.1 Identification of the substitution, including product name and manufacturer's name, address, telephone numbers, and web site.

.2 Reason(s) for proposing the substitution.

.3 A statement verifying that the substitution will not affect the Contract Price and Contract Time or, if applicable, the amount and extent of a proposed increase or decrease in Contract Price and Contract Time on account of the substitution.

.4 A statement verifying that the substitution will not affect the performance or warranty of other parts of the Work.

.5 Manufacturer's Product literature for the substitution, including material descriptions, compliance with applicable codes and reference standards, performance and test data, compatibility with contiguous materials and systems, and environmental considerations.

.6 Product samples as applicable.

.7 A summarized comparison of the physical properties and performance characteristics of the specified Product and the substitution, with any significant variations clearly highlighted.

.8 Availability of maintenance services and sources of replacement materials and parts for the substitution, as applicable, including associated costs and time frames.

.9 If applicable, estimated life cycle cost savings resulting from the substitution.

.10 Details of other projects and applications where the substitution has been used.

.11 Identification of any consequential changes in the Work to accommodate the substitution and any consequential effects on the performance of the Work as a whole. A later claim for an increase to the Contract Price or Contract Time for other changes in the Work attributable to the substitution will not be considered.

1.5 Incorporation of specified Products

.1 Coordinate the installation of the selected Products into the Work:

.1 Make any changes in the Work as may be required to accommodate the selected Products.

.2 Notify Consultant where a selected Product is inconsistent with the layouts and configurations indicated on Drawings and Schedules.

.3 Bear costs and waive claims for additional compensation for costs that are implicit in the use of the selected Products.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

- .1 Schedule of Labour Rates
- .2 Requests for Interpretation (RFIs)
- .3 Supplemental Instructions
- .4 Method of Contract Price Adjustment - Change Orders
- .5 Method of Contract Price Adjustment - Change Directive

1.2 Schedule of labour rates

.1 Prior to the first application for payment, submit for the Consultant's review a schedule of labour rates for all trades and classifications of trades, such as journeymen, apprentices, and foremen that will be employed in the Work. Provide a breakdown of payroll burden component of labour rates.

.2 Labour rates shall reflect the salaries, wages, and benefits paid to personnel in the direct employ of the Contractor, Subcontractors, and sub-Subcontractors, stated as hourly rates, that will be used when:

- .1 Preparing price quotations for Change Orders, and;
- .2 Determining the cost of work attributable to Change Directives.

.3 Labour rates stated in the schedule of labour rates shall be consistent with rates that will actually be paid, and payroll burden costs that will actually be incurred, in the normal performance of the Work, during regular working hours. Labour rates shall not include any additional overhead and profit component.

.4 Where collective agreements apply, the labour rates shall not exceed those established by collective agreement.

.5 Obtain the Owner's written acceptance of the schedule of labour rates before submitting the first Change Order quotation.

.6 Accepted schedule of labour rates will be used solely for evaluating Change Order quotations and cost of performing work attributable to Change Directives.

.7 The Contractor may request amendments to the accepted schedule of labour rates if changes in the labour rates that will actually be paid, or payroll burden cost that will actually be incurred, in the normal performance of the Work can be demonstrated. Obtain the Owner's written acceptance of such changes.

1.3 Request for interpretation (RFI)

.1 A request for interpretation (RFI) is a formal process used during the Work to obtain an interpretation of the Contract Documents.

.2 Submittal procedures:

.1 RFI form:

.1 Submit Contractors' standard RFI on "Request for Interpretation" form. The Consultant shall not respond to an RFI except as submitted on an RFI form.

.2 Where RFI form does not provide sufficient space for complete information to be provided thereon, attach additional sheets as required.

.3 Submit with RFI form necessary supporting documentation.

.2 RFI log:

.1 Maintain log of RFIs sent to and responses received from the Consultant, complete with corresponding dates.

.2 Submit updated log of RFIs with each progress draw submittal.

.3 Submit RFIs sufficiently in advance of affected parts of the Work so as not to cause delay in the performance of the Work. Costs resulting from failure to do this will not be paid by the Owner.

.4 RFIs shall be submitted only to the Consultant.

.5 RFIs shall be submitted only by Contractor. RFIs submitted by Subcontractors or Suppliers shall not be accepted.

.6 Number RFIs consecutively in one sequence in order submitted.

.7 Submit one distinct RFI per RFI form.

.8 Consultant shall review RFIs from the Contractor submitted in accordance with this Section, with the following understandings:

.1 Consultant's response shall not be considered as a Change Order or Change Directive, nor does it authorize changes in the Contract Price or Contract Time or changes in the Work.

.2 Only the Consultant shall respond to RFIs. Responses to RFIs received from entities other than the Consultant shall not be considered.

.9 Allow five (5) Working Days for review of each RFI by the Consultant.

.1 Consultant's review of RFI commences on date of receipt by the Consultant of RFI submittal and extends to date RFI returned by Consultant.

.2 When the RFI submittal is received by Consultant before noon, review period commences that day; when RFI submittal is received by Consultant after noon, review period begins on the next Working Day.

.10 Contractor shall satisfy itself that an RFI is warranted by undertaking a thorough review of the Contract Documents to determine that the claim, dispute, or other matters in question relating to the performance of the Work or the interpretation of the Contract Documents cannot be resolved by direct reference to the Contract Documents.

.11 Contractor shall describe in detail this review on the RFI form as part of the RFI submission. RFI submittals that lack such detailed review description, or where the detail provided is, in the opinion of the Consultant, insufficient, shall not be reviewed by the Consultant and shall be rejected.

1.4 Supplemental Instructions

.1 The Consultant may issue Supplemental Instructions to provide clarifications to the Contract Documents, provide additional information, or make minor variations in the Work not involving adjustment in the Contract Price or Contract Time.

.2 If the Contractor considers a Supplemental Instruction to require an adjustment in Contract Price or Contract Time, the Contractor shall promptly notify the Consultant and the Owner in writing and shall not

proceed with any work related to the Supplemental Instruction pending receipt of a Change Order, a Change Directive, or, in accordance with the dispute resolution provisions of the General Conditions of Contract, a Notice in Writing of a dispute and instructions to proceed.

1.5 Method of contract price adjustment - Change orders

.1 Unless otherwise agreed, the adjustment of the Contract Price on account of a proposed change in the Work shall be based on a quotation for a price increase or decrease to the Contract Price regardless of the Contractor's actual expenditures and savings.

.2 For procedures and fees associated with Change Orders, refer to GC 6.2 Change Order within CCDC 2-2020 and Appendix B - Supplementary Conditions.

1.6 Method of contract price adjustment - Change directives

.1 Unless the Owner and the Contractor reach an earlier agreement on the adjustment to the Contract Price by means of a Change Order that cancels the Change Directive, the adjustment in the Contract Price for change carried out by way of a Change Directive shall be determined as specified in GC 6.3 Change Directive within CCDC 2-2020 and Appendix B - Supplementary Conditions.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

- .1 Construction act holdback
- .2 Submission of proper invoices for payment
- .3 Workers' compensation clearance
- .4 Statutory declarations
- .5 Payment for products stored off site

1.2 Construction act holdback

.1 In accordance with the Construction Act, a 10% holdback will be deducted from each progress payment.

.2 The Owner shall have the right to withhold the 10% Construction Act regular and finishing holdbacks until the Owner is in receipt of the submissions specified in Section 01 33 00, for submissions at Substantial Performance of the Work and submissions at completion, as applicable.

1.3 Submission of proper invoices for payment

.1 In accordance with Appendix B – Supplementary Conditions, applications for payment shall be preceded by a payment review meeting to be held no less than five (5) Working Days before the end of the monthly payment period.

.2 In accordance with Appendix B – Supplementary Conditions, email draft invoices to the Consultant and the Owner at least one (1) Working Day prior to the scheduled monthly payment review meeting.

.3 At the payment review meeting, review with Owner and Consultant the Contractor's draft invoice, status of Change Orders and Change Directives, holdbacks and net amount due for that billing period.

.4 Consultant and Owner will provide a marked-up copy of the Contractor's draft invoice within five (5) Working Days of the payment review meeting.

.5 **Submit Proper Invoice by email to the Owner's Project Manager, Mr. Rafaelo Giovanniello and the Contract Services Coordinator, Ms. Sally Arnott** for processing no earlier than five (5) Working Days after the end of the billing period. **Do not mail a hardcopy**. Ensure Proper Invoice complies with all requirements detailed in Appendix B – Supplementary Conditions. Email title shall include "**URGENT – PROGRESS PAYMENT REQUEST for Contract T-1013-2024**" and be marked as High Priority.

1.4 Workers' compensation clearance

.1 Submit proof of workers' compensation clearance with each application for payment.

1.5 Statutory declarations

.1 Submit a statutory declaration in the form of CCDC 9A-2018 – Statutory Declaration of Progress Payment Distribution by Contractor with each application for payment except the first.

1.6 Payment for products stored off site

.1 Owner may, due to extraordinary circumstances and at Owner's sole discretion, make payments for Products delivered to and stored at a location other than Place of the Work, subject to:

.1 A request submitted by Contractor in writing, with appropriate justification, and;

.2 Whatever conditions Owner or Consultant may establish for such payments, as required to protect Owner's interests.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

.1 Administrative Requirements

.2 Construction Start-Up Meeting

.3 Progress Meetings

.4 Pre-Installation Meetings for Complex Equipment/Systems

.5 Pre-Takeover Meeting

.6 Post-Construction Meeting

1.2 Administrative requirements

.1 Responsibility matrix outlined below identifies parties responsible for scheduling meetings, preparing meeting agenda, taking meeting minutes and distribution of information (meeting agenda and minutes) to all required parties.

Meeting Type	Task	Consultant's Responsibility	Contractor's Responsibility
Construction Start-Up Meeting	Scheduling of Meeting	X	
	Preparing Meeting Agenda	X	
	Taking Meeting Minutes	X	
	Distribution of Information	X	
Progress Meetings	Scheduling of Meeting	X	
	Preparing Meeting Agenda	X	
	Taking Meeting Minutes	X	
	Distribution of Information	X	
Pre-Installation Meetings for Complex Equipment/Systems	Scheduling of Meeting		X
	Preparing Meeting Agenda		X
	Taking Meeting Minutes		X
	Distribution of Information		X

Meeting Type	Task	Consultant's Responsibility	Contractor's Responsibility
Pre-Takeover Meeting	Scheduling of Meeting		X
	Preparing Meeting Agenda		X
	Taking Meeting Minutes		X
	Distribution of Information		X
Post-Construction Meeting	Scheduling of Meeting	X	
	Preparing Meeting Agenda	X	
	Taking Meeting Minutes	X	
	Distribution of Information	X	

.2 Representatives of parties attending meetings shall be authorized to act on behalf of the parties they represent. Subcontractors and Suppliers do not attend meetings unless authorized by the Consultant and the Owner.

1.3 Construction start-up meeting

.1 Within five (5) Working Days after award of Contract, request a meeting of parties in Contract to discuss and resolve administrative procedures and responsibilities prior to the commencement of the Work.

.2 The Owner, the Consultant, the Contractor, site superintendent(s), inspection and testing company, and authorities having jurisdiction, as applicable and at their discretion, will be in attendance.

.1 Coordinate and organize attendance at the pre-construction meeting by representatives of major Subcontractors and other parties in contract with the Contractor.

.2 Owner will arrange attendance of other interested parties not responsible to the Contractor.

.3 The Consultant shall organize and chair the contract start-up meeting. Consultant shall record minutes of the contract start-up meeting and distribute a copy to each participant within five (5) Working Days of meeting.

.4 Agenda to include, but not limited to the following:

.1 Appointment of official representatives of Owner, Contractor, Subcontractors, Consultant, and subconsultants;

.2 Project communications;

.3 Contract Documents for construction purposes;

.4 Documents at the site;

.5 Contractor’s use of premises;

.6 Owner-supplied Products;

.7 Work restrictions;

.8 Substitution procedures;

.9 Contract modification procedures;

.10 Payment procedures;

.11 Construction progress meetings;

.12 Construction progress schedule, including long lead time items;

.13 Submittals schedule and procedures;

.14 Special procedures;

.15 Quality requirements, including testing and inspection procedures;

.16 Contractor’s mobilization;

.17 Temporary utilities;

.18 Existing utility services;

.19 Construction facilities;

.20 Temporary barriers and enclosures;

.21 Temporary controls;

.22 Field engineering and layout of work;

.23 Site safety;

.24 Site security;

.25 Cleaning and waste management;

.26 Closeout procedures and submittals;

.27 Demonstration and training (when required on the Project);

.28 Commissioning (when required on the Project).

1.4 Progress meetings

.1 Consultant’s responsibilities for progress meetings:

.1 Schedule construction progress meetings for the duration of the Work.

.2 Prepare meeting agendas, chair the meetings, and record and distribute the minutes.

.3 Arrange for and provide physical space for meetings.

.4 Record in the meeting minutes significant decisions and identify action items and action dates by attendees or the parties they represent.

.5 Distribute copies of minutes within three (3) Working Days after each meeting to attendees and any affected parties who may not be in attendance.

.2 Contractor's responsibilities for progress meetings:

.1 Ensure that Subcontractors attend as and when appropriate to the progress of the Work.

.3 Agenda for each meeting shall include the following, as a minimum:

.1 Approval of minutes of previous meeting, where required;

.2 Work progress since previous meeting;

.3 Field observations, including any problems, difficulties, or concerns;

.4 Construction progress schedule;

.5 Submittals schedule;

.6 Proposed changes in the Work;

.7 Requests for information;

.8 Site safety issues; and

.9 Other business.

1.5 Pre-installation meetings for complex equipment/systems

.1 Contractor's responsibilities for pre-installation meetings:

.1 Schedule pre-installation meetings, when necessary, for installation of complex equipment or systems. Ensure coordination with the Contract Documents, location of anchoring points/devices, location of required structural supports, and discuss any conditions that would impact the installation of the equipment/system in question.

.2 As far as possible, schedule pre-installation meetings to take place on the same day as regularly scheduled progress meetings.

.2 Agenda to include the following:

.1 Review of existing conditions and affected work and testing thereof as required.

.2 Review of installation procedures and requirements.

.3 Review of environmental and site condition requirements.

.4 Requirements for inspections and tests, as applicable.

.5 Special safety requirements and procedures.

.3 The following shall be in attendance:

.1 Contractor.

.2 Subcontractors affected by the work for which the pre-installation meeting is being conducted.

.3 Consultant.

.4 Manufacturer’s representatives, as applicable.

.5 Inspection and testing company, as applicable.

1.6 Pre-takeover meeting

.1 Prior to application for Substantial Performance of the Work, the Contractor shall schedule a pre-takeover meeting.

.2 Agenda to include the following:

.1 Review, approval of proceedings of previous meeting.

.2 Review of items arising from proceedings.

.3 Review of procedures for Substantial Performance of the Work, completion of the Contract, and handover of the Work.

.4 Field observations, problems, conflicts.

.5 Review of outstanding Contract modifications and interpretations including, but not limited to the following:

.1 Requests for interpretation (RFI) and log;

.2 Proposed Change Orders, Change Orders, and Change Directives;

.3 Supplemental Instructions, for effect on construction schedule and on Contract Time.

.6 Problems which impede Substantial Performance of the Work.

.7 Review of procedures for deficiency review. Corrective measures required.

.8 Progress, schedule, during succeeding period of the Work.

.9 Review submittal requirements for warranties, manuals, and all demonstrations and documentation required for Substantial Performance of the Work.

.10 Review of status of close-out documentation.

.11 Other business.

1.7 Post-construction meeting

.1 Prior to application for completion of Contract, the Consultant shall schedule a post-construction meeting.

.1 Three (3) Working Days prior to date for meeting, Consultant shall confirm the meeting based on evaluation of completion requirements.

.2 Agenda to include the following:

.1 Review, approval of proceedings of previous meeting.

.2 Confirmation that no business is arising from proceedings.

.3 Confirmation of completion of the Contract, and handover of reviewed documentation from the Consultant to the Owner.

.4 Confirmation of completion of proposed Change Orders, Change Orders, Change Directives, and Supplemental Instructions.

.5 Problems that impede Contract completion.

.6 Identify unresolved issues or potential warranty problems.

.7 Confirmation of completion of deficiencies.

.8 Corrective measures required.

.9 Confirm submittal requirements for warranties, manuals, and demonstrations and documentation for Contract completion are in order.

.10 Review of procedures for communication during post-construction period.

.11 Handover of reviewed record documents by the Consultant to the Owner.

.12 Handover of Contract completion insurance policy transcripts by Contractor.

.13 Submission of final application for payment.

.14 Review and finalize outstanding claims, pricing, and allowance amounts.

.15 Status of commissioning and training.

.16 Demobilization and the Place of the Work restoration.

.17 Review of requests for interpretation log.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 This Section specifies Contractor's responsibilities for preparation and submission of schedules and other documentation related to tracking construction progress.

.2 The purpose of submitting progress schedules is to:

.1 Inform Owner and Consultant of actual progress versus planned progress, and;

.2 Provide assurance that scheduling issues are being proactively identified and addressed in a timely manner, and that planned progress is being maintained as closely as possible.

1.2 Construction progress schedule

.1 Format and content:

.1 Prepare schedule in the form of a Critical Path Method (CPM) Gantt chart using appropriate scheduling software, as approved by the Consultant.

.2 Provide a work breakdown structure identifying key activities, work packages, and major milestones, including long delivery Products, inspection and testing activities, preparation and review of mock-ups, Owner decisions for cash allowances, shutdown or closure activities, demonstration and training activities, and similar items, at a sufficient level of detail to effectively manage construction progress.

.3 Provide a separate line for each required submittal, organized by Specifications section names and numbers, and further broken down by individual Products and systems as required.

.1 For each required submittal, show planned earliest date for initial submittal and latest date for return of reviewed submittal without causing delay.

.2 Allow time in schedule for resubmission of submittals, should resubmission be necessary.

.4 Submit updated cash flow diagram quarterly.

.1 Cash flow diagram shall be in format acceptable to the Owner.

.2 Cash flow diagram shall represent Contractor's anticipated invoicing.

.2 Submission:

.1 Submit a preliminary schedule to Owner and Consultant within fifteen (15) Working Days after Contract award.

.2 Submit schedule via e-mail as a pdf. File, unless otherwise noted.

.3 Consultant will review format and content of initial schedule and request necessary changes, if any, within five (5) Working Days after receipt.

.4 If changes are required, resubmit finalized initial schedule within five (5) Working Days after return of review copy.

.5 Submit updated construction schedule with each application for payment and whenever requested by the Consultant, identifying changes since the previous version.

.6 At each regular progress meeting, review and discuss current construction progress and submittals schedules with Consultant and Owner, including activities that are behind schedule and planned measures to regain schedule slippage in key areas on or near the critical path.

.1 Construction schedule updates include, but are not limited to the following:

.1 Indicate projected percentage of completion of each item as of first day of month;

.2 Indicate progress of each activity to date of submission schedule;

.3 Indicate changes occurring since previous submission of schedule, such as:

.1 Major changes in scope;

.2 Activities modified since previous submission;

.3 Revised projections of progress and completion;

.4 Other identifiable changes.

.4 Provide a narrative report to define:

.1 Problem areas, anticipated delays, and impact on schedule;

.2 Corrective action recommended and its effect;

.3 Effect of changes on schedules of Other Contractors.

.3 Submission of the schedules referred to in this Section shall constitute the Contractor's representation that:

.1 Contractor and its Subcontractors intend to execute the Work in the sequence indicated on the proposed schedule;

.2 Contractor has distributed the proposed schedule to its Subcontractors for their review and comment, and has obtained their agreement;

.3 All elements of the Work required for the performance of the Contract are included. Failure to include any such element shall not excuse the Contractor from completing the Work within the Contract Time and within any other constraints specified in the Contract;

.4 Seasonal weather conditions have been considered and included in the planning and scheduling of the Work influenced by high and low ambient temperatures and/or precipitation;

.5 Contractor has thoroughly inspected the Site and has incorporated any other special conditions in planning the Work such as specified or required non-work periods, etc.

1.3 Extension of Contract Time

.1 Submit to the Consultant, justification, project schedule data and supporting evidence for approval of extension to the Contract Time or interim milestone date when required. Include as part of supporting evidence:

.1 Written submission of proof of delay based on revised activity logic, duration and costs, showing time impact analysis illustrating

influence of each change or delay relative to approved Contract Schedule.

.2 Prepared schedule indicating how change will be incorporated into the overall logic diagram. Demonstrate perceived impact based on date of occurrence of change and include status of construction at that time.

.3 Other supporting evidence requested by the Consultant.

1.4 Progress reporting

.1 Monthly progress reports shall be prepared by the Contractor and submitted to the Consultant in the form an electronic copy of the relevant schedule files, to demonstrate how the Work is actually progressing and the planned and detailed sequencing of the Work at the time of the report. The cut-off date for the monthly progress report shall be as instructed by the Consultant and the report shall be submitted no later than ten (10) Working Days after the cut-off date and accompanying the monthly progress draw.

.2 Each monthly progress report shall be in a format acceptable to the Owner, and shall be arranged according to the following headings and sub-headings:

.1 Executive Summary.

.1 Activity to (date).

.2 Forecast activity to (date).

.2 Project Cost Information:

.1 Budget Summary.

.2 Cash Allowance Log.

.3 Change Order Log.

.3 Project Data:

.1 Project Schedule.

.2 Shop Drawing Log.

.3 Site Inspection Log.

.4 Site Testing Log.

.4 Critical Issues Log.

.5 Site Photos.

.3 Each monthly progress report shall include:

.1 An updated progress schedule, comparing actual and target progress for all milestones and activities. Sort activities by activity identification number and accompany with descriptions. List early and late start and finish dates together with durations, codes and float.

.2 Criticality report listing activities and milestones with up to five (5) days of total float used as first sort for ready identification of near critical paths through entire project. List early and late starts and finishes dates, together with durations, codes and float for critical activities.

.3 Progress report in early start sequence, listing for each trade, activities due to start, to be underway, or finished within two months from monthly update date. List activity identification number, description and duration. Provide columns for entry of actual start and finish dates, duration remaining and remarks concerning action required.

.4 A schedule narrative, including:

.1 Detailed descriptions of progress, including each stage of procurement, fabrication, delivery to site, construction, installation, and testing;

.2 Discussion of the basis for any work sequencing, logic, interdependencies or original activity duration revisions incorporated into an updated progress schedule; and

.3 Comparisons of actual and planned progress, with a brief commentary on any actual or forecast delays or problems that might have an impact on the completion. date of the Work, and a discussion of the measures being (or to be) adopted to overcome these.

.5 Charts showing the status of submittals, permits and approvals, utility relocations, purchase orders, manufacturing/fabrication and construction.

.6 For each fabricated item, the name and location of the fabricator, percentage progress, and the actual or expected dates of

commencement of fabrication, Contractor's inspections, tests and delivery.

.7 Progress photographs taken, prepared, and submitted in formats specified.

.8 RFI log.

.4 Timely submission of updates is of significant and crucial importance to the management of this project. Lack of or late receipt of updates diminishes their value to the Owner and the Consultant. Therefore, if the Contractor fails to submit any progress schedule or required revision to a progress schedule within the prescribed time period, the Owner, in its sole discretion, may hold back subsequent progress payments until the updated schedule is submitted or the revision is accepted.

.5 The monthly progress reports and progress schedules will be used by the Owner and the Consultant to monitor the Contractor’s performance against the current Contract Schedule.

1.5 Recording actual site conditions on as-built drawings

.1 Obtain from Consultant an electronic copy of the construction Drawings for the purpose of creating as-built drawings. Record information in electronic form, clearly identifying as-built deviations from the originally obtained construction Drawings.

.2 Clearly label each drawing as “AS-BUILT DRAWING”. Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.3 Record actual construction including:

.1 Measured depths of elements of foundation in relation to finish first floor datum;

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements;

.3 Measured locations of pipes, ducts, conduits, outlets, fixtures, access panels, and appurtenances, referenced to visible and accessible features of construction;

.4 Field changes of dimension and detail;

.5 Changes made by Change Orders and Supplemental Instructions;

.6 References to Shop Drawings, where Shop Drawings show more detail.

.4 Do not use as-built drawings for construction purposes.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 This Section includes suggested methods for establishing interference and coordination Drawings and documents for the project, including sharing of Building Information Modelling (BIM) Project Files, and is intended to assist with communications management and consistency by establishing protocols, procedures and limitations for the following:

.1 Interoperability, compatibility and formats of system components used to convey information.

.2 Use of BIM Project Files.

.2 Consultant is providing BIM Project Files in native formats where applicable and in generic conversion file using agreed upon generic formats to aid in document production for the convenience of the Contractor, Subcontractors and others contributing to the digital documentation process described in this Section.

1.2 Definitions

.1 Contract Documents: Drawings, Specifications and schedules, addenda and bid revisions and other documents issued during the Bid Period and that are listed in the Articles of Agreement in the Contract; BIM Project Files are issued for the convenience of the Contractor and are not Contract Documents.

.2 Building Information Modelling (BIM) Project Files: A virtual representation of the physical and functional characteristics of the project through an accumulation of information at various design and documentation stages of development starting from project inception through to completion.

1.3 Submittals

.1 Submit interference and coordination drawings for installation of mechanical and electrical Work, where applicable and all other applicable Divisions for efficient use of available space, for proper sequence of installation, and to resolve conflicts with the work of all Sections.

1.4 Interference and coordination Drawing requirements

.1 Coordinate sequencing of Work, placement of Products and arrangement of services of various Subcontractors and Other Contractors to assure the best arrangement of pipes, conduits, ducts, equipment, supports and other items in the available space.

.2 Under no circumstances will any claim for extra cost be allowed due to the failure by the Contractor to coordinate Work.

.3 Prepare interference and coordination drawings, showing the work of various Subcontractors and submit drawings to the Consultant for approval before commencing Work.

.4 Take field dimensions relative to this Work.

.5 Fabricate and erect work to suit field dimensions and field conditions.

.6 Provide all forms, templates, anchors, sleeves, inserts and accessories required to be fixed to or inserted in the Work and set in place or instruct the related Subcontractors as to their location.

.7 Pay any extra costs caused by, and make up time lost resulting from, failure to furnish the necessary cooperation, information or items to be fixed-to or built-in, in adequate time.

.8 Coordinate placement of equipment to ensure that components will be properly accommodated within spaces shown in the Contract Documents prior to commencement of Work.

.9 In areas where equipment and services are exposed exercise care to organize and layout services in an organized and orderly manner.

.10 Where possible services run services parallel or at right angles to one another as required.

.11 Consultant may request that service layout be reconfigured to suit sightline concerns during the interference and coordination drawings review phase. Revise drawings accordingly at no additional cost to the Owner.

2 Products

2.1 Documentation

.1 BIM Project Files Prepared by Consultant: Consultant has created digital databases, building models, drawings, specifications and other documentation that will be used to communicate the requirements of the project and administer the Contract and will share this information with the Contractor under the following conditions:

.1 Consultant makes no claim as to the accuracy of BIM Project Files or the interpretations made by subsequent developers and contributors to BIM Project Files for their individual contributions; Control of the Work remains with the Contractor in accordance with the General Conditions of the Contract.

.2 Contractor will remain responsible for establishing and confirming site dimensions and project conditions, and resolving constructability means and methods in accordance with the requirements of the Contract Documents.

.3 Contractor accepts that information transmitted by the Consultant represents the current state of BIM Project Files effective at the date the digital file is produced and that the Consultant will not issue updated versions of BIM Project Files except at their sole discretion.

.4 Consultant will not respond to formal Requests for Interpretation (RFIs) relating to BIM Project Files; Consultant will only respond to RFIs relating to Contract Documents.

.5 Contractor, Subcontractors and others will work collaboratively and cooperatively with the Consultant to derive acceptable solutions using informal forms of communications where clarifications to BIM Project Files are required.

3 Execution

3.1 Preparation

.1 Review of Documents: Information contained in BIM Project Files may change during the evolution of the project as a result of changes made by the Consultant and other contributors to BIM Project Files; It remains the

responsibility of the Contractor, Subcontractors, Suppliers, fabricators and manufacturers to confirm that the information they are using is current to the project stage.

3.2 Use of digital BIM documents

.1 BIM Project Files of the Consultant: BIM Project Files may be made available to Contractor by Consultant at their sole discretion subject to the following conditions:

.1 Contractor is required to sign the Consultant's standard terms of usage and digital file acceptance disclaimer.

.2 Contractor is required to provide a list of all Subcontractors that will have access to the BIM Project Files; failure to provide a list of Subcontractors will result in the Consultant withdrawing their offer to share BIM Project Files.

.3 BIM Project Files will be made available at no cost to the Contractor in Revit format software used to prepare BIM Project Files.

.4 BIM Project Files will be provided by DVD or FTP Site, depending on size of BIM Project Files.

.5 BIM Project Files will be provided in the file format used for production of drawings, a change to the version or format will not be undertaken by Consultant; Contractor is responsible to hire an outside service to change documents where formats do not meet their ability to read them.

.6 Direct requests for BIM Project Files from Subcontractors will not be considered by Consultant.

.7 Consultant reserves the right to alter BIM Project Files information not essential to Contract from materials provided to Contractor including the following:

.1 Remove title blocks and logos;

.2 Remove professional seals;

.3 Remove detail components and families;

.4 Bind external files.

.2 Contractor is responsible for coordinating Subcontractor requests for BIM Project Files; Contractor must request BIM Project Files at beginning of Work:

.1 The Contract Documents will govern in the event that there is a discrepancy between BIM Project Files provided to Contractor and Contract Documents.

.2 In the event that dimensions are not indicated, they must not be scaled digitally from BIM Project Files; missing dimensions must be brought to the attention of Consultant, who will determine dimensions or direct method for determination of missing dimensions.

.3 Contractor recognizes that use of BIM Project Files is at their own risk, and that Contractor will be required to sign Terms of Usage indicating acceptable uses that may include the following:

.1 Contractor, Subcontractor, Sub-Subcontractor, Supplier, manufacturer, or other third-party agent agrees to hold harmless Consultant from any damage, liability or costs arising from the use of BIM Project Files conveyed in file format provided.

.2 Consultant retains the copyright for proprietary information, and unique technical and design methods contained within BIM Project Files created by the Consultant; this content is made available to Contractor for information purposes only.

.3 Use of supplied BIM Project Files for any subsequent Project is strictly forbidden without express written consent of Consultant.

.4 Consultant will not be held liable of any unauthorized use or modification of BIM Project Files provided.

.5 Consultant assumes no responsibility for work produced by the Contractor and Subcontractor’s

.6 Consultant assumes no responsibility and disclaims any liability to any person or entity for any loss or damages including any special, indirect or consequential damages caused by error or omissions in BIM Project Files and format provided, whether resulting from negligence, accident or any other cause.

.4 Consultant reserves the right to withdraw the offer for BIM Project Files for any reason and at any time where an excessive number of requests are made for BIM Project Files or where the Consultant deems that sharing BIM Project Files have the potential to modify design decisions that compromise the Consultant's responsibilities under the Professionals Act for documents produced under seal by an Architect or Engineer.

.5 Consultant reserves the right to reject shop drawings prepared from BIM Project Files submitted to them by Contractor that have not been substantially altered from BIM Project Files provided, and as follows:

.1 Shop Drawings shall reflect constructability requirements.

.2 Shop Drawings shall be detailed in accordance with requirements listed in technical trade Sections.

3.3 Interference and coordination Drawings – field quality control

.1 On interference and coordination drawings, show the following minimum information to demonstrate understanding and coordination of Work of various Sections with the Work of, but not limited to the following:

.1 Mechanical (fire suppression, plumbing, HVAC, building automation).

.2 Electrical (power distribution and generation, lighting, fire alarm, communications, security & access controls, and facility protection).

.3 Piping: indicate sizes, locations and arrangements, including valves, indicating instruments, pumps and other accessories. Allow for thickness of insulation, as specified, for various types of piping.

.4 Ductwork: sizes, locations and arrangement including accessories such as dampers (fire, balancing and operating).

.5 Conduits: show surface-mounted and embedded conduit pipes, elbows, boxes and other accessories for power distribution, power generation, control wiring, fire alarm system, building controls system and other related systems.

.6 Equipment:

.1 Flydronic specialties, boilers, water heaters, chillers, coolers, radiant panels, fan coil units, air handling units, fans, VAV terminal units, etc.

.2 Transformers, power distribution equipment, wiring devices, panelboards, lighting, equipment, fire alarm devices, etc.

.7 Sleeves: Show size and location of penetrations through loadbearing and non-loadbearing elements.

.8 Inserts: Products or elements of assemblies to be cast into concrete and/or mortared into masonry elements.

.2 Show cross-sections in key areas, as required, and as defined by Consultant. Show re-bar, structural elements, piping, air handling and heating systems distribution, sprinkler system distribution, lighting, wall and ceiling assemblies, acoustical and seismic isolation, Products and systems involving life safety, conveying systems, electrical distribution.

.3 Resolve areas of conflict or interference in a mutually agreed manner between affected Subcontractors and Other Contractors and resubmit interference and coordination drawings until such time as accepted by the Consultant.

.4 Submit interference and coordination drawings electronically in .pdf format and Revit ".rvt" files.

.5 Submit interference and coordination drawings in uniform scale, with information assembled on separate layers within the electronic files to allow overlays to be assembled which show all components of various trades. Upon incorporation of details, Drawings shall be submitted jointly to the Consultant for review.

.6 Ensure that accesses and clearances required by jurisdictional authorities and/or for easy maintenance of equipment are indicated and accommodated in layout of equipment and services.

.7 Circulate interference and coordination drawings for review and mark-ups by Subcontractors responsible for work portrayed on the drawings.

.8 Coordinate preparation and submission of interference and coordination drawings with Shop Drawings.

End of section

1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

.1 Administrative requirements

.2 Shop Drawings and Product Data

1.2 Administrative requirements

.1 Submit specified submittals to Consultant for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in the Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time or for Product substitutions or other deviations from the Drawings and Specifications.

.2 Where required by Authorities having Jurisdiction, provide submittals to such authorities for review and approval.

.3 Do not proceed with Work affected by a submittal until review is complete.

.4 Present Shop Drawings and Product data in either just SI metric or both SI metric and imperial units. Where items or information is not produced in SI Metric units, converted values are acceptable.

.5 Reproduction of construction Drawings to serve as background for Shop Drawings is not permitted.

.6 Do not propose Substitutions or deviations from Contract Documents via Shop Drawing and Product data submittals.

.7 Contractor’s review of submittals:

.1 Review submittals, provide verified field measurements where applicable, and affix Contractor’s review stamp prior to submission to Consultant. Contractor’s review stamp represents that necessary requirements have been determined and verified, and that the submittal has been checked and coordinated with requirements of the Work and Contract Documents.

.2 Verify field measurements and that affected adjacent work is coordinated.

.3 Submittals not meeting specified requirements will be returned with comments.

.8 Consultant's review of submittals:

.1 Review of submittals by Consultant is for the sole purpose of ascertaining conformance with the general design concepts and the general intent of the Contract Documents. This review shall not mean that Consultant approves the detail design inherent in the submittals, responsibility for which shall remain with the Contractor. Such review shall not relieve the Contractor of responsibility for errors or omissions in the submittals, or responsibility for meeting requirements of Contract Documents.

.2 Contractor shall be responsible for dimensions to be confirmed and correlated at the Place of the Work for information that pertains solely to fabrication processes or to techniques of construction and installation, and for coordination of the Work.

.3 As part of their scope of Work, Consultant shall review submittals no more than two (2) times. Should three (3) or more reviews be required due to reasons of Contractor omissions causing resubmission requests, then Contractor shall reimburse the Consultant for time expended in these extra reviews.

.1 Time shall be invoiced to the Owner (to be deducted from monies due to the Contractor and paid to Consultant by Owner) at rates recommended by Consultant's professional association and disbursements shall be invoiced at Consultant's cost.

.2 The Contractor shall cover directly costs and administration associated with courier services and the like for these extra shop drawing reviews.

.4 Consultant's review and markings on submittals do not authorize changes in the Work or the Contract Time.

.5 Submittals received but not required by the Contract Documents or requested by the Consultant will not be reviewed by the Consultant and will be marked 'NOT REVIEWED' by the Consultant and returned to the Contractor.

.6 Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Consultant's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

.1 Initial Review: Allow three (3) Working Days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Advise Contractor when a submittal being processed must be delayed for coordination.

.2 Resubmittal Review: Allow two (2) Working Days for review of each resubmittal.

.7 Use for construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with reviewed notation from Consultant's action stamp.

.9 Engineered submittals:

.1 Submittals for items required to be sealed by professional engineer (or as otherwise indicated as engineered), shall be prepared under the direct control and supervision of a qualified professional engineer registered in the Place of the Work, and having minimum professional liability insurance required in accordance with the General Conditions, as amended.

.2 Design includes life safety, sizing of supports, anchors, framing, connections, spans, and as additionally required to meet or exceed requirements of applicable codes, standards, regulations, and authorities having jurisdiction.

.3 Engineered submittals shall include design calculations, complete with references to codes and standards used in such calculations, supporting the proposed design represented by the submittal. Prepare calculations in a clear and comprehensive manner so that they can be easily reviewed. Incomplete or haphazard calculations will be rejected.

.4 The professional engineer responsible for the preparation of engineered submittals shall undertake periodic field review, including review of associated mock-ups, at locations wherever the work as described by the engineered submittal is in progress,

during fabrication and installation of such work, and shall submit a field review report after each visit. Field review reports shall be submitted to the Consultant, to authorities having jurisdiction as required, and in accordance with the building code.

.5 Field reviews shall be at intervals as necessary and appropriate to the progress of the work described by the submittal to allow the engineer to be familiar with the progress and quality of such work and to determine if the work is proceeding in general conformity with the Contract Documents, including reviewed shop drawings and design calculations.

.6 Upon completion of the parts of the Work covered by the engineered submittal, the professional engineer responsible for the preparation of the engineered submittal and for undertaking the periodic field reviews described above, shall prepare and submit to the Consultant and authorities having jurisdiction, as required, a letter of general conformity for those parts of the Work, certifying that they have been Provided in accordance with the requirements both of the Contract Documents and of the authorities having jurisdiction over the Place of the Work.

.7 Costs for such field reviews and field review reports and letters of general conformity are included in the Contract Price.

.10 Keep copies of reviewed submittals at the Place of the Work in a neat, orderly condition. Only submittals that have been reviewed by the Consultant’s and are marked with Consultant’s review stamp, as applicable, are permitted at the Place of the Work.

.11 The Work shall conform to reviewed submittals subject to the requirements of this Section. Remove and replace materials or assemblies not matching reviewed submittals at no increase in the Contract Time and at no additional cost to the Owner.

1.3 Shop Drawings and product data

.1 Indicate Products, methods of construction, and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of the Work.

.2 Where Products attach or connect to other Products, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross-references to Drawings, Specifications and other already reviewed Shop Drawings.

.3 Accompany submittals with a transmittal information including:

.1 Date;

.2 Project title and number;

.3 Contractor's name and address;

.4 Identification of each submittal item and quantity;

.5 Other pertinent data.

.4 Each submittal shall be identified numerically by relevant technical trade Section number with a numeric indicator for multiple submittals by that Section followed by revisions number, for example 08 11 13-01-R0.

.5 Make any changes in submittal that Consultant may require, consistent with Contract Documents, and resubmit as directed by Consultant.

.6 Notify Consultant, in writing, when resubmitting, of any revisions other than those requested by Consultant.

.7 Shop Drawing submittals shall include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:

.1 Subcontractor.

.2 Supplier.

.3 Manufacturer.

.4 Contractor's stamp, date, and signature of Contractor's authorized representative responsible for Shop Drawing review, indicating that each Shop Drawing has been reviewed for compliance with Contract Documents and, where applicable, that field measurements have been verified.

.5 Details of appropriate portions of the Work as applicable:

.1 Fabrication.

.2 Layout, showing dimensions, including identified field dimensions, and clearances.

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Wiring diagrams.

.9 Single line and schematic diagrams.

.10 Relationships to other parts of the Work.

.8 Product data submittals shall include material safety data sheets (MSDS) for all controlled Products.

.9 Submit electronic copy of Shop Drawings where specified in the technical Specifications in .pdf format.

.10 Submit electronic copy of Product data sheets or brochures where specified in the technical Specifications in .pdf format.

.11 Where a submittal includes information not applicable to the Work, clearly identify applicable information and strike out non-applicable information.

.12 Supplement standard information to include details applicable to Project.

.13 Allow five (5) Working Days for Consultant's review of each submittal and incorporate in submittals schedule specified in Section 01 32 00. Allow additional three (3) Working Days where sub-Consultant or commissioning agent review is required.

.14 If upon Consultant’s review no errors or omissions are discovered, or if only minor corrections are required as indicated, submittal will be returned and fabrication or installation of Work may proceed.

.15 If upon Consultant’s review significant errors or omissions are discovered, a so noted copy will be returned for correction and resubmission. Do not commence fabrication or installation.

.16 Consultant’s notations on submittals are intended to ensure compliance with Contract Documents and are not intended to constitute a change in the Work requiring change to the Contract Price or Contract Time. If

Contractor considers any Consultant's notation to be a change in the Work, promptly notify Consultant in writing before proceeding with the Work.

.17 Resubmit corrected submittals through same procedure indicated above, before any fabrication or installation of the Work proceeds. When resubmitting, notify Consultant in writing of any revisions other than those requested by Consultant.

2 Products – not used

3 Execution

3.1 Submissions

.1 Submit the following to the Owner:

.1 Upon notification of award of this project, and prior to commencing work:

.1 Performance and Labour and Materials Payment Bonds Insurance in accordance with the Requirements of Section 00 61 14.

.2 Certificate(s) of Insurance in accordance with the Requirements of Section 00 61 14. Use the Owner's Certificate of Insurance form.

.3 Clearance Certificate from Workplace Safety & Insurance Board (WSIB).

.2 During construction:

.1 Progress reports;

.2 Update of any insurance certificates about to expire;

.3 Current valid WSIB clearance certificate;

.4 Shop Drawings and product data;

.5 Minutes of meetings;

.6 Inspection reports;

.7 Change Orders and Change Directives;

.8 Requests for information (RFI);

.9 Updated Construction Drawings;

.10 Updated Construction Schedule;

.3 At Substantial Performance of the Work, provide originals of:

.1 Statutory declaration;

.2 Occupancy permit;

.3 Substantial performance release of claims letter;

.4 Update of any insurance certificates about to expire;

.5 Current valid WSIB certificate of clearance;

.6 Extended warranties, if applicable;

.7 Closeout submittals; As indicated in Section 01 78 00.

.4 At completion:

.1 Update of any insurance certificates about to expire;

.2 Current valid WSIB certificate of clearance;

.3 Completion release of claims letter;

.4 Owner’s standard form for property owner’s release of land used by the Contractor.

.5 At end of warranty period:

.1 Final release of claims letter.

End of section

1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

.1 Health and safety administrative requirements for Contractors performing work on this Project, for the Owner.

1.2 Reference standards

.1 Province of Ontario website:

.1 Regulation 851; LGIC:

.1 Pre-Start Health and Review Requirements for Factories

.2 Construction site health and safety during COVID-19

.1 https://www.ontario.ca/page/construction-site-health-and-safety-during-covid-19

.3 Resources to prevent COVID-19 in the workplace

.1 https://www.ontario.ca/page/resources-prevent-covid-19-workplace#construction

.2 Canadian Construction Association (CCA):

.2 COVID-19 - Standardized Protocols for All Canadian Construction Sites

1.3 Health and safety policy

.1 Obtain copies of all Subcontractors' Health and Safety Policies and Programs prior to such Subcontractor commencing work on the site if and when requested.

.2 Provide a copy of Contractor's current Health and Safety Policies and Program, to implement that policy prior to the commencement of construction.

1.4 Health and safety legislation and requirements

.1 Comply with all Federal and Provincial laws relating to Health and Safety including Acts and Regulations as well as Lower Tier Municipality By-Laws.

.2 Comply with all applicable industry safety standards.

.3 Comply with 213/91 (Construction Projects) made under the Occupational Health and Safety Act (OHSA) and all amendments thereto.

.4 Comply with legislative requirements for work performed including, but not limited to:

.1 Qualifications of workers;

.2 Training;

.3 Supervision, and;

.4 Use of onsite equipment.

.5 Provide any and all personal protective equipment for Contractor's own workers where prescribed by legislation.

1.5 Construction safety measures - Contractor's responsibilities

.1 The Contractor shall ensure that its site superintendent (or designate in the absence of the Contractor's principal site superintendent) is present at the Project site and performs supervisory functions at all times as per provincial and local governmental occupational health and safety, fire safety, environmental protection, and workers' compensation statutes, public health guidance publications (where warranted), and Contract Documents.

.2 The site superintendent shall be responsible for enforcing compliance with respect to the use of personal protective equipment required at the Project site. No person shall be permitted to enter the Place of Work without the required personal protective equipment.

.3 Establish, maintain and mark clear routes, paths and points for routine and emergency entry and exit to, from and within the Project site for personnel and vehicles.

.4 Keep floors and other surfaces at the Project site free of obstructions, hazards and accumulations of refuse, snow or ice. Liberally apply sand or salt to snow or ice-covered surfaces where necessary to reduce hazards of slipping and falling.

.5 Make available at the Project site twelve (12) sets of new CSA-approved hard hats, CSA-approved all weather safety boots, safety eyewear (safety

glasses with side shields or safety goggles), and high visibility torso clothing (e.g. reflective vest, reflective shirt, reflective jacket) for the exclusive use of the Owner, Consultant and their representatives. Maintain in clean condition.

.6 Provide first aid, hygiene, and medical facilities at the Project site in accordance with requirements of provincial and local governmental occupational health, safety, and workers' compensation statutes, public health guidance publications (where warranted) and Contract Documents.

.7 Erect signage acceptable to the Owner at all entry points to the project containing the following information:

.1 The name, address and telephone number of the Contractor;

.2 Notice that all personnel on the Project site are required to comply with the safety policies, procedures and instructions of the Contractor;

.3 Notice specifying mandatory use and wearing of the protective equipment required by this Specification;

.4 Notice that any person or employer failing to adhere to the safety policies, procedures and instructions of the Contractor may be removed from the Project site and denied further access.

.8 Erect signs relating to safety on the Project, and signs or notices required by applicable provincial and local regulations or by the Contract Documents.

.9 Perform health and safety inspections of the Project site at least twice weekly, or more frequently if required by provincial or territorial health and safety regulatory requirements, in order to ensure that the Work is performed safely and that the Project site is maintained in accordance with the requirements of the provincial and local governmental regulations and the Contract Documents.

.10 The Contractor shall complete and maintain on site, a documented record of each health and safety inspection, using the "Contractor's Twice Weekly Health and Safety Compliance Checklist".

.11 Following completion of each health and safety inspection, the Contractor shall provide an electronic copy of the completed "Contractor's Health and

Safety Compliance Checklist" to the Owner's designated health and safety specialist, with all progress draw applications.

.12 At minimum, systems and devices for fall prevention and/or fall arrest shall be used and/or worn for any Work activity where a worker may fall a vertical distance of 3m (10') or more. Where the province or territory has more stringent requirements for the use of fall protection the Provincial requirements will take precedence over those of the Contract Document.

.13 Fall arrest harnesses attached to travel restraint lines or fall arrest lifelines shall be used and worn by all persons performing work upon rooftops.

.14 The Contractor shall ensure ongoing compliance with the applicable provincial / territorial occupational health and safety laws, public health guidelines, as well as the Contractor's own OHS policies and procedures.

.15 Alcohol and/or drugs will not be allowed on the site. Anyone found in possession of alcohol and/or drugs shall be dismissed from the site immediately and without notice, maybe subject to civil and/or criminal proceedings.

1.6 Construction safety measures – welding and/or cutting procedures

.1 When carrying out soldering, welding or cutting procedures, be it in shop or in the field, ensure that workers comply with the following:

.1 Wear appropriate protective clothing such as gloves, leather aprons and/or arm spark guards;

.2 Wear suitable goggles or face shields as appropriate;

.3 Protect co-workers from eye or other injuries through the use of fire resistant portable shielding devices;

.4 Provide and use a portable fume eliminator at all times during welding, soldering, or cutting operations within the existing building.

1.7 Safety data sheets (SDS)

.1 Provide to the Consultant a list of Designated Substances that will be brought to the site prior to commencing work. Safety Data Sheets (SDS) and the hazardous material inventory for each substance listed must be kept on the Project.

.2 Maintain copies of current SDS at the Place of the Work at a location accessible to all workers, the Consultant, the Owner and the building operators (where required).

1.8 Safety warnings

.1 The Consultant and the Owner shall have the right to document all Contractors for all health and safety warnings and/or to stop any Contractor's work if the Contractor fails to comply with any requirements under this Section.

.2 Similarly, the Consultant and the Owner shall have the right to issue warnings and/or to stop work for any Contractor violations of the contract including Owner health and safety policy and programs and/or if the Contractor creates a health or safety hazard.

.3 Written warnings and/or stop work orders shall be given to the Contractor using the Owner’s Contractor Health and Safety Warning / Stop Work Order Form.

.4 If the Contractor fails to adequately respond to the Consultant’s or the Owner’s order to correct a hazard, the Owner reserves the right to have the hazard corrected by a third party at the Contractor’s expense. The Consultant’s or the Owner’s decision, as the case may be, as to the urgency for such correction shall be final.

1.9 Notice of project

.1 Notify all regulatory bodies required for construction activities, (i.e., Notice of Project, employer notification, etc.).

.2 Notifications shall include, but not be limited to, the notification requirements laid out in OHSA Sec 51-53 and the requirements of Ontario Regulation 213/91 for Construction Projects, Sections 5, 6 and 7.

.3 For the purpose of this contract the Contractor shall be the “Constructor”.

1.10 Confined space

.1 Persons intended to work in confined spaces, as defined by the Owner, must have formal training in performing work in confined spaces.

.2 Provide proof of valid certificates of such training for all workers prior to entry of such workers into confined spaces.

.3 Provide all necessary safety equipment for entry into confined spaces.

.4 Where workers are required to enter a confined space, as defined by the OHSA, O. Reg. 632/05 Section 221.2, ensure that workers of the Contractor and all Subcontractors follow the requirements of the above legislation, including but not limited to:

.1 Having a method for recognizing each confined space to which the program applies;

.2 Having a method for assessing the hazards to which workers may be exposed;

.3 Having a method for the development of confined space entry plans (which include on-site rescue procedures);

.4 Having a method for training workers;

.5 Having an entry-permit system.

.5 Supply the necessary tools and equipment for workers to perform the confined space entry. These items include, but are not limited to the following:

.1 Required documentation;

.2 Gas detectors;

.3 Breathing equipment;

.4 Fall protection, and;

.5 Rescue equipment.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

.1 Establishment of fire safety requirements for the Project.

1.2 Fire safety requirements

.1 Fire safety plan:

.1 Contractors and their personnel shall be familiar with Section 2.8 of the Fire Code and its requirements for construction sites.

.2 A “fire safety plan”, is required to be prepared for the site prior to commencement of construction. The fire safety plan is required to include:

.1 The designation and organization of site personnel to carry out fire safety duties, including fire watch service where applicable.

.2 Emergency procedures to be used in the case of fire including sounding the alarm throughout the building, notifying the Fire Department, instructing site personnel on procedures to be followed and fire fighting procedures.

.3 The control of fire hazards in and around the building. This includes fire protection for combustible construction materials and combustible refuse on site.

.4 The maintenance of fire fighting facilities.

.3 The “fire safety plan”, is required to be submitted to the local Fire Department for approval and kept on-site in an approved location.

.2 Fire prevention:

.1 Enforce fire prevention and protection methods of good housekeeping and adhere to local and Underwriters’ fire regulations.

.2 Except where a building is provided with a fire alarm system or similar equipment acceptable to the authorities having jurisdiction, a

fire watch, is required to be provided when a portion of the building is occupied during construction operations.

.3 Where a fire watch is required in this Section, the following criteria are required to be achieved:

.1 The site will be toured at least once each hour;

.2 The fire watch personnel are required to be provided with a means of communication with the Fire Department and be equipped with portable illumination and protective equipment.

.3 A log documenting each tour of the site is required and it is to be kept.

.4 Unobstructed access, for fire fighting is required to be maintained to fire protection equipment, including hydrants, Fire Department connections and portable extinguishers.

.5 Where practical, Fire Department access route, are required to be provided, to the construction site. If the site is fenced in order to prevent general entry, provision is required to be made for access by Fire Department equipment and personnel.

.3 Hot works:

.1 Hot works, involving open flames or producing heat or sparks, are required to conform to CSA W117.2.

.2 Hot work equipment is required to be maintained in good operating condition, examined for leakage or defects prior to each use, and repaired, if necessary, prior to use. When Class 2 gas (i.e. compressed gas) hot work equipment is not in use, valves are required to be closed and gas lines bled. Electric hot work equipment is required to be de-energized when not in use.

.3 Hot work is required to be carried out in an area free of combustible and flammable contents, with walls, ceilings and floors of non-combustible construction or lined with non-combustible materials. When it is not practical to undertake hot works in such an area, the following measures are required to be taken:

.1 Combustible and flammable materials within a 15m (50’) distance from the hot work are required to be either

removed, protected against ignition by the use of non-combustible materials, or thoroughly wetted.

.2 A fire watch is required to be provided during the hot work and for a period not less than 60 minutes after its completion. The exposed areas are required to be examined for ignition of combustible materials by personnel equipped with and trained in the use of fire extinguishing equipment.

.3 A final inspection of the hot work area is required to be conducted 4hr after the completion of the work.

.4 Where sparks may leak onto combustible materials in areas adjacent to the area where the hot work is to be performed, openings in walls, floors or ceilings are required to be covered or closed to prevent the passage of sparks to such adjacent areas or be protected in accordance with the requirements in Clause 1.1.3.3.

.5 Hot work is not permitted to be performed on the following:

.1 Containers, equipment, or piping containing flammable or combustible liquids or Class 2.1 flammable gases unless they have been cleaned and tested with a gas detector to ascertain that they are free of explosive vapours;

.2 Totally enclosed containers, or;

.3 Metal objects that are in contact with combustible materials, unless safety precautions are taken to prevent ignition of the combustible materials by conduction.

.6 When hot work is to be carried out near piping containing Class 2.1 flammable gases, the piping is required to be cleaned and tested with a gas detector to ascertain that they are free of explosive vapours and be protected by a thermal barrier against the passage of heat.

.7 At least one portable fire extinguisher is required to be provided in the hot work area.

.4 Post-fire reporting:

.1 Report immediately all fire incidents to the Fire Department, Consultants, and Owner.

.5 Interior and exterior fire protection and alarm systems:

.1 A system that is audible throughout the building (e.g. air horns) is required to be provided to alert.

.2 Fire protection and alarm systems shall not be:

.1 Obstructed;

.2 Shut-off;

.3 Left inactive at the end of a Working Day or shift without notification and authorization from the Fire Chief or their representative.

.3 If a fire alarm system or part thereof, is shut down or inoperative for more than 2 hr for any reason, the authority having jurisdiction is required to be notified. When directed by the authorities having jurisdiction, a fire watch is required to be provided during the shut down of the fire alarm system.

.4 Fire hydrants, standpipes and hose systems shall not be used for other than fire fighting purposes unless authorized by the Fire Chief.

.6 Fire extinguishers:

.1 The Contractor shall supply fire extinguishers, to the satisfaction of the Fire Chief, necessary to protect, in an emergency, the work in progress and the Contractors physical plant on site. Listed Class A fire extinguishers having a minimum rating of 2A10BC are required to be provided on all moveable equipment. Listed Class A fire extinguishers with a minimum rating of 4A40BC are required in all other areas to protect a maximum area of 600m2 each, and located so that the maximum travel distance to an extinguisher is 25m.

.2 In addition to the requirements in Clause 1.1.6.1, fire extinguishers are required to be provided adjacent to welding or cutting operations, in areas where combustibles are stored, near or on any internal-combustion engines, adjacent to areas where flammable liquids or gases are stored/handled, adjacent to temporary oil-fired or gas-fired equipment, and adjacent to bitumen heating equipment.

.7 Blockage of roadways:

.1 The site superintendent shall be advised of any work that would impede fire apparatus response. This includes violation of minimum overhead clearance of 5m, erecting of barricades and the digging of trenches.

.8 Smoking precautions:

.1 Although smoking is not permitted in hazardous areas, care must still be exercised in the use of smoking materials in non-restricted areas. Signs are required to be posted to indicate areas where smoking is not permitted. Signs are required to have black lettering not less than 50mm x 150mm are permitted to be used in lieu of lettering. Alternatively, symbols of not less than 150mm x 150mm are permitted to be used in lieu of lettering.

.9 Rubbish and waste materials:

.1 Rubbish and waste materials are to be kept to a minimum.

.2 Combustible waste materials are not permitted to accumulate in quantities or locations that constitute an undue fire hazard.

.3 The burning of rubbish on site is prohibited.

.4 Removal:

.1 All rubbish shall be removed from the work site at the end of the Working Day or as directed.

.2 Waste material is required to be removed by means of appropriate containers, an enclosed shaft or chute conforming to NBC Sentence 8.2.7.4.(1) or a hosting apparatus if large pieces or objects are involved.

.5 Storage:

.1 Extreme care is required where it is necessary to store oily waste in work areas to ensure maximum possible cleanliness and safety.

.2 A non-combustible receptacle constructed of materials with a melting point of not less than 650 degrees Celsius and having no openings in the sides or bottom and a self-closing, tightly fitted metal cover is required to be provided for the collection of greasy or oily rags or materials subject to

spontaneous combustion, or ashes. If the flooring material upon which the receptacle is placed is combustible, the receptacle is required to have a flanged bottom or legs not less than 50mm high. The contents of this receptacle are required to be removed daily and disposed of in a manner that does not create a fire hazard.

.10 Flammable liquids:

.1 The handling, storage and use of flammable liquids is required to be in conformance with Part 4 of the Fire Code.

.2 Flammable liquids such as gasoline, kerosene and naphtha may be kept for ready use in quantities not exceeding 45 litres provided they are stored in approved safety cans bearing the Underwriter's Laboratory of Canada or Factory Mutual seal of approval. Storage of quantities of flammable liquids exceeding 45 litres for work purposes requires the permission of the Site Superintendent.

.3 Transfer of flammable liquids is prohibited within buildings.

.4 Transfer of flammable liquids shall not be carried out in the vicinity of open flames or any type of heat-producing devices.

.5 Flammable liquids having a flash point below 38 degrees Celsius such as naphtha or gasoline shall not be used as solvents or cleaning agents.

.6 Flammable waste liquids, for disposal, shall be stored in approved containers located in a safe ventilated area. Quantities are to be kept to a minimum and the Fire Department is to be notified when disposal is required.

.7 Spills of flammable or combustible liquids are required to be removed immediately with an absorbent material that will not increase the hazard and be disposed of in a safe manner.

.11 Hazardous substances:

.1 If the Work entails the use of any dangerous goods (e.g. toxic or hazardous materials, chemicals and/or explosives, or otherwise creates a hazard to life, safety, health or the environment), preform Work in accordance with Section 01 35 43, and the OBC.

.12 Floor finishing:

.1 Floor finishing operations involving the use of flammable or combustible liquids are required to be provided with ventilation to prevent the accumulation of flammable vapours. Mechanical ventilation is permitted if the equipment does not constitute a source of ignition.

.2 All sources if ignition (including mechanical systems or electric motors) are required to be shut down.

.3 Smoking and the use of open flames is not permitted during the application of flammable liquids with flash points less than 37.8 degrees Celsius and for at least 1hr after such application.

.13 Compressed gas cylinders:

.1 Cylinders of Class 2 (compressed) gases are required to be:

.1 Protected against mechanical damage;

.2 Protected against valve damage, and;

.3 Firmly secured in a position that will not interfere with the operation of the cylinder valve assembly.

.2 Except for fire extinguishers, cylinders of Class 2 gases are not permitted to be stored:

.1 In any exit or corridor providing access to exit;

.2 Under any fire escape, outside exit stair, passage or ramp, or;

.3 Within 1m of any exit.

.14 Egress provisions:

.1 At least one exit is required to be accessible and usable at all times.

.15 Excavation:

.1 All existing gas, electrical, water, steam and other services are permitted to be left within the area of excavation provided that the service company approves the proposed method of operation, their location is determined before excavation commences, the method of excavation will not damage the services and suitable temporary supports are provided.

.2 Existing services that do not meet the criteria in Clause 1.1.16.1 are required to be shut-off, capped and labelled prior to excavation. The service company whose service connections will be affected are required to be notified in advance. Service connections that are required to be maintained are required to be relocated and protected from damage.

.3 Excavations are required to be kept reasonable clear of water so as not to endanger the safety of the public or to create conditions hazardous to health.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

- .1 Reference standards and Codes
- .2 Authorities having jurisdiction
- .3 Independent inspection and testing agency requirements
- .4 Inspection and testing agency reports
- .5 Quality assurance
- .6 Metric vs. Imperial equipment
- .7 Permits
- .8 Testing procedures
- .9 Testing laboratories
- .10 Notification of non-compliance

1.2 Reference standards and codes

.1 “Reference standards” means consensus standards, trade association standards, guides, and other publications expressly referenced in Contract Documents.

.2 Where an edition or version date is not specified, referenced standards shall be deemed to be the latest edition or revision issued by the publisher at the time of bid closing. However if a particular edition or revision date of a specified standard is referenced in an applicable code or other regulatory requirement, the regulatory referenced edition or version shall apply.

.3 Reference standards establish minimum requirements. If Contract Documents call for requirements that differ from a referenced standard, the more stringent requirements shall govern.

.4 If compliance with two or more reference standards is specified and the standards establish different or conflicting requirements, comply with the most stringent requirement. Refer uncertainties to Consultant for clarification.

.5 Within the Specifications, reference may be made to the following standards writing, testing, or certification organizations by their acronyms or initialisms:

.1 Brick Institute Association (BIA)

.2 Canadian Construction Association (CCA)

.3 Canadian General Standards Board (CGSB)

.4 Canadian Prestressed Concrete Institute (CPCI)

.5 Canadian Standards Association (CSA)

.6 Canadian Sheet Steel Building Institute (CSSBI)

.7 Canadian Welding Bureau (CWB)

.8 Insulated Cable Engineers Association (ICEA)

.9 International Concrete Repair Institute (ICRI)

.10 Institute of Electrical and Electronics Engineers (IEEE)

.11 Insulating Glass Manufacturers Association of Canada (IGMAC)

.12 National Association of Architectural Metal Manufacturers (NAAMM)

.13 National Electrical Manufacturers Association (NEMA)

.14 National Fire Protection Association (NFPA)

.15 Ontario Concrete Masonry Block Association (OCBA)

.16 The Society for Protective Coatings (SSPC)

.17 Terrazzo, Tile and Marble Association of Canada (TTMAC)

.18 Underwriters' Laboratories of Canada (ULC)

.6 Perform the Work in accordance with the requirements of the latest editions of the following statutes and codes in force at the time of the Contract:

.1 Electrical Safety Authority

.2 Municipal building and fire codes and by-laws

.3 National Building Code

.4 National Fire Protection Association

.5 Ontario Building Code

.6 Ontario Construction Safety Act

.7 Ontario Electrical Safety Code

.8 Ontario Fire Code

.9 Ontario Hydro

.10 WHIMS

.7 Comply with any applicable revisions to codes and regulations after the date of the agreement. Costs of such revisions shall be compensated for through a Change Order.

.8 Precedence of standards:

.1 Where applicable, ensure that all materials and equipment conform to the applicable standards listed.

.2 Canadian standards take precedence over American standards in the case of duplication or conflict.

1.3 Authorities having jurisdiction

.1 Where reference is made to "authorities having jurisdiction", it shall mean all authorities who have within their constituted powers the right to enforce the laws of the place of the building.

1.4 Independent inspection and testing agencies

.1 Except as otherwise specified, Owner will retain and pay for independent inspection and testing agencies to inspect, test, or perform other quality control reviews of parts of the Work.

.2 Retain and pay for inspection and testing that is for Contractor’s own quality control or is required by regulatory requirements.

.3 Employment of inspection and testing agencies by Contractor or Owner does not relieve Contractor from responsibility to perform the Work in accordance with Contract Documents.

.4 Qualifications of inspection and testing companies:

.1 Companies engaged for inspection and testing shall provide equipment, methods of recording and evaluation, and knowledgeable personnel to conduct tests precisely as specified in reference standards.

.2 If requested, submit affidavits and copies of certificates of calibration made by an accredited calibrator to verify that testing

equipment was calibrated and its accuracy ensured within the previous twelve months.

.3 Inspection and testing of concrete and concrete materials will be carried out by a CSA Certified testing laboratory to CSA A283, for review in accordance with CSA A23.1/A23.2.

.5 Responsibilities of the Consultant:

.1 The Contractor will submit a list of Inspection and Testing companies to the Consultant for their review.

.2 The Consultant and Contractor will direct inspection and testing companies in the type and extent of inspection and testing to be undertaken.

.3 The Consultant will receive submitted reports of inspections and tests for evaluation and will decide upon any actions that may be required.

.4 The Consultant will provide Drawings and Specifications required by inspection and testing companies.

.6 Responsibilities of the Contractor:

.1 Inspection and testing performed by firms engaged for source and field quality control specified in other Sections shall not relieve the Contractor from responsibility of performing their Work in accordance with the Contract Documents.

.2 Provide access for inspection and testing personnel to Work in progress and to fabricator's operations.

.3 Provide samples of materials to be tested in required quantities at locations testing is performed.

.4 Submit copies of mill test reports.

.5 Provide labour and facilities:

.1 To facilitate inspections and tests.

.2 For storing of specimens at required temperature and free from vibration, in conformance with reference standard and inspection and testing company instructions.

.3 For obtaining, handling and transporting of samples at site and plant.

.6 Notify Consultant, and inspection and testing company at least 48 hours before Work to be inspected and tested commences.

.7 When it is discovered on inspection that Work is proceeding with incorrect materials or methods, ensure that corrections are immediately made and that improperly completed Work is replaced.

.8 Inspect all Work done by Subcontractors prior to application of final cover materials i.e. pressure plates, drywall ceilings, concrete slab pours and the like.

.7 Inspection and testing procedures:

.1 Perform specified inspection and testing only in accordance with specified reference standards, or as approved.

.2 Observe and report on compliance of Work to requirements of Contract Documents.

.3 Ensure that inspectors are on site or at fabricator's operations for full duration of critical operations, and as otherwise required to determine that Work is being performed in accordance with the Contract Documents.

.4 Identify samples.

.5 Identify sources of materials.

.6 Review and report on progress of Work. Report on count of units fabricated and inspected at fabricator's operations.

.7 Observe and report on conditions of significance to Work in progress at time of inspection or at fabricator's operations. Include where applicable and if critical to Work in progress:

.1 Time and date of inspection.

.2 Temperature of air, materials and adjacent surfaces.

.3 Humidity of air, and moisture content of materials and adjacent materials.

.4 Presence of sunlight, wind, rain, snow and other weather conditions.

.8 Include in reports all information critical to inspection and testing.

.9 Ensure that only materials from the Work and intended for use therein are tested.

.10 Determine locations for Work to be tested.

.8 Allow and arrange for inspection and testing agencies to have access to the Work, including access to offsite manufacturing and fabrication plants.

.9 For inspection and testing required by Contract Documents or by authorities having jurisdiction, provide Consultant and inspection and testing agencies with timely notification in advance of required inspection and testing.

.10 Submit test samples required for testing.

.11 Provide labour, Construction Equipment and temporary facilities to obtain and handle test samples on site.

1.5 Inspection and testing agency reports

.1 For inspection and testing required by Contract Documents or by regulatory requirements, and performed by Contractor retained inspection and testing agencies, submit to Consultant and Owner an electronic copy of reports. Submit within five (5) Working Days after completion of inspection and testing.

.2 For inspection and testing performed by Owner retained inspection and testing agencies, copies of inspection and testing agency reports will be provided to Contractor.

.3 Each report shall include:

.1 Date of issue.

.2 Project name and number.

.3 Name and address of inspection and testing company.

.4 Name and signature of inspector or tester.

.5 Date of inspection or test.

.6 Identification of Product and technical trade Sections covering inspected or tested Work.

.7 Location of inspection or from which tested material was derived.

.8 Type of inspection or test.

.9 Remarks and observations on compliance with Contract Documents.

1.6 Quality assurance

.1 Regulatory requirements: The provisions of the Occupational Health and Safety Act and Regulations are in full effect and in force on this Project, and as follows:

.1 For all the purposes of this Act, the Contractor is responsible for the health and safety of the workers at the site and shall post the appropriate notice on the site as required.

.2 All personnel employed at the Place of Work shall receive education and training in regard to the requirements of the Workplace Hazardous Materials Information System (WHMIS).

.3 For every Product delivered to the site which requires a Safety Data Sheet (SDS) provide an electronic copy of all SDS's to the Owner.

1.7 Metric vs. Imperial equipment

.1 Notwithstanding the requirements set out in the preceding paragraphs, because not all trades have adopted metric material or in cases of adapting to existing, where metric and imperial types of equipment are to be installed under the same contract, the Contractor shall ensure that mating of metric and non-metric equipment is possible.

.2 Supply shop drawings of proposed transition couplings, etc., to the Consultant prior to assembly. The supply and installation of such couplings, adapters, etc., shall be at no additional cost to the Owner.

.3 Provide electronically powered equipment, components, and supplies that are CSA and ULC approved.

1.8 Permits

.1 The Owner will obtain and pay for the building permit, permanent easements and rights of servitude only.

.2 Obtain all other necessary permits and approvals required for this project from the authorities having jurisdiction for all completed Work.

.3 Keep a copy of all permits on site.

1.9 Testing procedures

.1 Perform specified or required tests to verify that control measures are adequate to provide a Product which conforms to Contract requirements. Upon request, supply to the Owner duplicate samples of test specimens for possible testing by the Owner. Testing includes operation and/or acceptance tests when specified.

.2 Procure the services of a competent testing laboratory to perform the following activities and record and provide the following data:

.1 Verify that testing procedures comply with Contract requirements;

.2 Verify that facilities and testing equipment are available and comply with testing standards;

.3 Check test instrument calibration data against certified standards;

.4 Verify that recording forms and test identification control number system, including all the test documentation requirements, have been prepared.

.3 Results of all tests taken, both passing and failing tests, will be recorded for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test will be given.

.4 Failure to submit timely test reports as stated may result in nonpayment for related Work performed and disapproval of the test facility for this Contract.

1.10 Testing laboratories

.1 Capability check:

.1 The Owner reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the Contract specifications and to check the laboratory technician's testing procedures and techniques.

.2 Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D3740 and ASTM E329.

1.11 Notification of noncompliance

.1 The Owner and Consultant will notify the Contractor of any detected noncompliance with the foregoing requirements, take immediate corrective action after receipt of such notice.

.2 Such notice, when delivered to the Contractor at the worksite, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Owner and Consultant may issue an order stopping all or part of the Work until satisfactory corrective action has been taken.

.3 No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 Establish a minimum packaging, shipping and handling quality for Suppliers of goods, including but not limited to:

.1 Preservation of goods;

.2 Acceptable use of packaging materials;

.3 Handling requirements as specified by the material manufacturers so not to damage materials or void material warranties;

.4 Required, complete documentation indicating delivery location, quantity, list of goods, and any special delivery instructions needed by the Contractor to receive the shipment.

1.2 Reference standards

.1 American Society for Testing and Materials (ASTM):

.1 ASTM D5118/D5118M-15, Standard Practice for Fabrication of Fiberboard Shipping Boxes

.2 ASTM D4728-17, Standard Test Method for Random Vibration Testing of Shipping Containers

.3 ASTM D6179-07(2014), Standard Test Methods for Rough Handling of Unitized Loads and Large Shipping Cases and Crates

.4 ASTM D642-15, Standard Test Method for Determining Compressive Resistance of Shipping Containers, Components, and Unit Loads

.5 ASTM D4169-16, Standard Practice for Performance Testing of Shipping Containers and Systems

.6 ASTM D1185-98a(2017), Standard Test Methods for Pallets and Related Structures Employed in Materials Handling and Shipping

1.3 Administrative requirements

.1 All goods received including preservation and packaging materials together with package markings and documentation may be subject to inspection by the Contractor.

.2 Any costs incurred by the Owner due to delays in shipment, because of failure by the Supplier to comply with this Specification will be charged to the Supplier.

1.4 Quality assurance of goods for shipment

.1 Packaging:

.1 The Supplier must ensure that the method of packaging provides effective protection against damage in handling and transport between the Supplier and the final storage of the goods.

.2 All packaging and packing materials used must be able to withstand remote field conditions, including, but not limited to significant UV exposure, moisture and extreme temperatures.

.3 Goods shall be supplied in packages clearly identifying the item number and quantity.

.4 Any package which appears to be manageable by a single person should be limited to 15kg. If the package weighs greater than 15kg then it must be easily identifiable.

.2 Preservation:

.1 The Supplier must ensure that all goods are suitably protected to prevent corrosion during handling, transport and storage.

.2 Goods that have openings must be sealed with caps, plugs or waterproof tape to prevent the ingress of dust and moisture.

.3 Goods with painted surfaces shall be suitably protected to prevent rubbing or scuffing during transport.

.4 All surfaces that are subject to corrosion must be treated with an appropriate temporary corrosion preventative.

.5 Goods that are susceptible to climatic conditions must be packed in moisture-vapour proof sealed enclosures with adequate amounts of desiccant.

.3 Marking:

.1 Each package shall be identified with the following:

.1 Item number and manufacturer’s identification and part number;

.2 Quantity as per Purchase Order unit of measure;

.3 Number of packages associated with the packing slip contents;

.4 Ship to Location and final destination.

.2 Marking should be appropriate for long term storage if required.

.4 Shipping documentation:

.1 Shipping documentation must accompany all deliveries and include as a minimum a packing list itemizing the contents of the consignment to enable a check of ordered versus delivered Products.

.2 All documents are to be securely attached to the outside of the packaged items in a weather resistant sealed envelope.

.3 A packing list shall contain no less than the following information:

.1 Purchase order number;

.2 Tag/equipment number (if applicable);

.3 Supplier’s name;

.4 Final destination;

.5 Quantity of items;

.6 Description of the contents;

.7 Supplier reference number.

.5 Hazardous and dangerous materials:

.1 The Supplier must apply the proper warning labels and markings to the hazardous and dangerous goods.

.2 The appropriate Safety Data Sheets (SDS) must accompany the shipment and transportation must be in accordance with the relevant standard and/or legislation.

.6 Air shipments:

.1 Goods that are to travel via air transportation must be packed according to International Air Transport Authority (IATA) regulations.

.7 Pre-shipment notification:

.1 Where special manual handling equipment is required at the receiving site; the Supplier must notify Contractor at the time of the order receipt or within four (4) weeks of the expected arrival date of the requirements.

.8 Product handling:

.1 Schedule early delivery of Products to enable work to be executed without delay. Before delivery, arrange for receiving at site.

.2 Deliver and store Products at site where directed by the Contractor.

.3 Deliver packaged Products, and store until use, in original unopened wrapping or containers, with manufacturer's seals and labels intact.

.4 Product handling requirements may be repeated, and additional requirements specified, in other Sections of the Specifications.

1.5 Timber boxes, crates and skids

.1 The design of timber boxes and crates shall be in accordance with ASTM D5118.

.2 In addition, the Supplier shall ensure that all boxes and crates are either weatherproof lined or that the goods are weatherproofed prior to packing.

.3 Timber boxes, crates and skids are to be steel strapped and the straps are to be secured with crimped steel seals. Non-metallic strapping shall only be used on cartons or packages packed within the boxes or crates.

.4 Three-way corner construction reinforced with diagonals shall be used for all crates that are not plywood sheathed. Large crates must bear great superimposed loads. Top strength should be ensured through the use of frequent (not more than 1m apart) top joists. When sheathed, joists shall be placed under the sheathing. Joist supports are to be provided directly under the joist ends.

.5 For the purpose of lifting by forklift all boxes, crates and skids must be fitted with bearers having a height of no less than 100 mm high and 150 mm wide. Bearers are to permit forklift tine access from two opposite sides.

.6 Screws not nails should be used when sealing timber crates.

1.6 Support saddles

.1 Where support saddles are required for the transportation of goods such as vessels, columns and exchangers they shall be designed and incorporate the following:

.1 Saddles shall be designed for the purpose of transporting the Goods and transport drawings shall be submitted for review.

.2 Where appropriate steel wrapper plates shall be supplied to distribute the load and protect the saddles.

.3 Saddles shall be fitted with lifting lugs and supplied with a steel rope or flat metal strapping to secure the saddle to the goods during lifting or transport.

.4 Subject to the transport configuration and design requirements, saddles may be either of timber or steel construction.

1.7 Freight containers

.1 Freight containers are to be used in accordance with the following standards:

.1 ASTM D4728, Standard Test Method for Random Vibration Testing of Shipping Containers

.2 ASTM D6179, Standard Test Methods for Rough Handling of Unitized Loads and Large Shipping Cases and Crates

.3 ASTM D642, Standard Test Method for Determining Compressive Resistance of Shipping Containers, Components, and Unit Loads

.4 ASTM D4169, Standard Practice for Performance Testing of Shipping Containers and Systems

.2 All container movements must be accompanied by a valid container weight declaration (CWD).

.3 The CWD must contain the following information:

.1 The weight of the container (including its contents);

.2 The container number and other details to identify the container;

.3 The name and business name or details necessary to identify the container;

.4 The date of the declaration;

.5 And any other information required by the regulations (Example: DG Class, UN number etc.).

1.8 International shipping documents

.1 The Supplier shall provide commercial invoice, packing list and certificate of origin for international shipping and customs clearance purposes.

.2 The commercial invoice shall contain the following as a minimum:

.1 Date of invoice;

.2 A discrete identification of “invoice” number;

.3 Shipper name and address; consignee name and address;

.4 Show complete SELLER and SOLD TO company names and addresses;

.5 Typed or machine printed in English;

.6 Full description of the goods; not to use of “Lot” or Miscellaneous”; include tag number if applicable;

.7 Minimum first six digits of harmonized tariff code;

.8 Purchase order number;

.9 Shipping Control Number (SCN) if assigned by the BUYER;

.10 Unit cost; quantity shipped; total cost; currency used;

.11 Country of origin of the goods.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 Provide temporary utilities as specified and as otherwise necessary to perform the Work expeditiously.

.2 Arrange with the Owner for use of existing services. Prior approval from the Owner is required.

1.2 Temporary utilities - general

.1 Be responsible for all fees, permits and charges, including arrangements for all necessary applications, incurred throughout the construction period until the date of Substantial Performance.

.2 Provide power generators as required to maintain construction activities and all temporary facilities, if temporary electrical power supply is delayed or unavailable from the local authority at no extra cost to the Owner.

.3 Operate equipment according to the requirements of the Ontario Ministry of Labour under the Occupational Health and Safety Act and Regulations for Construction Projects.

.4 Remove temporary utilities after use.

1.3 Temporary water supply

.1 Arrange and pay for a temporary supply of potable quality water required during construction.

.2 When available and with written consent of the Owner, Contractor may connect to and use Owner’s existing water supply for temporary use during construction, subject to existing available volume and pressure. Usage at no cost to Contractor.

.3 The Owner will pay for the cost of the water supply for the existing service only. Where existing service is not sufficient, provide for additional service at Contractor’s expense.

.4 Extend supply pipe or pipes from nearest available sources and maintain in good condition until no longer required.

.5 Provide proper shut off valve and backflow preventer on all temporary connections between each existing and temporary service.

.6 Arrange and pay for necessary water supply connections and disconnections.

.7 Use of hydrants or fire hoses is not permitted without written consent from the Owner.

1.4 Temporary heating and ventilation

.1 Arrange and pay for temporary heating and ventilation required during construction.

.2 When available and with written consent of the Owner, Contractor may connect to and use Owner's existing supply of natural gas or propane (whichever is available for primary fuel for heating) for temporary use during construction, subject to existing available volume and pressure. Usage at no cost to Contractor.

.3 Vent construction heaters in enclosed spaces to the outside or use flameless type of construction heaters.

.4 Furnish other temporary heating as required by various technical trade Sections or by Product manufacturers. Replace with new, any work damaged due to failure to provide adequate heat at no cost to Owner.

.5 Be responsible for operation and maintenance of permanent heating and ventilation system, for replacing and repairing damage it may suffer, and shall assume operation and maintenance of the system in all its parts and payment for fuel consumed.

.6 Operation and maintenance shall include inspection at least every two weeks of thermostats, valves, switches, lubrication, fan, belt and motor adjustment, cleaning and/or replacement of filters, and replacement of filters and re-servicing of system at completion of work.

.7 Connect electric motors only to permanent source of power, or otherwise provide proper source with correct design characteristics and with no fluctuation in voltage.

.8 Operate systems in a non-wasteful and energy efficient manner. Be responsible for any system damage. Commence warranty period after re-servicing and from time the Owner takes over the premises.

.9 Just prior to Ready-for-Takeover, replace filters, clean HVAC ducting, and perform other required maintenance to ensure systems are in as near as new condition as possible.

.10 Ensure that systems manufacturers' warranties do not commence until the date of Ready-for-Takeover or, if manufacturers' warranties do commence earlier when systems are put into use, arrange for necessary extension of manufacturers' warranties or provide equivalent coverage under Contractor's warranty

.11 Provide temporary heat for the Work as required to:

.1 Facilitate progress of Work;

.2 Protect the Work against dampness and cold;

.3 Prevent moisture condensation on surfaces, freezing, or other damage to finishes or stored Products;

.4 Maintain specified minimum ambient temperatures and humidity levels for storage, installation and curing of Products;

.5 After building is enclosed, maintain interior temperature of minimum 10 degrees C in isolated areas to 20 degrees C as required by technical trade Sections or by Product manufacturers.

.12 Provide temporary ventilation for the Work as required to:

.1 Prevent accumulations of fumes, exhaust, vapours, gases and other hazardous, noxious, or volatile substances in enclosed spaces, as required to maintain a safe work environment meeting applicable regulatory requirements;

.2 Ensure that hazardous, noxious, or volatile substances do not migrate to Owner occupied spaces;

.3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons;

.4 Ventilate temporary sanitary facilities;

.5 Ventilate storage spaces containing hazardous or volatile materials;

.6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

1.5 Temporary electrical power and lighting

.1 Arrange and pay for temporary power and lighting required during construction.

.2 When available and with written consent of the Owner, Contractor may connect to and use Owner's existing electrical supply for temporary use during construction. Usage at no cost to Contractor.

.3 Operate systems in a non-wasteful and energy efficient manner. Be responsible for any system damage.

.4 Just prior to Ready-for-Takeover, replace lamps which have been used for more than three (3) months.

.5 Ensure that systems manufacturers' warranties do not commence until the date of Ready-for-Takeover, or, if manufacturers' warranties do commence earlier when systems are putinto use, arrange for necessary extension of manufacturers' warranties or provide equivalent coverage under Contractor's warranty.

.6 Provide and maintain an adequate temporary electrical service for performance of the Work including, but not limited to, operation of electric pumps, motors, vibrators and other power tools, hoisting and related construction and general illumination during the Work.

.7 Provide power at temporary storage sheds and field office when required.

.8 Make connections available to any part of the work within distance of a 3048mm (10') extension. Each Subcontractor shall be responsible for their own extension cords.

.9 Provide and maintain any components and equipment necessary to transform supply power to necessary temporary power voltage.

.10 Contractor will be permitted use of existing power for construction purposes at no cost to the Contractor. Provide additional temporary power for individual tasks required by the technical trade Sections.

.11 Arrange and pay for necessary connections and disconnections of temporary power and lighting in accordance with regulatory requirements.

.12 Install temporary lighting for the following:

.1 Emergency evacuation, safety and security throughout the Project at intensity levels required by authorities having jurisdiction;

.2 Performance of work throughout work areas as required, evenly distributed, and at intensities to ensure proper installations and applications are achieved;

.3 Performance of finishing work in areas as required, evenly distributed, and of an intensity of at least 30 foot candles.

1.6 Temporary sanitary facilities

.1 Provide sanitary facilities for persons on the work site as approved by the Authorities having Jurisdiction. Install them in sufficient number and maintain them in a sanitary condition.

.2 Provide and maintain drinking water and washing facilities in accordance with governing regulations and ordinances.

.3 Do not permit construction personnel to use washroom and toilet facilities on premises which have been installed as part of the new work or which are part of the existing building for use by non-construction personnel.

.4 Post notices and take such precautions as required by local health authorities.

.5 When permanent water and drain connections are completed, provide temporary water closets and urinals complete with temporary enclosures, inside building.

.6 Except where connected to municipal sewer system, periodically remove wastes from Site.

1.7 Existing building heating, ventilation, power, and lighting

.1 Existing building heating, ventilation, power, and lighting may be relied upon and used during construction except during hours or days when the building is not operational.

.2 Coordinate and make arrangements with the building operator and pay any costs required for provision of these services during hours or days when the building is not operational.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 Provide temporary construction facilities as necessary for performance of the Work and in compliance with applicable regulatory requirements.

.2 Maintain temporary construction facilities in good condition for the duration of the Work.

.3 Remove temporary construction facilities from Place of the Work when no longer required.

1.2 Construction facilities - general

.1 Construct temporary Work of new materials unless otherwise approved.

.2 Prepare shop drawings and specifications of temporary Work and submit for approval of authorities having jurisdiction if so required. Provide an electronic copy to Consultant for their information.

.3 Locate temporary facilities where shown on Drawings, or as coordinated with the facility operators, subject to the satisfaction of the Consultant.

1.3 Falsework

.1 Provide and maintain required shoring and bracing in accordance with applicable provincial and local construction safety regulatory requirements and other applicable regulations.

.2 Design and construct falsework in accordance with CSA S269.1-1975.

.3 All shoring and related support structures and systems shall be designed, constructed, and installed in accordance with applicable provincial and local governmental regulatory requirements.

.4 Shoring or related support structures or systems in excess of a height of 1.2m (4′-0″) shall be constructed and installed in accordance with Drawings bearing the seal and signature of a Professional Engineer licensed to practice in the Province in which the Work is located.

1.4 Storage sheds

.1 Storage areas are defined on the Drawings, or as designated by the Consultant. Store materials to ensure the preservation of their quality and fitness for the Work.

.2 Store materials on wooden platforms or other hard, clean surfaces off the ground or in a watertight storage shed of sufficient size for the storage of materials that might be damaged by storage in the open. Provide the shed with a wood floor raised a minimum of 150mm (6”) clear of the ground.

.3 Store materials to ensure the preservation of their quality and fitness for the Work. Store materials on wooden platforms or other hard, clean surface off the ground. Locate stored materials to facilitate prompt inspection.

.4 If working or storage areas in addition to areas provided at the Place of the Work are required, the Contractor shall be responsible for making arrangements to obtain such additional areas, whether adjacent to the Place of the Work or not, and for obtaining all permits and making rental payments that may be required for such additional areas.

.5 Provide weathertight heated storage sheds with raised floors for the storage of equipment, as required by the Consultant and/or equipment manufacturers. Provide all storage instructions from equipment Suppliers well in advance of the scheduled delivery dates.

.6 Handle and store Products in a manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer’s instructions.

.7 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.

.8 Store Products subject to damage from weather in weatherproof enclosures.

.9 Store cementitious Products clear of earth or concrete floors, and away from walls.

.10 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.11 Store sheet materials, lumber, etc. on flat, solid supports and keep clear of ground. Slope to shed moisture.

.12 Store and mix paints in a heated and ventilated room. Remove oily rags and other combustible debris from the site daily. Take every precaution necessary to prevent spontaneous combustion.

.13 Remove and replace damaged Products to the satisfaction of the Consultant.

.14 Do not use private property for storage purposes without the written permission of the property owner. Pay rental charges and damages associated with occupying private lands.

1.5 Sanitary facilities

.1 Provide sanitary facilities for workers as indicated in Section 01 51 00.

1.6 Construction aids

.1 Hoists and cranes:

.1 Each Subcontractor is responsible for providing his own hoisting and crane operations. Equipment shall be operated by qualified hoist and/or crane operators.

.2 Where multiple trades are involved in high level Work, the Contractor shall co-ordinate the hoisting and trade requirements.

.2 Scaffolding:

.1 Each Subcontractor shall provide his own scaffolding.

.2 Scaffolding shall be erected clear of walls, and to ensure that it does not interfere with continuing Work.

.3 Design, construct, install, inspect, and dismantle scaffolding in accordance with applicable provincial and local governmental regulatory requirements and requirements of CAN/CSA S269.2.

.4 Subcontractor shall be responsible for its examination for sufficiency of his scaffolding and be responsible for accidents due to its insufficiency.

.5 The Contractor will be responsible for co-ordination of scaffold Work if multiple trade usage can be achieved from one installation.

.3 Elevators:

.1 Do not use permanent elevators for construction purposes.

.1 Just prior to Ready-for-Takeover, perform required maintenance to ensure elevators are in as near as new condition as possible.

.2 Ensure that elevator manufacturer's warranty does not commence until the date of Ready-for-Takeover, or, if manufacturer's warranty does commence earlier when elevators are put into use, arrange for necessary extension of manufacturer's warranty or provide equivalent coverage under Contractor's warranty.

1.7 Security

.1 Maintain security of construction site by control of access through enclosing barricades, and hoardings during times Work is in progress, and by locking hardware.

.2 Properly close and lock the construction site at nights, Sundays, holidays and other occasions when the Work is not in progress.

.3 The Owner assumes no responsibility for the safeguarding of tools or equipment from theft.

.4 Take precautions to guard construction site, premises, materials and the public during and after working hours. During regular working hours, maintain watch to guard construction site and contents.

.5 Maintain security at all times if construction is shut down because of a strike or a lockout.

.6 Provide security guards and security lighting during all after hour Work.

.7 Provide personnel to direct traffic as required during working hours.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

- .1 Access to site.
- .2 Working on public roadways.
- .3 Informational and warning devices.
- .4 Traffic control – flag persons.
- .5 Operational requirements.
- .6 Temporary parking for consultant.
- .7 Temporary parking for construction personnel.
- .8 Fire routes.
- .9 Road closure procedures.

1.2 Reference standards

.1 Ontario Traffic Manual (OTM), Book 7 - Temporary Conditions, current revision.

.2 Ontario Provincial Standards (OPS):

- .1 OPS.MUNI 314 – Construction Specification for Untreated Subbase, Base, Surface, Shoulder, Selected Subgrade and Stockpiling
- .2 OPS.MUNI 1010 – Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material

.3 Uniform Traffic Control Devices (UTCD):

- .1 Latest edition of the Manual on Uniform Traffic Control Devices

1.3 Access to site

.1 Do not obstruct entrances, stairs or fire exits.

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

.3 Obtain approval from the Consultant before constructing temporary roads. Keep temporary road surfaces over backfilled excavations free from potholes.

.4 Provide for mud and snow removal and dust suppression, as required during the construction period.

.5 Maintain vehicular access to all properties within and adjacent to the Place of the Work at all times except when Contractor's operations reasonably necessitate a temporary restriction. Such restrictions shall be kept to a minimum and shall be coordinated with the affected property owner or occupant.

.6 All traffic arrangements shall be subject to the approval of the Consultant and the authority having jurisdiction.

.7 Plan and schedule the routes of vehicles transporting all materials to, from or within the Place of the Work, so that vehicular movements are accomplished with minimum interference and interruptions to traffic.

.8 The Owner reserves the right to alter or reject proposed delivery and trucking routes as considered necessary. The Contractor shall notify Suppliers of materials and equipment of the above requirements.

1.4 Working on public roadways

.1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of or storage of vehicles, materials and equipment on public roadways.

.2 When working on public-travelled way:

.1 Obtain road occupancy permit from authority having jurisdiction.

.2 Prepare and submit a traffic control plan acceptable to the Consultant.

.3 Erect temporary traffic control signs and devices according to OTM Book 7.

.4 Place equipment and materials in position to present minimum of interference and hazard to traveling public.

.5 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.

.6 Do not leave equipment on travelled way overnight. Store equipment outside the roadway “clear zone” when not in use

.7 Do not close any lanes of road without approval of Consultant and the authority having jurisdiction.

.8 Keep travelled way graded, free of pot holes and of sufficient width for required number of lanes of traffic.

.3 Provide minimum 7.0 m wide temporary roadway for traffic in two-way sections (3.5 m per traffic direction) through Work and on detours.

.4 Provide minimum 5.0 m wide temporary roadway for traffic in one-way sections through Work and on detours.

.5 Access to adjacent properties:

.1 Provide and maintain road access and egress to property fronting along Work under Contract and in other areas as indicated, unless other means of road access exist that meet approval of Consultant and authority having jurisdiction.

1.5 Informational and warning devices

.1 Provide and maintain signs and other devices required to indicate construction activities or other temporary and unusual conditions resulting from the Contractor’s operations which requires road user response.

.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in OTM Book 7.

.3 Place signs and other devices in locations recommended in OTM Book 7.

.4 Meet with Consultant prior to commencement of Work to prepare list of signs and other devices required for project. If situation on site changes, revise list for approval of Consultant.

.5 Continually maintain traffic control devices in use by:

.1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.

.2 Removing or covering signs which do not apply to conditions existing from day to day.

1.6 Traffic control – flag persons

.1 Provide traffic control according to the current revision of Ontario Traffic Manual (OTM), Book 7 - Temporary Conditions, and guidelines of the Infrastructure Health and Safety Association.

.2 Provide competent, properly equipped flag persons:

.1 When public traffic is required to pass working vehicles or equipment which block all or part of travelled roadway.

.2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.

.3 When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.

.4 Where temporary protection is required while other traffic control devices are being erected or taken down.

.5 For emergency protection when other traffic control devices are not readily available.

.6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.

.7 At each end of restricted sections where pilot cars are required.

.3 Delays to public traffic due to Contractor's operators: Maximum five (5) minutes.

.4 Where roadway carrying two-way traffic is to be restricted to one (1) lane for twenty-four (24) hours each day, provide portable traffic signal system.

.5 Adjust as necessary, and regularly maintain system during period of restriction.

.6 Provide secure, rigid guardrails and barricades around deep excavations and open shafts as required by governing authorities.

.7 Provide paid duty police officers for traffic control in or near intersections where traffic is required to move against normal traffic signal cycles.

.8 Submit a traffic control and staging plan for review by the Consultant at least two (2) weeks prior to commencement of construction activities and material deliveries.

.9 Include both a narrative description of the proposed construction methods and a dimensioned drawing showing typical layout of traffic control measures in each stage of the Work and how the Contractor intends to maintain traffic as specified in the Contract Documents providing specific references to appropriate typical layouts in the OTM.

.10 Traffic control plan shall consider the movement of both vehicular and pedestrian traffic and the impacts on abutting properties and businesses. Ensure that properties with more than one entrance have at least one (1) entrance maintained at all times.

.11 Design roadway Work zones with specific consideration for worker safety, road user and pedestrian safety, and community mobility, with proper advanced warning of the Work zone and proper site identification.

.12 If the Contractor requires any temporary deviations from the above the Contractor must receive approval from the Consultant. Provide a minimum of three (3) Working Days notice prior to the Contractor's proposed temporary deviations.

.13 Maintain all traffic lanes in good condition, free of mud and dirt.

.14 The Owner reserves the right to order the Contractor to retain the services of an acceptable traffic control specialist firm if, in the Consultant's sole opinion, the Contractor continually fails to provide acceptable traffic control measures.

.15 The Consultant may issue a Stop Work Order to the Contractor if the Contractor’s operations jeopardize the safety of the public. In such case, the Contractor shall immediately make the Work Area safe and comply with the Stop Work Order.

.1 The Contractor shall not be permitted to continue working until he can demonstrate to the satisfaction of the Consultant that traffic control shall be carried out in an acceptable manner.

.2 Issuance of a Stop Work Order for this, or any other cause, shall be at the sole expense of the Contractor.

.3 The Consultant shall not consider an extension of the time to substantially perform or complete the Work due to issuance of any Stop Work Order with regards to traffic control.

1.7 Operational Requirements

.1 Maintain existing conditions for traffic throughout period of Contract except that, when required for construction under this Contract and when measures have been taken as specified and approved by Consultant to protect and control public traffic, existing conditions for traffic to be restricted as follows:

.2 Road portion from 8:30am to 4:30pm.

.1 One lane closed for < one km.

.3 Maintain existing conditions for traffic crossing right-of-way.

1.8 Temporary parking for consultant

.1 There is no parking available for the Consultant on the project site.

1.9 Temporary parking for construction personnel

.1 There is no site parking for Contractor's, Subcontractors, Suppliers and/or their employee's vehicles shall be limited to restricted area as designated by the Owner.

.2 The Owner and their employees will not be responsible for parking fines incurred by the Contractor, Subcontractors, Suppliers and/or their employees.

.3 Provide and maintain adequate access to project site.

.4 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

.5 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.10 Fire routes

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

1.11 Road closure procedure

.1 Apply these procedures for any Work requiring the temporary closure of a Regional Road.

.2 Provide the Owner and Consultant a minimum of fifteen (15) Working Days advanced notice of a planned road closure where such closure is permitted in the Contract.

.3 The Owner will notify Emergency Services, School Boards, Durham Region Transit and Local Municipalities before the Contractor may close any roadway to traffic. The Owner will arrange for public notices and detour signing.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 Provide temporary barriers and enclosures necessary to protect the public and building occupants and to secure Place of the Work during performance of the Work.

.2 Adequately protect the Work at all stages of operations and maintain protection until the Work is completed. Remove and replace, at no additional cost to Owner, damaged Work and materials that cannot be repaired or restored to the approval of the Consultant.

.3 Comply with applicable regulatory requirements.

1.2 Barriers and enclosures - general

.1 Maintain temporary barriers and enclosures in good condition for the duration of the Work.

.2 In addition to requirements of authorities having jurisdiction, provide temporary protection and safeguards adequate to protect against:

.1 Accident or injury to workers and other persons on the site or adjacent Work and properties.

.2 Damage to any part of the Work and to any adjoining or adjacent structure, property, services, and other similar items, by overloading, weather, frost, any other cause resulting from the execution of the Work.

.3 Protect Work, existing property, adjacent tenant and public property from damage during performance of Work. Should any part of the Work or any buildings, services or similar items on or surrounding the areas of the Work and adjacent to any road leading thereto become damaged or disfigured due to lack or failure of such protection, they shall be made good with material identical with the existing and adjoining surfaces, to the satisfaction of the authorities having jurisdiction and the Owner.

.4 Damaged Work shall be made good by those performing Work originally, or workers experienced or skilled in that particular type of Work, at expense of those causing damage.

.5 Provide and maintain necessary temporary enclosures, hoardings, fences, gates, barriers, guards, hoists, cranes, stairs, ladders and scaffolding, walks, platforms, staging as necessary for the Work and protection of workers, public and others from injury, and for public access to adjacent buildings. All such apparatus shall meet requirements of the authorities having jurisdiction.

.6 Provide secure, rigid guard railings, hoardings and barricades around openings, as required by authorities having jurisdiction and to maintain safety.

.7 Provide proper guard devices, signs, signals and lights for the prevention of accidents.

.8 Maintain at night, sufficient and suitable warning lights to prevent accidents and injuries to persons and/or property.

.9 Alter, remove and relocate or replace hoardings, barriers and entrances as required by the Work. Hazards requiring such protection shall be eliminated as soon as possible and protection devices removed. Maintain protection until state of construction allows their removal.

.10 Provide and maintain temporary weathertight protection for all exterior openings in walls, floors and roofs until the building is closed in.

.11 Close off floor areas where walls are not finished, seal off openings and enclose building interior Work area. Polyethylene or other approved translucent material shall be framed in or around wall openings. Provide temporary doors, frames, hinges, locks, keys and bolts as required.

.12 Should the Work be stopped for any cause, provide protection and bracing for the Work.

.3 Lay protective 13mm (1/2") plywood over completed areas of roof on which other trades are to Work.

.4 Remove temporary barriers and enclosures from Place of the Work when no longer required.

1.3 Design and safety requirements for temporary Work

.1 Be responsible for design, erection, operation, maintenance and removal of temporary structural and other temporary facilities, barriers, and enclosures.

.2 Engage and pay for registered professional engineering personnel skilled in the appropriate disciplines to perform these functions where required by law or by the Contract Documents; and in cases where such temporary facilities and their method of construction are of such a nature that professional engineering skill is required to produce safe and satisfactory results.

.3 Engage and pay for Professional Engineer(s) registered in Place of the Work to design and supervise construction and maintenance of hoardings, covered ways, protective canopies and project sign(s). Designs provided by Consultant or Owner for such Work cover general appearance only.

1.4 Protection of open trenches and excavations

.1 In addition to the provisions of Ontario Regulation 213/91 made under the Occupational Health and Safety Act, R.S.O. 1990, employ the following protection measures for trenches and excavations left open at the end of the Workday or where, during any Workday, a trench or excavation is left unattended by the Contractor:

.1 Where the public has access to the perimeter of an excavation, install a barrier at least 1.1 m high around the complete perimeter of the excavation.

.2 Vertical supports must be secure, have a spacing of not more than 1.1 m and be a minimum distance of 300 mm from the top of the wall of the excavation.

.3 The barrier shall include a fencing fabric, with openings not exceeding 100 mm, securely attached to the vertical supports at the top, center and bottom and spacing not exceeding 100 mm.

.4 If the excavation is greater than 0.3 m in depth, install toe board with the fencing fabric securely fastened to it to prevent persons from slipping under the fabric and into the excavation.

.5 If an excavation is adjacent to a sidewalk or an area commonly used by the public as a walkway or recreation area, the fencing fabric shall be a metal mesh.

.2 Where an excavation is greater than 1.0 m in depth, and the public has access to the perimeter, signs shall be posted indicating “Danger Due to Excavation”.

.3 Ensure barriers are in good condition and stable prior to vacating the project at the end of each Workday.

1.5 Exterior hoarding / fencing

.1 Erect temporary exterior site hoarding to comply with applicable regulatory requirements.

.2 Medium-security temporary plywood hoarding enclosure:

.1 Erect framing members and install hoarding panels at the perimeter of the Place of the Work as indicated or required by authorities having jurisdiction to fully enclose the Place of the Work and as follows, unless otherwise indicated or required by authorities having jurisdiction:

.2 Height of hoarding: 2440mm (8') minimum, unless otherwise indicated, above grade at any point.

.3 Vertical posts spaced 2440mm (8’) on centre, maximum.

.4 Vertical posts: Set a minimum of 1220mm (4’) in the ground.

.5 Horizontal rails securely nailed or screwed to vertical posts at top, bottom, and intermediate locations at 610mm (24") on centre.

.6 Erect panels around objects as required.

.7 Hoarding shall contain no opening more than 100mm (4") wide or less than 914mm (3') above the bottom of the fence except where required for access to and from the Place of the Work.

.8 Provide no rails, other horizontal or diagonal bracing, attachments, or pattern of openings on the outside that would facilitate climbing.

.9 At access openings: Provide gates that provide performance and safety at least equivalent to hoarding and contain wire mesh of sufficient openness to provide visibility for traffic entering or exiting the Place of the Work.

.10 Provide overhead protection hoarding where public access is required.

.1 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.

.11 Paint public side of site enclosure in selected colours with one (1) coat of exterior alkyd primer and one (1) coat of exterior alkyd paint. Maintain public side of enclosure in clean condition. Paint project side of particleboard panels with one (1) coat of exterior alkyd primer.

.3 Low-security temporary chain link hoarding enclosure:

.1 Fence fabric: 3.75mm diameter (No. 9 gauge) steel wire woven in a 50mm (2") mesh, hot dipped galvanized after weaving and knuckled finish top and bottom selvage edges.

.2 Galvanized fabric to have a minimum zinc application of 490 g/m² of surface area.

.3 Posts: CLFMI (Chain Link Fence Manufacturer Institute) Type 1, standard buttwelded Schedule 40, ASTM F1083-10 standard weight, galvanized pipe.

.4 Provide prefabricated panelized chain link and post galvanized metal hoarding system.

.4 Signage: Provide suitable sized notice signs at entrance to the Place of the Work with contrasting text "RESTRICTED ACCESS - CONSTRUCTION SITE" complete with the name of Contractor.

.5 Provide lockable access gates for Construction Equipment and lockable pedestrian doors as required to facilitate construction access.

.6 Erect and maintain pedestrian walkways including roof and side covers, complete with pedestrian signage and electrical lighting.

1.6 Weather enclosures

.1 Provide weather tight enclosures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

.2 Provide weather enclosures to protect floor areas where walls are not finished and to enclose Work areas that require temporary heating.

.3 Design weather enclosures to withstand wind pressure and snow loading requirements.

1.7 Dust tight screens and/or partitions

.1 Provide dust tight screens or barriers to localize dust generating activities for the protection of tenants, employees, equipment, adjacent and finished areas of Work, and the public. Maintain and relocate protection until Work is complete. Respond immediately to complaints of dust received from the public, authorities having jurisdiction, Owner and Consultant.

.2 Obtain Consultant's approval of installed dustproof screens and protection methods before proceeding with construction/alteration Work.

.3 Painted gypsum wallboard and metal stud dustproof screens, shall extend to underside of structure, and shall be erected to protect adjoining areas and rooms. Apply bead of sealant or other acceptable seal continuously around periphery of each face of partitioning to seal gypsum board/structure junction where dustproof screens abut fixed building components. Seal perimeter of cutouts, around fixtures and fittings and other penetrations. Tape or seal between adjacent boards. Separate construction areas from occupied areas.

.4 Provide protection for existing equipment sensitive to dust and noise. Prevent dust migration through HVAC or return air systems.

.5 Co-ordinate location of dust barriers and dust tight doors with Consultant.

.6 Install temporary packing at bottom of doors to areas where demolition/construction shall be performed to prevent dust seepage into existing spaces. Do not permit dust and dirt to escape beyond area being constructed/altered.

.7 Provide daily vacuuming of construction dust from existing areas as Work progresses; this shall be considered a minimum requirement, increase vacuuming as necessary. The Owner may have vacuuming Work done by others and cost deducted from Contractor's progress payments if this requirement is not fulfilled.

.8 Provide locked doors in barriers to permit access by Consultant, Owner and Owner's security personnel to construction areas and to areas under Contractor's custody. Supply padlocks and construction cores.

.9 Remove dustproof screens at completion of Work in areas and make good damaged or blemished areas. Patch and make good to access, altered and damaged areas caused by Work and screens. Maintain integrity of fire or sound separation.

.10 Prevent nuisance to adjacent areas near the Work from dust by taking additional appropriate anti-dust measures at such times as found necessary, and at other times complaints of dust are received from the Owner's representative and others.

1.8 Fire routes

.1 Maintain fire access routes, including overhead clearances, for use by emergency response vehicles.

1.9 Protection of building finishes

.1 Provide necessary temporary barriers and enclosures to protect [existing and] completed or partially completed finished surfaces from damage during performance of the Work.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

- .1 Product options
- .2 Product handling
- .3 Storage and protection
- .4 Scheduling of Product delivery
- .5 Defective Products and Work
- .6 Specified Products
- .7 Manufacturer's instructions
- .8 Workmanship

1.2 Product options

.1 Subject to the provisions of Section 01 25 00:

- .1 Wherever a Product or manufacturer is specified by a single proprietary name, provide the named Product only.
- .2 Wherever more than one Product or manufacturer is specified by proprietary name for a single application, provide any one of the named Products.

.2 Wherever a Product is specified by reference to a standard only, provide any Product that meets or exceeds the specified standard. If requested by Consultant, submit information verifying that the proposed Product meets or exceeds the specified standard.

.3 Wherever a Product is specified by descriptive or performance requirements only, provide any Product that meets or exceeds the specified requirements. If requested by Consultant, submit information verifying that the proposed Product meets or exceeds the specified requirements.

.4 As far as practical, favour use of Products of Canadian manufacture unless such Products are not manufactured in Canada, are specified otherwise, or are not competitive.

.5 All Products and materials supplied shall have a low V.O.C. rating.

.6 Products for use in the Project and on which the Bid was based shall be in production at time of tender date, with a precise model and shop drawings available for viewing.

.7 Unless otherwise specified, maintain uniformity of manufacture for like items throughout.

.8 Where equivalent Products are specified, or where alternatives are proposed, these Products claimed by the Contractor as equivalent shall be comparable in construction, type, function, quality, performance, and, where applicable, in appearance. Where specified equivalents are used in the Stipulated Price for the Work, they shall be subject to final approval.

.9 Incorporate Products in the Work in strict accordance with Manufacturers' directions, instructions and specifications, where reference is made to them, shall include full information on storing, handling, preparing, mixing, installing, erecting, applying, and other matters concerning the materials that are pertinent to their use and their relationship to materials with which they are incorporated.

.10 Products delivered to the Project site for incorporation in the Work shall be considered the property of the Owner. Maintain protection and security of Products stored on the site after payment has been made for them.

.11 Do not install permanently incorporated labels, trademarks and nameplates, in visible locations unless required for operating instructions or by authorities having jurisdiction.

1.3 Product handling

.1 Manufacture, pack, ship, deliver and store Products so that no damage occurs to structural qualities and finish appearance, nor in any other way detrimental to their function or appearance, as indicated in Section 01 45 43.

1.4 Storage and protection

.1 Store Products on site with secure protection against all harmful environmental conditions. Prevent damage, adulteration, staining and soiling of materials while stored.

.2 Protect prefinished metal surfaces by protective coatings or wrappings until time of final cleaning. Protection shall be easily removable under Section 01 74 00, without damage to finishes.

.3 Store manufactured Products in accordance with manufacturers' instructions.

.4 Comply with the requirements of the workplace hazardous materials information system (WHMIS) regarding use, handling, storage, and disposal of hazardous materials, including requirements for labeling and the provision of safety data sheets (SDS).

.5 Store steel, lumber, masonry units, and similar Products on platforms raised clear of ground.

.6 Store finished Products and woodwork under cover at all times.

.7 Do not store Products at locations or in such a manner that they damage previously completed Work.

.8 Storage and special protection requirements may be repeated and additional requirements specified, in other Sections.

1.5 Scheduling of product delivery

.1 Verify that Products supplied by all Sections are ordered from Suppliers in sufficient time to ensure delivery for incorporation in the Work within the time limits established by approved construction schedule.

.2 Obtain confirmed delivery dates from Suppliers.

.3 Immediately inform the Consultant should Supplier's confirmation of delivery dates indicate that Project completion may be delayed.

.4 Submit copies of purchase orders and confirmations of delivery dates for Products as may be requested.

.5 A schedule of Product delivery shall be established and reviewed at each job site meeting.

.6 When deemed necessary, plant visits shall occur by the Contractor to ensure delivery dates given are true and accurate.

1.6 Defective products and work

.1 Products and Work found defective; not in accordance with the Specifications; or defaced or injured through negligence of the Contractor, his employees or Subcontractors, or by fire, weather or any other cause will be rejected for incorporation in the Work whether or not incorporated in the Work.

.2 Remove rejected Products and Work from the premises immediately.

.3 Replace rejected Products and Work with no delay after rejection. Provide replacement Products and execute replacement Work precisely as required by the Specifications for the defective Work replaced.

.4 Previous inspection and payment shall not relieve the Contractor from the obligation of providing sound and satisfactory Work in compliance with the Specifications.

.5 Testing and retesting of any part of the Work as directed by the Owner, Consultant or Contractor to establish its conformance to the Contract Documents shall be performed at no addition to the Contract Price.

1.7 Workers, suppliers and subcontractors

.1 Assign Work only to workers, Suppliers, and Subcontractors who have complete knowledge, not only of the conditions of the Specifications, but of jurisdictional requirements, and reference standards and Specifications.

.2 Give preference to use of local workers, Suppliers and Subcontractors wherever possible.

.3 Certified and qualified installers of a specific Product line shall be used when called for in these Specifications.

2 Products

2.1 Specified products

.1 Products used for temporary facilities may have been previously used, providing they are sound in structural qualities.

.2 Specified options: The Work is based on materials, Products and systems specified by manufacturer's catalogued trade names, references to

standards, by prescriptive specifications and by performance specifications.

.1 Where only one manufacturer's catalogued trade name is specified for a Product, the Product is single sourced and shall be supplied by the specified manufacturer.

.2 Where more than one manufacturer's catalogue trade name is specified for a Product, supply the Product from any one of those manufacturers specified.

.3 When a Product is specified by reference to a standard, select any Product from any manufacturer that meets or exceeds the requirements of the standard.

.4 When a Product or system is specified by prescriptive or performance specifications, Provide any Product or system which meets or exceeds the requirements of the prescriptive or performance specifications.

.5 The onus is on the Contractor to prove compliance with governing published standards, prescriptive specifications and with performance specifications.

.3 Products, materials, equipment and articles (referred to as Products throughout the Contract Documents) incorporated in the Work shall be new, not damaged or defective, and of the quality standards specified, for the purpose intended. If requested, furnish evidence as to type, source and quality of Products Provided.

.4 Where Contract Documents list acceptable Products or acceptable manufacturers, select as applicable, any one Product from any one manufacturer meeting performance of specifications.

.5 Where Contract Documents require design of a Product or system, and minimum material requirements are specified, the design of such Product or system shall employ materials specified within applicable technical trade Sections. Where secondary materials or components are not specified, augment with materials meeting applicable code limitations, and incorporating compatibility criteria with adjacent Work.

.6 Defective Products, whenever identified prior to completion of the Work, will be rejected, regardless of previous reviews. Review of the Work by the

Consultant or inspection and testing companies does not relieve the Contractor of the responsibility for executing the Work in accordance with the requirements of the Contract Documents, but is a precaution against oversight or error. Remove and replace defective Products and be responsible for delays and expenses caused by rejection at no additional cost to the Owner.

.7 Should any dispute arise as to quality or fitness of Products, the decision rests strictly with Consultant based upon the requirements of the Contract Documents.

.8 Unless otherwise indicated in the Contract Documents, maintain uniformity of manufacturer for any like item, material, equipment or assembly for the duration of the Work.

.9 Products exposed in the finished Work shall be uniform in colour, texture, range, and quality, and be from one production run or batch, unless otherwise indicated.

.10 Permanent labels, trademarks and nameplates on Products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical, electrical, machinery or like rooms.

.11 Owner retains right to select from choices available within specified Products for colours, patterns, finishes or other options normally made available. Submit full range of Product options in accordance with 01 33 00 for such selection.

.12 Quality control:

.1 Implement a system of quality control to ensure compliance with Contract Documents.

.2 Notify Consultant of defects in the Work or departures from intent of Contract Documents that may occur during construction. Consultant will recommend appropriate corrective action in accordance with requirements of the Contract.

3 Execution

3.1 Manufacturer's instructions

.1 Unless otherwise indicated in the Contract Documents, install or erect Products in accordance with manufacturer's printed instructions. Do not rely on labels or enclosures supplied with Products. Obtain printed instructions directly from manufacturers.

.2 Notify Consultant in writing, of conflicts between the Contract Documents and manufacturer's instructions.

.3 Improper installation or erection of Products, due to failure in complying with these requirements, authorizes Consultant to require removal and re-installation at no additional cost to the Owner.

.4 Manufacturers’ representatives shall have access to the Work at all times. Contractor shall render assistance and facilities for such access in order that the manufacturers’ representatives may properly perform their function.

3.2 Galvanic/dissimilar metal corrosion

.1 Insulate dissimilar metals from each other by suitable plastic strips, washers or sleeves to prevent galvanic corrosion where conductive liquid or electrolyte exists.

3.3 Workmanship

.1 Execute the Work using workers experienced and skilled in the respective duties for which they are employed.

.2 Do not employ an unfit person or anyone unskilled in their required duties.

.3 Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with Consultant, whose decision is final.

End of section

1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

- .1 Request for cutting
- .2 Definitions
- .3 Products
- .4 Preparation
- .5 Cutting, patching and remedial Work
- .6 Performance

1.2 Request for cutting, patching and remedial work

.1 Submit written request in advance of cutting, coring, or alteration which affects or is likely to affect:

- .1 Structural integrity of any element of the Work;
- .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 Other Contractors;
- .6 Warranty of Products affected.

.2 Include in request:

- .1 Identification of Project;
- .2 Location and description of affected Work, including drawings or sketches as required;
- .3 Statement on necessity for cutting or alteration;
- .4 Description of proposed Work, and Products to be used;
- .5 Alternatives to cutting and patching;
- .6 Effect on Work of Owner or Other Contractors;
- .7 Written permission of affected Other Contractors;
- .8 Date and time Work will be executed.

1.3 Definitions

.1 Cutting: Removal of existing construction necessary to permit installation or performance of other Work.

.2 Patching: Fitting and repair Work required to restore surfaces to original conditions after installation of other Work.

1.4 Products

.1 Unless otherwise specified, when replacing existing or previously installed Products in the course of cutting and patching Work, use replacement Products of the same character and quality as those being replaced.

.2 If an existing or previously installed Product must be replaced with a different Product, submit request for substitution in accordance with Section 01 25 00.

1.5 Preparation

.1 Provide supports to ensure structural integrity of surroundings; provide devices and methods to protect other portions of the Work from damage.

.2 Provide protection from elements for areas that may be exposed by uncovering Work.

1.6 Cutting, patching, and remedial work

.1 Coordinate and perform the Work to ensure that cutting and patching Work is kept to a minimum.

.2 Perform cutting, fitting, patching, and remedial work to make the affected parts of the Work come together properly and complete the Work.

.3 Provide openings in non-structural elements of the Work for penetrations of mechanical and electrical Work.

.4 Perform cutting by methods to avoid damage to other Work.

.5 Provide proper surfaces to receive patching, remedial Work, and finishing.

.6 Perform cutting, patching, and remedial Work using competent and qualified specialists familiar with the Products affected, in a manner that neither damages nor endangers the Work.

.7 Do not use pneumatic or impact tools without Consultant’s prior approval.

.8 Ensure that cutting, patching, and remedial Work does not jeopardize manufacturers' warranties.

.9 Refinish surfaces to match adjacent finishes. For continuous surfaces refinish to nearest intersection. For an assembly, refinish entire unit.

.10 Fit Work to pipes, sleeves, ducts, conduit, and other penetrations through surfaces with suitable allowance for deflection, expansion, contraction, acoustic isolation, and firestopping.

.11 Maintain fire ratings of fire rated assemblies where cutting, patching, or remedial Work is performed. Completely seal voids or penetrations of assembly with firestopping material to full depth or with suitably rated devices.

.12 Structural elements: Do not cut and patch structural elements in a manner that could change their load carrying capacity or load deflection ratio.

.13 Operational elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety, including but not limited to the following:

.1 Primary operational systems and equipment;

.2 Air or smoke barriers;

.3 Fire protection systems;

.4 Control systems;

.5 Communication systems;

.6 Conveying systems;

.7 Electrical wiring systems.

.14 Miscellaneous elements: Do not cut and patch the following elements or related components in a manner that could change their load carrying capacity, that results in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety, including but not limited to the following:

.1 Equipment supports;

.2 Piping, ductwork, vessels, and equipment;

.3 Noise and vibration control elements and systems.

.15 Visual requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching.

.16 Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Consultant's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

.17 If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm, including but not limited to the following:

.1 Firestopping and smoke seals;

.2 Finished flooring;

.3 Finished coatings;

.4 Wall coverings;

.18 Tooth new masonry Work into existing masonry when installed in the existing building.

.19 Cutting and patching conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.7 Performance

.1 Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay:

.1 Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

.2 Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction.

.1 In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

.2 Existing finished surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

.3 Concrete or masonry: Cut using a cutting machine, such as an abrasive saw or a diamond core drill.

.4 Mechanical and electrical services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

.5 Proceed with patching after construction operations requiring cutting are complete.

.3 Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

.1 Definitions;

.2 Submittals;

.3 General cleaning requirements;

.4 Progressive cleaning requirements;

.5 Cleaning prior to completion;

.6 Diversion of materials.

1.2 Definitions

.1 Alternative daily cover: Material (other than earthen material) that is placed on the surface of the active face of municipal solid waste landfills at the end of each Working Day to control vectors, fires, odours, blowing litter, and scavenging.

.2 Biomass: Plant material from trees, grasses, or crops that can be converted to heat energy to produce electricity.

.3 Construction and demolition debris: Includes waste and recyclables generated from construction and from the renovation, demolition, or deconstruction of pre-existing structures. It does not include hazardous materials or land-clearing debris, such as soil, vegetation, and rocks.

.4 Eligible biofuels: Untreated wood waste, agricultural crops or waste, landfill gas, animal waste and other organic waste.

.5 Hazardous materials: As defined by relevant regulations in the location of the project. Hazardous materials should be excluded from calculations and should be disposed of according to relevant regulations.

.6 Incineration facilities: Waste management operations that use combustion as a means of reducing the volume of waste materials.

.7 Recycling: The collection, reprocessing, marketing, and use of materials that were diverted or recovered from the solid waste stream.

.8 Reuse: The return of materials to active use in the same or a related capacity as their original use, thus extending the lifetime of materials that would otherwise be discarded.

.9 Tipping fees: Charged by a landfill for disposal of waste, typically quoted per tonne.

1.3 Submittals

.1 Submit end-use confirmation documentation electronically as part of closeout submittals, as indicated in Section 01 78 00.

.1 Confirmation from recycling and/or reuse facilities of the destination and end use for each material diverted from landfills.

.1 Signed letters provided by recycling and/or reuse facilities, including:

.1 Municipal addresses of receiving facilities;

.2 Process or method used of recycling the material (melting, crushing, chipping);

.3 Intended use of each type of material received.

1.4 General cleaning requirements

.1 Provide adequate ventilation during use of volatile or noxious substances. Do not rely on building ventilation systems for this purpose.

.2 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.3 Prevent cross-contamination during the cleaning process.

.4 Notify the Consultant of the need for cleaning caused by Owner or Other Contractors.

1.5 Progressive cleaning and waste management

.1 Maintain the Work in a tidy and safe condition, free from accumulation of waste materials and construction debris.

.2 Provide appropriate, clearly marked, containers for collection of waste materials and recyclables. Locate containers where indicated on Drawings, or where identified by the Consultant.

.3 Remove waste materials and recyclables from Work areas, separate, and deposit in designated recycling containers at end of each Working Day. Collect packaging materials for recycling or reuse.

.4 Remove waste materials and recyclables from Place of the Work weekly. Increase removal where required to ensure the site is left in a clean and tidy state.

.5 Ensure that spatters, droppings, soil, labels and debris are removed from the surfaces to receive finishes, before they set up. Leave Work and adjacent finished Work in new condition to the satisfaction of the Consultant.

.6 Use only cleaning materials which are recommended for the purpose by both the manufacturer of the surface to be cleaned and of the cleaning material.

.7 Maintain areas “broom clean” at all times during the Work. Vacuum clean interior areas immediately before finish painting commences.

.8 Do not burn or bury waste material at the site unless otherwise instructed or approved, in writing, by the Consultant.

.9 Do not allow waste material and/or debris to accumulate in an unsatisfactory or hazardous manner. Sprinkle dusty accumulations with water.

.10 Each Section shall supply the Contractor with instructions for final cleaning of their Work, for inclusion in O&M manual indicated in Section 01 78 00.

.11 Clean interior building areas prior to start of finish Work and maintain free of dust and other contaminants during finishing operations.

.12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly finished surfaces nor contaminate building systems.

1.6 Cleaning prior to completion

.1 Before final cleaning, arrange a meeting at Place of the Work to determine the acceptable standard of cleaning. Ensure that Owner, Consultant, Contractor and cleaning company (where applicable) are in attendance.

.2 Remove from Place of the Work surplus Products, waste materials, recyclables, temporary Work, and construction equipment not required to perform any remaining Work.

.3 Lock or otherwise restrict access to each room or area after completing final cleaning in that area.

.4 Re-clean as necessary areas that have been accessed by Contractor's workers prior to Owner occupancy.

.5 Remove stains, spots, marks, and dirt from finished surfaces, electrical and mechanical fixtures, furniture fitments, walls, floors and ceilings.

.6 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and all other finished surfaces. Replace broken, scratched or otherwise damaged glass.

.7 Remove dust from lighting reflectors, lenses, lamps, bulbs, and other lighting surfaces.

.8 Vacuum clean and dust exposed wall, floor, and ceiling surfaces, behind grilles, louvres and screens.

.9 Clean mechanical, electrical, and other equipment. Replace filters for mechanical equipment if equipment is used during construction.

.10 Remove waste material and debris from crawlspaces and other accessible concealed spaces.

.11 Clean exterior and interior window glass and frames.

.12 Remove stains, spots, marks, and dirt from exterior facades.

.13 Clean and sweep roofs, clear roof drains, clean gutters and downspouts.

.14 Sweep clean, power wash, remove snow and ice from exterior sidewalks, steps, driveways, roads, parking lots, and other paved surfaces.

.15 Use leaf blowers to clean landscaped surfaces.

2 Products – not used

3 Execution

3.1 Diversion of materials

.1 Recycle and/or salvage non-hazardous construction and demolition debris excluding land-clearing debris such as soil and rocks.

.1 Prevent contamination of materials for reuse and recycling by handling in accordance with requirements for acceptance by designated facilities.

.2 Separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Consultant, and consistent with applicable fire regulations.

.1 A project may choose to separate construction waste on-site or have commingled construction waste sorted at an off-site facility.

.1 On-site separation provides immediate feedback of the ongoing waste diversion efforts but may require additional labour.

.2 Commingled recycling simplifies the waste management effort on-site. This option is especially useful for projects with tight space constraints and no room for multiple collection bins.

.3 Work with manufacturer’s to minimize unnecessary packaging and making arrangements for pallets to be reclaimed after use can also reduce waste volumes and waste management costs.

.4 The Contractor must identify on-site recycling locations and review recycling requirements with all Subcontractors.

.5 Recommended construction and demolition waste diversion shall be as follows:

.1 Minimum 75% diversion from landfill:

.1 Concrete;

.2 Asphalt;

.3 Clean rubble;

.4 Cardboard;

.5 Standard gypsum board (unpainted);

.6 Clean lumber;

.7 Glass;

.8 All metals (aluminum, steel, iron, copper).

.6 Transportation of waste:

.1 Transport all separated reusable, recyclable or disposable construction and/or demolition waste materials to approved recycling or disposal facilities.

.7 Disposal of waste:

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of any waste into waterways, storm or sanitary sewers.

.3 Keep records of construction waste including:

.1 Number and size of bins;

.2 Waste type of each bin;

.3 Total tonnage generated;

.4 Re-used or recycled waste destination.

.8 Cleaning:

.1 Remove tools and waste materials on completion of Work and leave Work area in clean and orderly condition.

.2 Clean up Work area as Work progresses.

.3 Source separate materials to be reused/recycled into specified sort areas.

End of section

1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

- .1 Inspection and review before takeover
- .2 Final payment prerequisites
- .3 Partial user occupancy
- .4 Substantial Performance of the Work

1.2 Ready-for-takeover

.1 The prerequisites to attaining Ready-for-Takeover of the Work are described in the General Conditions of the Contract.

1.3 Inspection and review before takeover

.1 Contractor's inspection: Before applying for the Consultant’s review to establish Ready-for-Takeover:

- .1 Ensure that the specified prerequisites to Ready-for-Takeover milestone are completed.
- .2 Conduct an inspection of the Work to identify defective, deficient, or incomplete Work.
- .3 Prepare a comprehensive and detailed list of items to be completed or corrected.
- .4 Provide an anticipated schedule and costs for items to be completed or corrected.

.2 Consultant’s review: Upon receipt of the Contractor’s application for review, together with the Contractor’s list of items to be completed or corrected, the Consultant and the Contractor shall arrange a mutually satisfactory agreed date and time to jointly review the Work. The Consultant will advise the Contractor whether or not the Work is Ready-for-Takeover. Add additional items, if any, to the Contractor’s list of items to be completed or corrected. Provide the Consultant with a copy of the revised list.

.3 Maintain the list of items to be completed or corrected and promptly correct or complete defective, deficient and incomplete Work. The Contractor's inspection and Consultant's review procedures specified above shall be repeated until the Work is Ready-for-Takeover and no items remain on the Contractor's list of items to be completed or corrected.

.4 When the Consultant determines that the Work has meet the Ready-for-Takeover requirements outlined in the Project Manual, the Consultant will notify the Contractor and the Owner in writing to that effect.

1.4 Prerequisites to final payment

.1 After Ready-for-Takeover milestone has been achieved, and before submitting an application for final payment in accordance with the General Conditions of Contract, do the following:

.1 Correct or complete all remaining defective, deficient, and incomplete Work;

.2 Remove from the Place of the Work all remaining surplus Products, Construction Equipment, and temporary Work;

.3 Perform final cleaning and waste removal necessitated by the Contractor's Work performed after Ready-for-Takeover, as specified in Section 01 74 00.

1.5 Partial user occupancy

.1 If partial Owner occupancy of a part of the Work is required before the date of Ready-for-Takeover of the entire Work of the Contract, the provisions of this Section shall apply, to the extent applicable, to that part of the Work that the Owner intends to occupy.

1.6 Substantial Performance of the Work

.1 The prerequisites to, and the procedures for, attaining substantial performance of the Work, or similar such milestone as provided for in the lien legislation applicable to the Place of the Work, shall be:

.1 In accordance with the lien legislation applicable to the Place of the Work.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 The Work of this Section includes, but is not limited to the following:

.1 Operation and maintenance manual (O&M) format, content, Product and finishes content and warranties content.

.2 Contractor's as-built Drawings

.3 Project record Drawings

1.2 Operation and maintenance (O&M) manual

.1 Prepare a comprehensive operation and maintenance (O&M) manual, in the language(s) of the Contract, using personnel qualified and experienced for this task.

.2 Submit an initial draft of the O&M manual for Consultant's review. If required by Consultant's review comments, revise manual contents and resubmit for Consultant's review. If required, repeat this process until Consultant accepts the draft manual in writing.

.3 Submit final version to Owner in electronic format, as indicated below.

.4 Operation and maintenance (O&M) manual - format:

.1 Organize data in the form of an instructional manual and provide an electronic copy of the O&M manual in .pdf format.

.2 Title page: Identify the title "Operation and Maintenance Manual", name of Project or facility, and subject matter of contents.

.3 Arrange content by systems, under Section name and numbers, as sequenced within the Table of Contents of the Specifications.

.4 Text: Arial size 10 or 11 font for typed data.

.5 Drawings: Provide in .pdf format.

.6 Provide electronic copy of Shop Drawings in manual, scaled to reflect that of the Drawing details; Files in .dwg format on electronic media acceptable to Owner.

.5 Operation and maintenance (O&M) manual – general content:

.1 Table of contents for each volume.

.2 Introductory information including:

.1 Date of manual submission;

.2 Complete contact information for Consultant, Subconsultants, other consultants, and Contractor, with names of responsible parties;

.3 Schedule of Products and systems indexed to content of volume.

.3 For each Product or system, include complete contact information for Subcontractors, Suppliers and manufacturers, including local sources for supplies and replacement parts.

.4 Product data: mark each sheet to clearly identify specific Products, options, and component parts, and data applicable to installation. Delete or strike out inapplicable information. Supplement with additional information as required.

.5 Reviewed Shop Drawings.

.6 Permits, certificates, letters of assurance and other relevant documents issued by or required by authorities having jurisdiction.

.7 Warranties.

.8 Operating and maintenance procedures, incorporating manufacturer's operating and maintenance instructions, in a logical sequence.

.9 Training materials.

.6 Operation and maintenance (O&M) manual - equipment and systems content:

.1 Each item of equipment and each system: Include description of unit or system and component parts.

.1 Give function, normal operation characteristics, and limiting conditions.

.2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: Provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating procedures: Include start-up, break-in, and routine normal operating instructions and sequences.

.1 Include regulation, control, stopping, shut-down, and emergency instructions.

.2 Include summer, winter, and any special operating instructions.

.5 Maintenance requirements: Include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide installed control diagrams by controls manufacturer.

.10 Provide original manufacturer's parts list, illustrations, assembly Drawings, and diagrams required for maintenance.

.11 Provide Contractor's coordination Drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include testing and balancing reports.

.15 Include additional content as specified in technical trade Sections.

.7 Operation and maintenance (O&M) manual - Products and finishes content:

.1 Include Product data, with catalogue number, options selected, size, composition, and colour and texture designations.

.2 Provide information for re-ordering custom manufactured Products.

.3 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Include an outline of requirements for routine and special inspections and for regular maintenance to ensure that on-going performance of the building envelope will meet the initial building envelope criteria.

.5 Include additional content as specified in technical trade Sections.

.8 Operation and maintenance (O&M) manual - warranties content:

.1 Separate each warranty with index tab sheets keyed to Table of Contents listing.

.2 List each warrantor with complete contact information.

.3 Verify that documents are in proper form and contain full information. Ensure that warranties are for the correct duration and are in Owner's name.

1.3 Contractor's as-built Drawings

.1 Submit final as-built Drawings in the form specified in Section 01 32 00, to Owner and Consultant.

1.4 Project record Drawings

.1 Transfer all information marked up on the as-built Drawings during the progress of the Work to a master set of record Drawing files provided by Consultant; Files in .dwg electronic format.

.2 Mark revised Drawings as "RECORD DRAWINGS".

.3 Submit completed record Drawings in electronic form to Owner and Consultant.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Summary

.1 The Section includes the requirements related to submission of extended warranties, as identified within the material/systems corresponding technical trade Sections.

1.2 Definitions

.1 Extended Warranty: Unless otherwise specified, an extended warranty is a full labour and materials product or system warranty which is required beyond the expiry of the two (2) year standard warranty period, as identified in Appendix B - Supplementary Conditions for CCDC 2-2020.

.2 Extended warranties shall commence upon the expiry of the standard 2-year warranty period; therefore, the total warranty period is 2-years plus the extended warranty period.

1.3 Administrative requirements

.1 Inform all manufacturers providing extended warranties of all obligations required under such extended warranties.

1.4 Submittals

.1 Provide the following information with each extended warranty:

.1 Name and address of manufacturer;

.2 Warranty description and length of warranty;

.3 Procedure for failure or malfunction;

.4 Instances which will affect warranty;

.5 Certification of Contractor’s installation;

.6 Manufacturer’s certification.

.2 Extended warranties shall be submitted to the Consultant no later than twenty (20) Working Days after the date of Substantial Performance of the Work.

.3 **After Substantial Performance of the Work, the Owner will retain $5,000 until satisfactory extended warranty documents are provided.**

1.5 Payment

.1 Payment for this Section shall be made only upon submission of extended warranty documentation satisfactory to the Owner for all specified extended warranties.

.2 No partial payment will be made for submission of individual extended warranties.

2 Products

2.1 Extended warranties

.1 Extended Warranties are required for the following Products and systems. Reference the specific technical trade Sections for details.

.2 Extended Warranties for the specified components and Sections will remain in effect for the number of years as follows:

Material / System Description	Trade Section Number	Total Length of Material / System Warranty (years)
Passenger Elevator	14 21 06	10

3 Execution

3.1 Contractor requirements

.1 Inform all manufacturers providing extended warranties of all obligations required under such extended warranties.

.2 Provide access to the work site to all manufacturers required to provide extended warranties for such manufacturers to witness installation of equipment and systems requiring an extended warranty as well as related and interconnected products and systems.

3.2 Warrantor requirements under extended warranties

.1 Manufacturers shall provide extended warranties.

.2 Extended warranties shall provide the Owner with the same rights as the original contract warranty.

.3 All work performed under an extended warranty shall be subject to the same warranty as the original work of the Contract, and such warranty shall remain in effect until the expiry of the extended warranty

.4 Upon notification of defects in product or services under an extended warranty, remedy any defect identified by the Owner during the period specified above.

.5 Remedy any damage to Owner-owned or controlled real or personal property, when such damage is the direct result of any defect of equipment, material, workmanship, or design furnished.

.6 Commence repairs and replacements within five (5) Working Days of notification of defect unless a shorter response time is specified elsewhere in the Contract Documents.

.7 Supplier’s/manufacturer’s standard disclaimers and limitations on product and services warranties shall not relieve the warrantor of their obligations required under the specific extended warranty.

.8 The warrantor shall not be liable for the repair of any defects of material nor resultant damage where such defect or damage results from any defect in Owner-furnished material or design.

End of section

1 General

1.1 Summary

.1 Demonstrate and provide training to Owner's personnel on operation and maintenance of the elevator operations prior to scheduled date of use.

.2 Owner will provide list of personnel to receive training and will coordinate their attendance at agreed upon times.

.3 Coordinate and schedule demonstration and training provided by Subcontractors and Suppliers.

.4 Coordinate training with Consultant..

1.2 Submittals

.1 Submit proposed dates, times, durations, and locations for demonstration and training of each item of equipment and each system for which demonstration and training is required. Allow sufficient time for training and demonstration for each item of equipment or system, or time as may be specified in technical trade Sections.

.2 Consultant and Owner will review submittal and advise Contractor of any necessary revisions.

.3 Submit report(s) within five (5) Working Days after completion of demonstration and training:

.1 Identifying time and date of each demonstration and training session;

.2 Summarizing the demonstration and training performed, and;

.3 Including a list of attendees.

1.3 Prerequisites to demonstration and training

.1 Testing, adjusting, and balancing has been performed in accordance with Contract Documents.

.2 Equipment and systems are fully operational.

.3 Copy of completed operation and maintenance manual is available for use in demonstration and training.

.4 Conditions for demonstration and training comply with requirements specified in technical Specifications.

1.4 Demonstration and training

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing and maintenance of each item of equipment and system.

.2 Review operation and maintenance (O&M) manual in detail to explain all aspects of operation and maintenance.

.3 Prepare and insert additional information in operation and maintenance (O&M) manual if required.

2 Products – not used

3 Execution

3.1 Preparation

.1 Verify that suitable conditions for demonstration and instructions are available.

.2 Verify that designated personnel are present.

.3 Prepare agendas and outlines.

.4 Establish seminar organization.

.5 Explain component design and operational philosophy and strategy.

.6 Develop equipment presentations.

.7 Present system demonstrations.

.8 Accept and respond to seminar and demonstration questions with appropriate answers.

3.2 Preparation of agendas and outlines

.1 Prepare agendas and outlines including the following:

.1 Equipment and systems to be included in seminar presentations;

.2 Name of companies and representatives presenting at seminars;

.3 Outline of each seminar's content;

.4 Time and date allocated to each system and item of equipment;

.5 Provide separate agenda for each system.

.2 Seminar organization:

.1 Coordinate content and presentations for seminars.

.2 Coordinate individual presentations and ensure representatives scheduled to present at seminars are in attendance.

.3 Arrange for presentation leaders familiar with the design, operation, maintenance and troubleshooting of the equipment and systems.

.4 Where a single person is not familiar with all aspects of the equipment or system, arrange for specialists familiar with each aspect.

.5 Coordinate proposed dates for seminars with Owner and select mutually agreeable dates.

3.3 Explanation of design strategy

.1 Explain design philosophy of each system, including but not limited to the following:

.1 An overview of how system is intended to operate.

.2 Description of design parameters, constraints and operational requirements;

.3 Description of system operation strategies;

.4 Information to help in identifying and troubleshooting system problems.

3.4 Time allocated for instruction

.1 Ensure amount of time required for instruction of each item of equipment or system as follows:

.1 Section 14 21 06 - Passenger Elevators 1 hours of instruction.

.2 Section 16 00 10 - Electrical 1 hours of instruction.

End of section

1 General

1.1 Summary

.1 Section Includes, but is not limited to, the following:

.1 Brick veneer, concrete blocks, mortar, anchors and air seals.

.2 Labour, Products, equipment and services necessary to complete the Work of this section.

1.2 References

.1 Conform to the latest edition of the following:

.1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies

.2 CSA A82.1-M, Burned Clay Brick

.3 CSA A165 Series, CSA Standards on Concrete Masonry Units

.4 CSA A179, Mortar and Grout for Unit Masonry

.5 CSA A370, Connectors for Masonry

.6 CSA S304.1, Design of Masonry Structures

.7 CSA A371, Masonry Construction for Buildings

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

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

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

.11 CSA W117.2, Safety in Welding, Cutting, and Allied Processes

1.3 Submittals

.1 Product data: Submit as Shop Drawings, manufacturer's specifications and other data for masonry, in accordance with Section 01 33 00.

.2 Samples

.1 Submit to Consultant, two samples of brick in accordance with Contract requirements.

.2 If coloured mortar is specified, submit a sample board incorporating specified unit masonry in selected coloured mortar.

.3 Ensure materials used do not vary in any respect from approved samples. If variations occur in materials delivered to Site, Consultant may, at its discretion, reject such materials.

1.4 Product Delivery, storage and handling

.1 Check materials for damage and carefully unload. Remove unsatisfactory materials from the Site and replace with new materials to satisfaction of Consultant at no increase in Contract Price.

.2 Store materials on Site in a manner to prevent damage thereto. Stockpile for easy heating if required. Protect from the weather. Do not concentrate storage on any part of the structure so as not to set up any strain beyond the designed load of any portion thereof.

.3 Take particular care so as not to overload unsupported portions of the structure which have not attained their full strength.

.4 Comply with CSA A371.

.5 Protect the following:

.1 Masonry materials during storage and construction from wetting by rain, snow or ground water, or inter-mixture with earth or other materials.

.2 Metal reinforcing or ties against corrosion or contamination, including ice, which will reduce or destroy bond.

.3 Other Work from damage resulting from this Work.

.4 Sills, ledges and projections from droppings of mortar.

.6 Cover tops of masonry walls not enclosed or sheltered during rain, at the end of each day's construction and at times when Work is not in progress, with waterproof covers temporarily secured against displacement, until flashings are completed. Drape cover over wall and extend 600 mm down both sides. Anchor securely in position. Protect exposed corners against droppings or damage from other trades, by boarding or other means.

.7 Prevent grout or mortar from staining the face of masonry to be left exposed or painted. Immediately remove grout or mortar in contact with such masonry.

.8 Cold weather protection: Do not lay masonry at air temperatures below 5°C (41°F) without prior review by Consultant of proposed protective measures. Comply with CSA A371.

.9 Repair or replace damaged Work to satisfaction of Consultant at no increase in Contract Price.

1.5 Scaffolding

.1 Erect, maintain and remove on completion, scaffolding adequate for the proper execution of the Work.

.2 Conform to "Occupational Health and Safety Act". Lay masonry from scaffolds erected on same side as face Work. Do not support scaffolding from finished building surfaces.

1.6 Welding

.1 Retain a firm certified in accordance with CSA W47.1 Division 1 or 2.1 to perform welding of anchor clips.

.2 Employ welding operators licensed per CSA W47.1 for types of welding required by the Work.

1.7 Temporary bracing

.1 Temporarily brace masonry Work during erection to prevent damage due to winds or other lateral loads until permanent structure provides adequate bracing.

2 Products

2.1 Materials

.1 Source each type of masonry unit from one manufacturer. Units to be of uniform texture and colour for each kind required.

.2 Brick face veneer: Metric modular, hard burned clay brick masonry units, conforming to CSA A82.1-M, Hanson Brick, Northern Collection, Ironspot

MKII, MTM or approved equivalent. Finish exposed ends of brick at external corners, headers, control joints and openings same as the face.

.3 Interior concrete blocks: Lightweight, metric modular moisture-controlled units conforming to CSA A165.1, Type H/15/C/M (and Type S/15/C/M). Do not use for walls in contact with earth or where exposed to the weather. For the purpose of fire-resistance rating, conform to the requirements of $L_2$20S as specified in the National Building Code.

.4 Exposed surfaces: Free of cracks, chips or other blemishes and broken corners. Include required sash blocks for control joints, solid block around openings for rolling steel doors or shutters where noted, and concrete block lintels over openings in concrete block walls unless steel lintels are shown.

.5 Units on external corners of exposed interior block and block at door jambs: bullnosed type.

.6 Special shapes: Manufacture to shape shown; do not field cut stretcher units to make special shapes.

.7 Mortar: Conforming to CSA A179-M, Type "S".

.8 Mortar (exterior wythe blocks in cavity wall): Conforming to CSA A179-M, Type "N", 1:1:6 ready mixed. Use pre-mixed/pre-bagged/pre-gauged cement-lime requiring water to be added in the mixer per mortar manufacturer's directions. No loose sand allowed on site. Mix colour pigment manufactured by Harcros Pigment Canada or Solomon Colours, Inc.or approved equivalent to produce coloured mortar colour; colour as selected by the Consultant.

.9 Pointing mortar: Mortar as specified with Sika, or approved euivalent, admixture added to mix according to manufacturer's specifications.

.10 Grout: Conforming to CSA A179-M, coarse.

.11 Horizontal masonry reinforcement: Welded wire, galvanized units in heavy duty truss or ladder two-side rod design by Dur-O-Wal, Blok-Lok, or Hohmann and Barnard, or reviewed equal, prefabricated in straight lengths of not less than 3 m with matching corner "L" and intersection "T" units. Overall width shall be such that side rods are positioned at the centreline of both face shells of the concrete block. Reinforcing gauge and

finish to meet requirements of the Ontario Building Code and referenced CSA Standards. Wire reinforcing types as follows:

.1 Single wythe: Standard truss or ladder heavy duty two-side rod design by Dur-O-Wal, Blok-Lok or Hohman & Barnard or approved equivalent.

.2 Cavity: Blok-Lok "Econo-Cavity Lok" ladder type heavy duty with additional bar for “Wedge-Lok" insulation wedges, or equivalent by Dur-O-Wal or Hohman & Barnard. Supply "Wedge-Lok" or approved equal, as part of the work.

.12 Masonry anchors: 6 mm thick steel plate anchors and clips to laterally support masonry walls from other walls or structural elements. For interior or dry locations, clean to SSPC-SP3 and prime with CISC/CPMA solvent reducible primer. For exterior or humid conditions, hot-dip galvanize to CSA G164. For non-structural anchorage, Blok-Lok "Flex-O-Lok" or approved equal, may be used.

.13 Vertical reinforcement: Conforming to CAN/CSA G30.18-M, Grade 400.

.14 Cavity wall insulation: As specified in Section 07 21 00.

.15 Compressible filler atop non-fire rated masonry walls: Where ceiling is used as a return air plenum use:

.1 "Zero Draft Z2-600" by Can-Am Building Envelope Systems, a foamed-in-place material with a flame spread rating of 25 or less in accordance with CAN/ULC-S102, or

.2 Fibreglass or mineral wool sealed with a firestop spray meeting the maximum flame spread and smoke ratings as above, as manufactured by 3M, Tremco, Johns Manville or approved equivalent..

.16 Compressible filler atop non-fire-rated masonry walls: Where ceiling space is not used as a return air plenum, use soft grade closed cell foam joint filler strips by CPD.

.17 Premoulded control joint gasket: Dur-O-Wal "Rapid Control Joint" in "Wide-Flange", or approved equal, design of type to suit wall thickness. Use "Regular" design for control joints at pilasters or columns. For fire-

rated control joint gaskets, use fire-rated closed cell neoprene conforming to ASTM D1056 or ASTM D2056.

.18 Dampproof course and through-wall flashings: "Blueskin SA" by Monsey Bakor, or "Sopraseal Stick" by Soprema, or reviewed equal self-adhesive grade.

.19 Cavity wall ventilation inserts: Dur-O-Wal "Cell Vent Weep-Hole Ventilator" or reviewed equal. Colour as selected by the Consultant.

.20 Cavity wall drainage net: High density polyethylene or polypropylene, 25 mm thick x 250 mm high x manufacturer's standard lengths "Mortar Net" with insect barrier.

.21 Brick and block vents: Titus "Model OXL-77" or reviewed equal complete with duct extension and birdscreen; exposed surfaces clear anodize finished.

.22 Anchor bolts: Minimum 9 mm diameter steel, in length shown on Drawings, hot-dip galvanized to CAN/CSA G164-M.

.23 Foamed-in-place air seals: Class 1, single component polyurethane foam conforming to CAN/ULC-S710.1, with flame spread rating of 20 or less and smoke developed of 25 or less. Density of 20.8 to 28.8 kg/m³, "Zerodraft Foam Sealant" by Canam Building Envelope Specialists Inc., "Great Stuff Pro" by Dow Chemical Company, "LEF" by Tremco or reviewed equal.

3 Execution

3.1 Mortar mixing

.1 Mix mortar with the maximum amount of water consistent with workability to provide maximum tensile bond strength within the capacity of the mortar. Use a mechanical mixer. No hand mixing permitted.

.2 Do not use mortar which has begun to set or if more than 2½ hours has elapsed since initial mixing. Retemper mortar during the 2½ hour period only as required to restore workability.

.3 Retain the same brand and source of materials used to mix coloured mortar.

.4 Place a thoroughly experienced, reliable and competent person in charge of mortar mixing.

3.2 General masonry construction

.1 Carefully and neatly lay masonry, truly vertical and horizontal, with joints of uniform size as required to suit requirements for design coursing and bonding.

.2 Tooth intersections of walls with alternating units, except as otherwise shown or where control joints and expansion joints occur.

.3 Lay blocks in running bond except where shown otherwise. Lay in full mortar beds with face shell vertical joints filled. Align block webs vertically and with thicker ends of face shells up.

.4 When thumbprint hard, tool exposed joints shallow concave with non-staining round jointer. Tool joints flush where shown and where gypsum wallboard, ceramic tile and resilient base are to be applied as finish.

.5 Keep masonry walls 25 mm clear of underside of steel building frame, roof or floor and deck over. For non-fire rated masonry walls used as air plenum, pack the clear space with the specified material of either fibrous filler and spray seal combination, or foam-in-place. For non-fire rated masonry walls that are not used as air plenum, fill the clear space with specified foam strips. Compress to 50% of original thickness.

.6 Lay brick in such a way that vertical joints in alternate brick courses are plumb from the top course to the bottom course.

.7 Cut masonry units using a motor-driven table saw designed to cut masonry with clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use full-size units without cutting wherever possible.

.8 Match coursing, bonding (colour and texture) of new masonry work with existing Work where indicated.

.9 Build movement joints in masonry walls at 6000 mm at exterior and 7500 mm at interior unless shown otherwise. Provide joints using sash block units. Fill chase and joint with premoulded gasket full height of control

joints. Leave a depth of 12 mm for caulking. Locate control joints in modular dimensions.

.10 Coordinate building-in of anchors as required for the proper installation of the Work of other trades.

.11 Provide solid block or provide metal lath under block and fill block cells solid for lintel bearing and as required to secure built-in anchor bolts and/or anchors.

.12 Build-in door frames, borrowed light and glazed screen frames, anchors, inserts, loose lintels, shelf angles, conduits and other items required to be built into masonry. Set anchors between frames and masonry and fill voids between metal frames and masonry walls with mortar.

.13 Build recesses to receive items recessed in masonry.

3.3 Reinforcing, ties and anchors

.1 Build-in continuous masonry reinforcement in horizontal courses terminating at vertical terminations such as control and expansion joints, full height of walls and partitions, at every second block course. Install reinforcing in first and second courses over door and window openings.

.2 Maintain continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut, bend and lap reinforcing units as per printed directions of manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

.3 Build-in dovetail anchors.

.4 Weld masonry anchor clips to structural steel in accordance with the following standards:

.1 CSA W48.1-M - for electrodes. If rods are used, only coated rods are allowed.

.2 CSA W59-M - for design of connections and workmanship.

.3 CSA-W117.2 - for safety.

.5 Thoroughly clean welded joints and expose steel for a sufficient space to perform welding operations. Touch-up disturbed primer paint with matching primer.

.6 Where shown, install vertical steel reinforcing and fill block cells with grout. At lintels, install reinforcing per schedule and fill with grout. Allow 200 mm minimum bearing on each lintel end up to 1.2 m span; 400 mm minimum bearing on each end for spans exceeding 1.2 m. Temporarily support lintels until concrete has cured.

3.4 Cavity wall construction

.1 Lay block as specified under "General Masonry Construction".

.2 Tie exterior wythe to interior wythe using shear connectors spaced 600 mm vertically and 800 mm horizontally.

.3 Lay damp course and through-wall flashings. Lap joints 50 mm minimum. Roll with steel hand roller to ensure proper contact at laps. Carry through-wall-flashings continuous past exterior steel columns.

.4 Extend flashing membrane one block course up the back wall and return into mortar joint a minimum 25 mm.

.5 Install cavity wall ventilator inserts in vertical brick or block joints immediately over dampproof courses and through-wall flashings, at 600 mm o.c. Set 3 mm from the face of masonry unit. Ensure inserts are not plugged with mortar or debris. Slope flashings towards the exterior in order that any water that penetrates the exterior wythe and drains to the bottom, is directed back to the exterior through the inserts.

.6 Install through-wall flashings at any interruption of the air space behind the face veneer such as:

.1 Bottom of cavity walls

.2 Over shelf angles and lintels in exterior walls

.3 At other locations shown

.7 Flashing above windows and doors that is discontinuous shall be turned up at ends to form a dam.

.8 Place continuous run of drainage net on top of through-wall flashing.

.9 Keep exterior wall cavities free from mortar droppings. Strike mortar joints facing cavity flush.

.10 Coordinate masonry Work with the application of sprayed insulation on cavity side of inner masonry wythe.

3.5 Field quality control

.1 The Owner may engage an inspection and testing company to observe workmanship and to conduct block, mortar and grout strength tests in accordance with CSA A165.1, CSA A179, and CSA S304, and will pay all costs thereto.

3.6 Repair, pointing and cleaning

.1 Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, point to eliminate evidence of replacement.

.2 Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar.

.3 Point-up joints including corners, openings and adjacent work to provide a neat, uniform appearance, properly prepared for application of sealant compounds.

.4 Rake out to 12 mm depth, joints between sills and between ends of sills and masonry. Point to full 12 mm depth with pointing material specified. Tool pointing to a slightly concave smooth condition.

.5 Clean exposed masonry surfaces by wiping off excess mortar as the Work progresses. Dry brush at the end of each day's Work.

3.7 Final cleaning

.1 After mortar is thoroughly set and cured, clean one-half of sample wall panel. Obtain Consultant's acceptance of sample wall panel cleaning before proceeding to clean building masonry Work.

.2 Dry clean to remove large particles of mortar using wood paddles and scrapers. Use chisel or wire brush if required.

.3 Scrub down wall with stiff fibre brush.

.4 Acid cleaning of masonry is not permitted.

End of section

1 General

1.1 Summary

.1 Section Includes, but is not limited to, the following:

.2 Structural steel framing, primer, shapes and connections.

.3 Labour, Products, equipment and services necessary to complete the Work of this section.

1.2 References

.1 Conform to the latest edition of the following:

.1 ASTM A325M, Standard Specification for High-Strength Bolts for Structural Steel Joints [Metric]

.2 ASTM A563M, Standard Specification for Carbon and Alloy Steel Nuts [Metric]

.3 ASTM A570, Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality

.4 ASTM B695, Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel

.5 ASTM F1554, Standard Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength

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

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

.8 CSA S136, Cold-Formed Structural Steel Members

.9 CAN/CGSB 1.181, Ready-Mixed Organic Zinc-Rich Coating

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

.11 CISC, Canadian Institute of Steel Construction, "Code of Standard Practice"

.12 CISC/CPMA 2.75, Canadian Institute of Steel Construction/Canadian Paint Manufacturers Association “A Quick-Drying Primer for Use on Structural Steel”

.13 CMAA No. 70, Crane Manufacturers Association of America, Specification #70

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

.15 CSA W48 Series, Electrodes

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

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

.18 CSA-W117.2, Safety in Welding, Cutting, and Allied Processes

.19 CSA W178.1, Certification of Welding Inspection Organizations

.20 CSA W178.2, Certification of Welding Inspectors

.21 SSPC, Steel Structures Painting Council, "Steel Structures Painting Manual, Vol. 2"

1.3 Design criteria

.1 Framing Design

.1 Building has been designed on the basis of sections shown and it is the intent of Contract that designated shapes, thicknesses, arrangements and grades of material be used.

.2 If for any reason sections shown are not available, substitute sections may be proposed for use and must be accepted in writing by Consultant prior to use. Consultant may consider such substitutions only if proposed members provide equal or greater strength with deflection compatible with adjacent construction, and do not interfere in any way with the architectural construction or the installation of mechanical, process and electrical utilities. No increase in payment will be made because of substitutions. Proposed substitutions to Class IV sections must be accompanied by calculations which are to be sealed and signed by a Professional Engineer licensed to practice in the province of Ontario.

.2 Design Requirements

.1 Obtain written acceptance from Consultant before fabricating members with randomly located butt welded splices.

.2 Obtain location of maximum stresses in members where randomly located butt welded splices will occur.

.3 If members with randomly located butt welded splices are used, have visual and non-destructive inspection/testing executed by an independent inspection/testing company, qualified in accordance with the Specifications, and pay all costs thereto. Refer to "Source Quality Control" herein for testing required. Identify unit costs for such testing as an attachment to the Tender. Submit test results to Consultant.

1.4 Submittals

.1 Shop Drawings

.1 In advance of preparation of detail Shop Drawings, submit for review, typical details of connections, special connections, and connections which do not meet requirements of "Beam Connections" article specified herein.

.2 Submit Shop Drawings for fabrication and erection of structural steel in accordance with Section 01 33 00.

.3 Clearly show and describe in detail, steel members, dimensions and connections, etc.

.4 Steel Data: In addition, submit mill test reports, equivalent test data or manufacturer's certification, that steel provided conforms to Specifications.

.5 Test Results and Certifications: Submit test reports, procedure Specifications and certifications as required to substantiate welded connection design, and welder qualifications.

.2 Diagrams/Templates: Submit to installing trade, anchor bolt diagrams and/or templates for anchor bolt locations, in accordance with installing trade's schedule requirements.

1.5 Quality assurance

.1 Welding Qualifications

.1 Welding: executed by an organization certified in accordance with CSA W47.1 Division 1 or 2.1.

.2 Operators employed on the Work: qualified "Class O" per CSA W47.1 for work as required by Contract.

.3 Inspection/testing company, and welding inspector and supervisors: meeting qualifications per CSA W178.1 and CSA W178.2 and are certified by the Canadian Welding Bureau in Category (a), Buildings.

.4 Have welding undertaken by companies and welders fully approved to CSA W47.1 and CSA W59-M.

.2 Testing and Inspection

.1 Refer to Quality Control in Section 01 45 00.

.2 Except for inspection/testing of splices introduced by fabricator in steel sections at random locations as specified herein, Owner will employ an inspection/testing company to perform other shop and field inspection/testing as specified herein, and will pay costs for same.

.3 Inspection/testing company's representative will visit fabrication plant and submit reports of each visit, with copies to Contractor and Consultant. Reports will show tonnage fabricated and inspected, with comments on conformity to Specifications, workmanship and listing of defects or inaccuracies encountered. Reports will also be submitted for inspection of field erection per CAN/CSA S16.1.

.4 Mill Inspection: Inspection will determine that materials conform to Specifications. Mill test reports, properly correlated to materials, will be accepted in lieu of physical tests.

.5 Shop Inspection: Inspection will establish that structural steel is fabricated within specified tolerances and in accordance with reviewed Shop Drawings and in conformance with specified fabrication and welding procedures; surface preparation and prime painting as specified herein. Steel will also be inspected in the shop prior to shipment to Site.

.6 Extent of inspection/testing during fabrication and erection will be as specifically detailed to inspection/testing company by Consultant. Cooperate with inspection/testing company personnel and allow access and facilities for inspection and testing.

.7 Inspection and testing does not relieve Contractor of its responsibility for quality control but is a precaution against errors. Defective materials and/or workmanship may be rejected, regardless of previous inspection, whenever found.

.3 Welded Joints: Inspection/testing company will perform non-destructive testing of 25% of welded connections chosen at random as follows.

.4 Moment connections involving use of fillet welds: 100% magnetic particle inspection for fillet welds.

.5 Moment connections involving use of full penetration groove welds: 100% ultrasonic testing for groove welds.

.6 Where moments are transferred by either fillet welds or groove welds into end plates in "T" joint configurations, base metal is to be examined by Ultrasonics for lamellar tearing or cracking.

.7 Prime Painting

.1 Inspection/testing company will inspect cleaning and prime painting in fabricator's shop.

.2 Inspection/testing of surfaces will generally take place after preparation and cleaning of surfaces but prior to application of primer paint. Notify inspection/ testing company in advance of surface preparation and primer paint application. Preparation of substrate will be inspected and evaluated for conformance with the referenced SSPC specifications, in particular, peak profile.

.3 Primer paint system will be tested for dry film thickness using non-destructive method; it will be inspected for cure and film imperfections such as runs, sags and embedded foreign matter; inspection/testing company will also inspect field touch-up and preparation of surfaces to receive same.

.4 Correct deficiencies and have such corrected Work approved by inspection/ testing company before resumption of Work.

1.6 Product delivery, storage and handling

.1 Handle and store materials in shop and at site in a manner to prevent damage to primer finish. Repair or replace damaged materials due to improper storage or handling at no cost to Owner.

.2 Deliver anchor bolts, base, bearing and leveling plates, cast-in hardware and other material that is supplied only under Work of this section to section responsible for installation, to location directed at time required by construction schedule.

.3 Handle and store structural steel and cold-formed elements to prevent damage or corrosion to stored or erected Work, or to other property.

.4 Verify paint delivery dates with paint supplier to ensure primer paint is supplied to coincide with schedule of Work.

.5 Exercise care in handling shop-primed materials. Do not handle steel until primer paint has cured sufficiently to handle without damage to same.

.6 Prevent the formation of wet storage stain on galvanized articles by complying with the following measures:

.1 Stack articles or bundle to allow air between the galvanized surfaces during transport from supplier. Load materials in such a manner that continuous drainage can occur.

.2 Raise articles from the ground and separate with strip spacers to provide free access of air to most parts of the surface. Incline in a manner which will allow continuous drainage. Do not lay galvanized steel on cinders, clinkers, wet soil or decaying vegetation.

.3 Handle galvanized articles in such a manner as to avoid any mechanical damage and to prevent distortion.

1.7 Project conditions

.1 Environmental requirements: Maintain ambient temperature and humidity conditions compatible to proper workability of primer paint material as specified by manufacturer and to a successfully completed installation. Keep a daily log of ambient temperature and humidity conditions during primer application. Have log made available for examination by the inspection/testing company.

.2 Existing conditions: Field verify existing Site conditions and measurements which could have affect on the Work.

1.8 Warranty

.1 Submit a written warranty in a form approved by Owner, warranting primer-finish paint system against chipping, cracking, flaking, blistering, peeling on delamination from substrate for a period of two years, commencing from date of Substantial Performance.

2 Products

2.1 Materials

.1 Structural shapes, plates, etc.: New material conforming to CSA-G40.20/G40.21-M, Grade 350W for W and H shapes, and Grade 300W for other shapes, and plates.

.2 Hollow structural sections: New material conforming to CSA-G40.20/G40.21-M Grade 350W, Class C.

.3 Checker plate: to CSA G40.21, Grade 300W, with rolled in embossments to provide non-slip surface.

.4 High strength bolts, nuts and washers: Conforming to ASTM A325M, with each type and size of bolt and nut of same manufacture and of same lot.

.5 Bolts: Heavy, hexagon head high strength structural bolts, of standard size, of lengths required for thickness of members joined and for type of connection.

.6 Nuts: Heavy hexagon semi-finished nuts per ASTM A563M.

.7 Washers: Flat and smooth hardened washers, quenched and tempered.

.8 Direct tension indicator washers: Specially hardened washers with compressive protrusions on one face conforming to ASTM F959.

.9 Machine bolts and anchor rods: As specified below, complete with hexagon heads and nuts:

.1 Common bolts: Conforming to ASTM A307, Grade A, of lengths required to suit thickness of material being joined, but not projecting more than 6 mm beyond nut, without the use of washers.

.2 Anchor rods: Conforming to ASTM F1554, grade 36, of lengths noted, but projecting not less than 13 mm beyond nut unless otherwise noted.

.3 Nuts: per ASTM A563M.

.10 Expansion bolts: Stud/wedge type; Carbon Steel Hilti Kwik Bolts, medium duty or Rawl-stud (threaded version) by Rawlplug Canada Ltd. Galvanize bolts per ASTM B695 or approved equal. Refer to Drawing for bolt diameter and length.

.11 Welding electrodes: To meet CSA W48 Series on welding electrodes. Any process which produces deposited weld metal meeting requirements of applicable CSA W48 series standard for any grade of arc welding electrodes shall be accepted as equivalent to use of such electrodes.

.12 Crane rail clips: Two interacting component system, self-locking and self-tightening, Weldlok Series by Gantrex, complete with Gantrex MK6 or MK4 rubber pads or approved equal.

.13 Girder tie back linkage: Integral linkage and bearing housing, to suit bolt diameter and working loads, "GP" or “GPA” series by Gantrex, configurations as shown.

.14 Crane girders: As shown, to sustain over 2,000,000 cycles of load. Proportion connections, welds and bolts in accordance with requirements of CAN/CSA S16.1, Clause 14 entitled "Fatigue", fatigue as illustrated in "Appendix K - Fatigue", and in accordance with requirements of Section 12 of CSA W59-M.

.15 Crane rails: Controlled, cooled carbon steel, US Steel with Brinnell Hardness of 280-320. Rails to have milled, tight end joints suitable for crane service and with related accessories required.

.16 Primer paint: Solvent-reducible alkyd, light grey, in fast drying, lead and zinc-chromate free formulation conforming to CISC/CPMA 2.75. Use one brand of primer paint throughout the Work, in any of the following, tinted to the specified colour:

.1 "97-680" by PPG Canada Inc.

.2 Selectone "MR-05-3" by Selectone Paints Ltd.

.3 ICI Devoe "Rustguard 4140-6120"

.4 "Kem Bond HS-B50WZ4" by Sherwin-Williams

.5 Or approved equivalent

.17 Galvanizing: Hot-dip galvanizing with minimum zinc coating of 600 g/m^2 to CAN/CSA G164-M.

.18 Galvanized primer: Zinc rich conforming to CGSB 1-GP-181M for new galvanized metal in compliance with CGSB 85-GP-16M. For galvanized fabrications touchup to remain unpainted in finished Work, use W.R. Meadows of Canada Ltd. "Galvafroid" or Kerry Industries "Z.R.C." or Niagara Paint Inc. "PL052898" zinc rich coating or approved equivalent.

2.2 Workmanship and fabrication

.1 Design details and execute Work in accordance with CAN/CSA S16.1.

.2 Shop weld per welding requirements specified herein.

.3 Carefully make and fit details and take special care so finished Work presents a neat and workmanlike appearance.

.4 Assemble members true and without twists or open joints.

.5 Properly cut and size holes for connecting Work of other trades where such can be determined prior to fabrication. Where possible, show such holes on Shop Drawings.

.6 Allow for future expansion as shown.

.7 Beam Connections

.1 Of type to adequately resist reactions produced by framing or load conditions.

.2 Beam and girder to column connections to be of type which applies vertical reaction with negligible eccentricity at connecting face of column, such as double angle web connections or unstiffened seats, unless otherwise shown.

.3 Comply with requirements of CISC Handbook of Steel Construction, except that length of beam or girder web angles shall not be less than half the depth of beam or girder, and single angles shall not be used for beams or girders except as otherwise shown on the Drawings.

.4 Use direct connections to flanges of spandrel beams to restrain twisting.

.5 Do not use fish plate or shear plate connections.

.8 Holes

.1 Cut holes and reinforce openings only where shown. Cutting of holes in structural members in the field will not be permitted except with written approval of Consultant.

.2 Prevent accumulation of water in tubular members by providing drainage holes.

.9 Columns and base plates: Sawcut bottom of columns and weld to flattened base plates. Size holes in base plates to allow for slight field adjustment to bring columns into line.

.1 Follow suggested anchor rod hole sizes by CISC Handbook of Steel Construction, latest edition.

.2 Provide washers with standard size holes, added beneath the nuts and sized to cover entire hole when anchor rod is located at the edge of the hole. Washer thickness must be adequate to prevent pulling through the hole and not less than 1/3 the anchor rod diameter.

.3 Weld washers appropriately to base plates of columns which belong to the braced bays and/or the moment frame.

.10 Beams, Girders, Purlins, Girts and Sag Rods

.1 Beams, purlins, girts and sag rods are as shown and as required to complete the Work. Machine bolts may be used for girts, and door frames not connecting to columns if they are not in a braced bay, and therefore not part of bracing system.

.2 Rolled sections and/or welded wide flange sections to be straight without camber, except for beams and girders exceeding 12 m in length, in which case, camber beams and girders 3 mm per 3 m of length. (Where beam or girder is parallel to adjacent joist, camber beam or girder to match joist camber).

.11 Door Frames

.1 Select frames for trueness of web and flange. Straighten sections as required so finished frames are uniform, square and true.

.2 Provide door frames with plates, extensions, stops, lintels, including required expansion bolts and anchors for field installation.

.3 Fabricate and assemble frames by welding. Join built-up members by plug welding. Continuously weld exposed joints, with welds ground smooth.

.4 Tack weld temporary steel spreaders to prevent frames from springing out of shape. Grind welds smooth following removal of spreaders.

2.3 Surface preparation and prime painting

.1 Clean structural steel to SSPC SP3 – Power Tool Cleaning.

.2 Prepare paint material in accordance with paint manufacturer's written directions. Material may be thinned if required, using materials recommended by paint manufacturer, using minimum amounts, but not exceeding paint manufacturer's maximum allowable mixing ratio. Provide for paint manufacturer representation in shop for application instructions. Comply with paint manufacturer's recommendations relative to equipment and application techniques.

.3 Prime Painting

.1 Shop prime steel with one coat of primer paint to a dry film thickness of 0.051 mm to 0.064 mm.

.2 Clean but do not paint surfaces to be field welded or buried in concrete or masonry (or surfaces to receive sprayed fireproofing).

.3 Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7^{o}C.

.4 Paint surfaces which will be inaccessible after assembly with two coats of primer paint before assembly. Paint surfaces inaccessible during general painting of the building with two shop coats before erection.

.5 Paint materials under cover and leave under cover until paint is thoroughly dry. Thoroughly work paint into joints and open surfaces. Follow paint manufacturer's recommendations regarding

application methods, equipment, temperature and humidity conditions.

.6 Use one brand of paint throughout the Work.

2.4 Hot-dip galvanizing

.1 Galvanize specified steel members.

.2 Perform hot-dip galvanizing after fabrication. Provide relief and drain holes. After galvanizing, ream holes to proper size and re-tap threads. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with galvanize primer in accordance with manufacturer's printed directions.

.3 Wet storage stain: Remove wet storage stain that may have developed in the coating before installation so that premature failure of the coating does not occur. Remove wet storage stain in accordance with galvanizer's recommendations.

.4 Repair of galvanized items: Repair coatings damaged by welding, cutting, or during handling, transport or erection using cold galvanizing compound specified, and as follows:

.1 Ensure surface is clean, dry, and free of oil, grease and corrosion.

.2 Power clean surface to near white metal condition, extending into undamaged galvanized coating.

.3 Apply touch up material to a dry film thickness of 0.203 mm minimum. If touched up Work is to remain exposed in the finished Work, apply a finish coat of aluminum paint to provide a colour blend with the surrounding galvanizing.

.4 Coating shall be continuous, adherent, smooth and evenly distributed.

2.5 Source quality control

.1 Non-destructive testing of randomly located butt welded splices: Using ultrasonic, radiographic or other non-destructive test method acceptable to Consultant, test butt welded splices which are composed of random lengths of structural sections as follows:

.1 100% of splices in beams, beam columns, girts or any other member in the zone where tensile bending stresses are greater than 0.90 times the design maximum bending stress. For simply spanning members this may be taken to be any splice within the central third of span.

.2 10% of splices located elsewhere, chosen at random.

3 Execution

3.1 Removals

.1 Take precautions to protect the existing structure from damage.

.2 Dismantle and cut existing structural steel as required. Provide temporary shoring and bracing required for these operations. Retain a Professional Engineer to design the temporary shoring and to review this Work on site.

.3 Remove and dispose of off site, existing steel which is dismantled but not designated for reuse. It shall become the property of the Contractor.

3.2 Examination

.1 Verify that location of concrete piers, foundations and anchor bolts are correct and at proper elevations to allow for subsequent grouting of structural steel base plates.

.2 Check location of anchor bolts in sufficient time to allow any required corrective Work to be performed by Contractor responsible before commencement of structural steel erection, to assure that schedule of steel erection is maintained.

3.3 Erection

.1 Erect structural steel Work conforming to CAN/CSA S16.1.

.2 Set steel accurately to lines and elevations shown. Set column bases and shim to proper elevations, ready for grouting.

.3 Obtain Consultant's written permission prior to any field cutting or altering of structural members.

.4 Only light drifting to draw parts together will be permitted; any enlargement of holes to execute bolted connections shall be done by reaming with a twist drill. Burning is not permitted for forming of holes, enlarging of holes, or matching of unfair holes.

.5 Guying and bracing: Structure has been designed to resist loads shown only in its completed, fully-clad state. Review the structure for loads, including wind and temperature effects, acting on frames under various stages of erection until completion of structure. Make provision for horizontal and vertical erection loads and for temporary guying and bracing to keep structural frame safe, plumb and in true alignment per CAN/CSA S16.1.

.6 Tolerance: Plumb and level individual pieces of structural steel frame in accordance with CAN/CSA S16.1.

.7 General Connections

.1 Weld or otherwise bolt main member connections with high tensile-strength bolts using CISC double angle header connections, except where specifically noted or shown otherwise. Provide high tensile-strength bolted connections per "Bolted Connection" paragraph specified herein using minimum 19 mm diameter bolts conforming to ASTM A325M.

.2 Do not permit connections to encroach on clearance lines required for the installation of Work of other contracts and subcontracts.

.3 Support the dead load of the steel structure plus the weight of the metal deck and siding on steel shims or double-nuts until grouting is completed.

.8 Bolted Connections

.1 Perform high tensile-strength bolted connections in accordance with CAN/CSA S16.1. Accurately space holes of size 2.0 mm larger than nominal diameter of bolt.

.2 Furnish compressors or electrical equipment capable of supplying and maintaining required pressure at wrench. Make connections without the use of erection bolts, some high tensile-strength bolts will serve that purpose. Nuts on bolts, except high tensile-strength bolts, shall be prevented from becoming loose by burring bolt

thread or by lock washers or lock nuts. In the case of sag rods, connect each end with double nuts; in other words, one nut above and one nut below the web of the girt.

.9 Welded Connections

.1 Perform welding without causing damage or distortion to the Work. Should there be, in opinion of Consultant, inspection/testing company will test such welds for efficiency. Remove any Work not meeting CSA standards and replace with new Work satisfactory to Consultant. Execute welding in accordance with the following standards:

.1 CSA W48.1-M - for electrodes (If rods are used, only coated rods are allowed)

.2 CSA W59-M - for design of connections and workmanship

.3 CAN/CSA-W117.2-M - for safety

.2 Take necessary safety precautions in accordance with CSA standards when welding is carried out in cold weather.

3.4 Crane rails

.1 Installation

.1 Install rails to tolerances specified in CMAA No. 70, Table 1.4.2-1 with a maximum deflection of 1/1000 of span. Install so that joints on opposite sides of the crane runway are staggered with respect to each other and with respect to the wheel base of the crane. Rail joints shall not occur at crane girder splices.

.2 Mill or grind crane rail ends to achieve a tight fit joint. Tight fit joint is 0.8 mm maximum gap between adjoining sections of rail at splices.

.3 Thermite weld all crane rails.

.4 The running surface and the side faces of adjoining rails at a splice shall be flush and in the same plane.

.2 Welding of Crane Rail Joints

.1 Weld all rail joints using thermite welding.

.2 Perform thermite field welds at the time of laying, regardless of temperature.

.3 Have all field welds made by qualified welders in accordance with latest Specifications.

.4 Ensure that the molds and thermite charges, chromium or carbon, correspond to the size and type of rail to be welded.

.5 Dry crucible thoroughly by preheating before making first weld, or when crucible has been exposed to moisture conditions, to prevent any possibility of erratic reaction.

.6 Cut all rail ends and face near-square with abrasive cut-off saw or blade saw just prior to the welding operation.

.7 Properly align and space both rail ends with a gap of 22 mm plus or minus 2 mm.

.8 Preheat rail ends with a propane compressed air flame to a temperature of about 871 – 927°C (1600 – 1700°F) controlled by using a 260°C (500°F) Tempilstik which melts on the rail web for a distance of approximately 100 mm from the edge of the mold, usually after fifteen to twenty-five minutes of preheating time, depending on rail section size and ambient temperature.

.9 After igniting the thermite charge in the crucible, allow a reaction time of approximately twenty-four seconds before tapping. The slag impurities will float to the top of the crucible during the reaction period and will be excluded from the material forming the weld. Tapping can be controlled manually or by the use of self-tapping thimbles.

.10 Allow sufficient cooling time, approximately five minutes, before removing the mold, in order to prevent hot tears in the finished weld filler metal.

.11 Do not remove rail pullers or tensors before the thermite weld metal has cooled to below 371°C (700°F), as measured by applying a Tempilstik directly on the thermite weld metal. Remove the hydraulic pressure in the rail tensor or expander very slowly and with extreme care to avoid the possibility of hot tears.

.12 Carry out thermite welding on rail ends that have been rail end hardened, built up by welding or have rail end batter exceeding 0.25 mm.

.13 Use standard carbon rail thermite weld charges for joining chromium to carbon and carbon to carbon rail. Use special chromium rail thermite weld charges marked "chrome" for joining chromium to chromium rail.

.3 Special connections: Install crane rail clips and girder tie back linkages in accordance with manufacturer's printed instructions and to suit project conditions.

3.5 Field quality control

.1 Field inspection by an inspection/testing company will be performed to meet requirements as specified under "Inspection/Testing" specified herein, and include:

.1 Inspection of erection and fit-up, including placing, plumbing, leveling and temporary and permanent bracing.

.2 Inspection of bolted connections.

.3 Inspection of welded joints.

.4 General inspection of field cutting and alterations.

.5 General inspection of preparation, prime painting and field touch up of prime painting.

3.6 Cleaning and touch-up

.1 As steel is erected, clean bolt heads, washers and nuts, previously unprimed connections, surfaces damaged during erection, welds and burned or scratched surfaces, with power wire brush to SSPC-SP3, then touch-up with same primer used in the shop, and to shop paint dry film thickness. Coverage of touch-up paint to a given area shall be concentrated to disturbed, damaged or unpainted portion, and extend to limits as required to maintain continuity and integrity of paint film and appearance.

.2 As steel is erected, thoroughly wash down with clean water, or other means as approved by paint manufacturer, to remove mud, erection marks and other foreign matter from steel.

End of section

1 General

1.1 Summary

.1 Section Includes, but is not limited to, the following:

.2 Structural shapes, bolts, primer, bumpers, plates and grating.

.3 Labour, Products, equipment and services necessary to complete the Work of this section.

1.2 References

.1 Conform to the latest edition of the following:

.1 ASTM A53, Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

.2 ASTM F1554, Standard Specifications for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

.3 ASTM A325M, High-Strength Bolts for Structural Steel Joints [Metric]

.4 ASTM A500, Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

.5 ASTM F436, Hardened Steel Washers (for Use with High Strength Bolts)

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

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

.8 CAN/CGSB-1.181, Ready Mixed Organic Zinc Rich Coating

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

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

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

.12 CSA W48 Series, Electrodes

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

.14 CSA-W117.2, Safety in Welding, Cutting and Allied Processes

.15 CISC/CPMA 2.75, Canadian Institute of Steel Construction/Canadian Paint Manufacturers Association “A Quick-Drying Primer for Use on Structural Steel”

.16 CISC, Canadian Institute of Steel Construction, "Code of Standard Practice"

.17 OPSS, Ontario Provincial Standard Specifications

.18 SSPC, Steel Structures Painting Council, "Steel Structures Painting Manual, Vol. 2"

1.3 Submittals

.1 Shop Drawings

.1 Submit Shop Drawings for fabrication and erection of miscellaneous metals in accordance with Section 01 33 00.

.2 Clearly show and describe all items; sections, dimensions, erection details, anchors and fastenings, connection and jointing details.

.3 Shop Drawings for stairs and handrails and support members shall bear the seal and signature of a licensed Ontario Professional Structural Engineer responsible for their design.

1.4 Quality assurance

.1 Retain a firm certified in accordance with CSA W47.1 Division 1 or 2.1 to perform welding.

.2 Employ welding operators licensed per CSA W47.1 for types of welding required by the Work.

1.5 Product delivery, storage and handling

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off-the-ground, covered storage locations. Do not load areas beyond the designed limits.

.2 Handle and store metal materials at job Site in a manner to prevent damage to other materials, to existing buildings or property.

.3 Handle components with care, and Provide protection for surfaces against marring or other damage. Ship and store members with cardboard or other resilient spacers between surfaces. Use lifting chokers of material which will not damage surface of steel members.

.4 Use strippable coatings or wrappings to protect exposed surfaces of prefinished metal Work which does not receive Site finishing. Use materials recommended by finishers or manufacturers of metals, to ensure that method is sufficiently protective, easily removed, and harmless to the finish.

.5 Prevent the formation of wet storage stain on galvanized articles by complying with the following measures:

.1 Stack articles or bundle to allow air between the galvanized surfaces during transport from supplier. Load materials in such a manner that continuous drainage could occur.

.2 Raise articles from the ground and separate with strip spacers to provide free access of air to most parts of the surface. Incline in a manner which will allow continuous drainage. Do not lay galvanized steel on cinders, clinkers, wet soil or decaying vegetation.

.3 Handle galvanized articles in such a manner as to avoid any mechanical damage and to prevent distortion.

.6 Tag metal fabrications, including associated anchor bolts, sleeves, and bases, or otherwise mark for ease of identification at Project site.

1.6 Coordination

.1 Supply to concrete, masonry and/or other sections, materials requiring setting and/or building-in in concrete, masonry or other trades. This includes inserts, anchors, frames, sleeves, etc. Verify locations of said materials.

1.7 Project conditions

.1 Field Measurements: Take measurements at the building to assure proper fitting, fabrication, and erection of the Work. Check dimensions in the field, whether or not shown, upon which the accurate fitting together and building-in of the metal fabrication Work may depend or which affects the proper installation of the Work of others.

2 Products

2.1 Materials

.1 General: Metals shall be free from defects which impair strength or durability, or which are visible. Metals shall be new, of best quality and free from rust, waves or buckles, and clean, straight throughout entire length, sharply defined profiles and true in web and flange.

.2 Structural Shapes, Plates, Etc.: New material conforming to CSA-G40.20/G40.21-M, Grade 350W for W and H shapes, and Grade 300W for other shapes, and plates.

.3 Hollow Structural Sections: New material conforming to CSA-G40.20/G40.21-M Grade 350W, Class H.

.4 Welding Materials: Conforming to CSA W48.1-M and CSA W59-M.

.5 High Strength Bolts, Nuts and Washers: Conforming to ASTM A325M, with each type and size of bolt and nut of same manufacture and of same lot.

.1 Bolts: Heavy, hexagon head high strength structural bolts, of standard size, of lengths required for thickness of members joined and for type of connection.

.2 Nuts: Heavy hexagon semi-finished nuts per ASTM A563M.

.3 Washers: Flat and smooth hardened washers, quenched and tempered.

.6 Machine bolts and anchor rods: as specified below, complete with hexagon heads and nuts:

.1 Common bolts: conforming to ASTM A307, Grade A, of lengths required to suit thickness of material being joined, but not projecting more than 6 mm beyond nut, without the use of washers.

.2 Anchor rods: conforming to ASTM F1554, Grade 36, of lengths noted, but projecting not less than 13 mm beyond nut unless otherwise noted.

.3 Nuts: per ASTM A563M.

.7 Primer Paint: Solvent reducible alkyd, light grey, in fast drying, lead and zinc-chromate free formulation conforming to CISC/CPMA 2.75. Use one brand of primer paint throughout the Work, in any of the following, tinted to the specified colour:

.1 "97-680" by PPG Canada Inc.

.2 Selectone "MR-05-3" by Selectone Paints Ltd.

.3 "Kem Bond HS-B50WZ4" by Sherwin-Williams

.4 Or reviewed equal

.8 Galvanizing: Hot dipped galvanizing with minimum zinc coating of 600 g/m^2 to CAN/CSA G164-M.

.9 Galvanized Primer: Zinc rich conforming to CAN/CGSB-1.181 for new galvanized metal in compliance with CGSB 85-GP-16M. For galvanized fabrications touchup to remain unpainted in finished Work, use W.R. Meadows of Canada Ltd. "Galvafroid" or Kerry Industries "Z.R.C." or Niagara Paint Inc. "PL052898" zinc rich coating or approved equal.

.10 Steel Pipe Bumpers: Conforming to ASTM A500, cold rolled, bare, seamless steel pipe of sizes shown.

.11 Checkered Plate: to ASTM A36, 6 mm thick, with raised diamond floor surface pattern.

.12 Steel Bar Grating: As manufactured by Fisher & Ludlow, Armco Irving, Borden Metal Products or Ohio Gratings Inc or approved equal.

.13 Drilled Inserts: Ramset "Mega" or Hilti "HSL" or approved equal, heavy-duty anchors installed in accordance with manufacturer's directions, to

sizes shown. Load capacity when embedded in 25 MPa concrete shall not be less than:

Diameter	Pullout kN	Shear kN
8 mm	30.0	36.0
10 mm	43.6	57.2
12 mm	53.6	82.8
16 mm	83.6	149.6
20 mm	119.6	205.6

.14 Epoxy Capsule Type Anchors: Hilti “HVA Adhesive Anchor”, two-part, threaded steel stud and epoxy adhesive filled capsule anchoring system or approved equal. Install per manufacturer’s recommendations.

2.2 Shop fabrication

.1 Fabricate items that are to be built into masonry or concrete and deliver to Project site for setting; furnish items complete with bolts, anchors, clips, etc., ready to set. Furnish, completely install and connect other items. Erect items to proper lines and levels, plumb and true, and in correct relation to adjoining Work. Secure parts in a rigid and substantial manner using concealed connections where practicable.

.2 Where necessary to secure Work to the structure by means of expansion bolts, cinch anchors, and similar connections, lay out the Work and install such connections, install the Work and bolt up, unless otherwise noted.

.3 Provide bolts, shims, blocks, nuts, washers, wedging pieces, etc., required for complete installation, unless otherwise noted.

.4 Drill field holes for bolts or rivets. Do not burn holes.

.5 Furnish fitting-up bolts, drift pins, other tools and equipment and do necessary reaming of unfair holes found in field connections. New holes or enlargement of unfair holes by use of cutting torch is cause for rejection of the entire member. Replacement shall be made at Contractor’s expense.

.6 Mill joints to a tight, hairline fit; cope or miter corners. Form joints exposed to weather to exclude water.

.7 Remove burrs from all exposed cut edges.

.8 Execute shop welding conforming to welding requirements specified under "Quality Assurance" and "Welding" herein.

.9 Accurately cut, machine and fit joints so that finished Work presents a neat appearance.

.10 Assemble members without twists or open joints.

.11 Drill properly sized holes for connecting the Work of other trades where such can be determined prior to fabrication. Where possible, show such holes on Shop Drawings. Place holes so not to cause an appreciable reduction in strength of member.

.12 Certain miscellaneous metal elements are listed with a corresponding description below. Such listing is intended to provide requirements or clarify the given elements and not to represent the scope of metal fabrications Work.

.13 Channel Door Frames

.1 Structural channel sections, selected for trueness of web and flange, with joints welded and ground smooth.

.2 Fit frames with temporary spreaders to prevent frame from springing out of shape.

.14 Steel Frames for Miscellaneous Openings

.1 Connections: Connect built-up members of frames by means of plug welding. Miter or cope and join members with continuous welding beads.

.2 Top of frames embedded in concrete: Fabricate frames so top of frames are flush with finish floor elevation.

.15 Lintels

.1 Weld pairs of members back to back together and in no case shall lintels be more than 25 mm less in width than wall they support.

.2 Extend lengths to allow 150 mm minimum end bearing on masonry. Unless otherwise shown, lintels in block walls shall be of steel furnished under this section.

.16 Lateral Supports For Masonry Walls

.1 Minimum size 100 x 100 x 150 x 6 mm thick, steel angles along top of concrete block walls as shown. Fasten angles to structure above and space at not over 1.8 m o.c. on both sides of the walls, staggering the angles, that when combined, angles are not over 900 mm o.c.

.17 Checkered Plate Covers: Diamond shaped raised pattern, of nominal thickness shown exclusive of raised pattern.

.18 Floor Plate: Shearing, cutting, or punching shall leave clean, true lines and surfaces. Drill countersunk holes in plate where it will be bolted in place.

2.3 Welding

.1 Execute welding to avoid damage or distortion to the Work. Should there be, in the opinion of Consultant or inspection and testing company, doubt as to adequacy of welds, such welds shall be tested for efficiency and any Work not meeting specified standards shall be removed and replaced with new Work satisfactory to Consultant. Execute welding in accordance with the following standards:

.1 CSA W48-M - for electrodes. If rods are used, only coated rods are allowed.

.2 CSA W59-M - for design of connections and workmanship.

.3 CAN/CSA-W117.2-M - for safety.

.2 Thoroughly clean welded joints and expose steel for a sufficient space to perform welding operations. Neatly finish welds. Where exposed to view and finish painted, apply weld continuously and grind to a uniformly smooth finish.

2.4 Cleaning, shop priming

.1 Clean steel to SSPC SP3 and remove loose mill scale, weld flux and splatter.

.2 Shop prime with one coat of primer paint to dry film thickness of 0.025 mm. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7ºC (45ºF). 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 Clean but do not paint surfaces being welded in field.

.4 Do not paint surfaces embedded in concrete.

.5 Do not paint surfaces in friction connections.

2.5 Hot dip galvanizing

.1 Galvanize members exposed to exterior elements when in final location; members embedded on the exterior side of exterior walls; members embedded in concrete; members specified in this section or noted on Drawings.

.2 Perform hot dip galvanizing after fabrication. Plug relief vents air tight. After galvanizing, remove plugs, ream holes to proper size and re-tap threads. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with galvanize primer in accordance with manufacturer's printed directions.

.3 Wet Storage Stain: Remove wet storage stain that may have developed in the coating before installation so that premature failure of the coating does not occur. Remove wet storage stain in accordance with galvanizer's recommendations.

.4 Repair of Galvanized Items: Repair coatings damaged by welding, cutting, or during handling, transport or erection using cold galvanizing compound specified, and as follows:

.1 Ensure surface is clean, dry, and free of oil, grease and corrosion.

.2 Power clean surface to near white metal condition, extending into undamaged galvanized coating.

.3 Apply touch up material to a dry film thickness of 0.203 mm minimum. If touched up Work is to remain exposed in the finished

Work, apply a finish coat of aluminum paint to provide a colour blend with the surrounding galvanizing.

.4 Coating shall be continuous, adherent, smooth and evenly distributed.

3 Execution

3.1 Erection

.1 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.

.2 Fit door frames and jambs with temporary steel spreaders to prevent springing frames and jambs out of shape.

.3 Weld as specified herein.

.4 Take adequate care to prevent damage to any material such as weld burns, etc.

.5 Include all cutting and patching of masonry walls where necessary. Obtain Contractor's approval of cutouts in advance.

.6 Insulate where necessary to prevent electrolysis due to dissimilar metal to metal contact, or metal to masonry and concrete. Use bituminous paint, butyl tape, building paper or other approved means.

.7 Install materials in a good and workmanlike manner, cleaning and grinding all welding laitance and touching up primer where necessary.

3.2 Connections

.1 Weld or high strength bolt main member connections. Use CISC double angle header connections wherever possible. High strength bolted connections shall be bearing type using 19 mm diameter bolts conforming to ASTM A325M. Secondary members may be bolted with machine bolts.

.2 Perform high tensile bolted connections in accordance with CSA-S16.1. Accurately space holes of size 1.6 mm larger than the nominal diameter of the bolt. Install bearing type high tensile bolted connections unless shown

otherwise on Drawings. Provide compressor or electrical equipment capable of supplying and maintaining required pressure at the wrench. Make connections without the use of erection bolts; some high tensile bolts will serve that purpose. Prevent nuts on bolts, except high tensile bolts, from becoming loose by burring bolt thread, by welding or by lock washers or lock nuts.

.3 Execute welding as specified under shop welding in Part 2 and as follows:

.1 Provide continuous welds on exterior Work to provide proper weathering.

.2 Take necessary safety precautions in accordance with CSA standards when welding is carried out in cold weather.

3.3 Field touch-up

.1 Paint bolt heads, washers, nuts, field welds and previously unprimed items. Touch up shop primer and galvanizing damaged during transit and installation with material to match shop primer or galvanize coating.

.2 Clean off dirt on installed miscellaneous metal surfaces.

End of section

1 General

1.1 Section includes

.1 Vapour retarders.

1.2 Reference standards

.1 ASTM International (ASTM)

.1 ASTM E96/E96M-16 Standard Test Methods for Water Vapor Transmission of Materials

.2 ASTM F1249-13 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34 Vapour Barrier, Polyethylene Sheet, for Use in Building Construction

1.3 Submittals

.1 Provide submittals in accordance with Section 01 33 00.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Manufacturer's Data: Submit manufacturer's literature describing each material to be used in the work of this Section. Literature shall contain a statement that the material complies with the specified standard.

.2 Safety Data Sheets: Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on Site for reference by workers.

1.4 Quality assurance

.1 Use an experienced installer and adequate number of skilled personnel who are thoroughly trained and experienced in the application of the vapor retarder.

.2 Obtain vapour retarder materials from a single manufacturer regularly engaged in manufacturing the product.

.3 Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

1.5 Site conditions

.1 Products specified are not intended for uses subject to abuse or permanent exposure to the elements.

1.6 Delivery, storage handling and protection

.1 Deliver all materials to the jobsite in their original, unopened containers, with all labels intact.

.2 Receive and store materials as recommended by materials manufacturer.

.3 Maintain containers and labels in undamaged condition.

2 Products

2.1 Sheet vapour barrier

.1 Polyethylene film: to CAN/CGSB-51.34, 0.15 mm thick.

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

.3 Mastic: as recommended by membrane manufacturer and compatible with substrate.

.4 Sealant: compatible with vapour retarder materials, recommended by vapour retarder manufacturer.

.5 Moulded box vapour barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.

3 Execution

3.1 Vapour retarders in walls

.1 Ensure services are installed and inspected prior to installation of vapour retarder.

.2 Use sheets of largest practical size to minimize joints. Install horizontally on wall surfaces.

.3 Adhere membrane to metal studs with continuous ribbons of mastic.

.4 Tape all joints.

.5 Seal perimeter of sheet vapour barrier as follows:

.1 Apply continuous bead of sealant to substrate at perimeter of sheets.

.2 Lap sheet over sealant and press into sealant bead.

.3 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

.6 Seal lap joints of sheet vapour barrier as follows:

.1 Attach first sheet to substrate using sealant/adhesive.

.2 Apply continuous bead of sealant over solid backing at joint.

.3 Lap adjoining sheet minimum 150 mm and press into sealant bead.

.4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

.7 Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:

.1 Install moulded box vapour barrier.

.2 Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover.

.8 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

.9 Refer to building elements schedule on the drawings and details for locations of vapour retarders.

3.2 Inspection

.1 Arrange for inspection of vapour retarders immediately prior to covering, by local building department and Consultant.

.2 Make all required repairs identified during inspection.

3.3 Cleaning and protection

.1 Remove all waste materials from site. Leave work in a condition satisfactory to the Consultant.

End of section

1 General

1.1 General requirements

.1 Conform to the requirements of Division 1.

1.2 Reference standards

.1 ASTM International (ASTM)

- .1 ASTM D882-18 Standard Test Method for Tensile Properties of Thin Plastic Sheeting
- .2 ASTM D903-98(2017) Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
- .3 ASTM E84-21a Standard Test Method for Surface Burning Characteristics of Building Materials
- .4 ASTM E96/E96M-16 Standard Test Methods for Water Vapor Transmission of Materials
- .5 ASTM E283/E283M-19 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
- .6 ASTM E330/E330M-14 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
- .7 ASTM E331-00(2016) Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
- .8 ASTM E1186-17 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
- .9 ASTM E2178-21a Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials
- .10 ASTM E2357-18 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- .11 National Air Barrier Association (NABA)

.1 National Air Barrier Association's (NABA) Quality Assurance Program (QAP)

1.3 Submittals

.1 Make submittals in accordance with Section 01 33 00.

.2 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Submit manufacturer’s complete set of standard details for air barriers.

.4 Quality Assurance Submittals: submit following in accordance with Section 01 45 00.

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

1.4 Performance requirements

.1 Select and install wall components and assemblies to resist air leakage caused by static air pressure across exterior wall assemblies, including windows, glass, doors, and other interruptions to integrity of wall systems; to maximum air leakage rate of 0.01 L/s.m² when subjected to pressure differential of 75 Pa as measured in accordance with ASTM E330.

.2 Select and install wall components and assemblies to resist air leakage caused by dynamic air pressure across exterior wall assemblies, including windows, glass, doors and other interruptions to integrity of wall systems; to maximum air leakage rate of 0.013 L/s.m² when subjected to hourly wind design loads in accordance with NBC, using 1 in 10 year probability, as measured in accordance with ASTM E330.

.3 If ongoing testing is required throughout air barrier system installation, perform qualitative testing methods in accordance with ASTM E1186 and ASTM D4541.

.4 Provide continuity of air barrier materials and assemblies in conjunction with materials described in other Sections.

1.5 Quality assurance

.1 Quality Assurance Program: Submit evidence of current Contractor accreditation and Installer certification under the National Air Barrier Association's (NABA) Quality Assurance Program.

.2 Preconstruction Meeting: Convene a minimum of two weeks prior to commencing work of this Section. Agenda shall include, at a minimum, construction and testing of mock-up, sequence of construction, coordination with substrate preparation, air barrier materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction and chemical/fire safety plans. Attendance is required by representatives of related trades including covering materials, substrate materials and adjacent materials.

.3 Mock-Ups: Build mock-up representative of primary air barrier assemblies and glazing assemblies including backup wall and typical penetrations as acceptable to the Consultant. Mock-up shall be dimensions no less than 2.5 metres long by 2.5 metres high and include the materials and accessories proposed for use in the exterior wall assembly. Mock-ups shall be suitable for testing as specified in the following paragraph.

1.6 Sequencing

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

1.7 Shipping, handling and storage

.1 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

1.8 Waste management and disposal

.1 Refer to Section 01 74 00

1.9 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of two years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

2 Products

2.1 Materials

.1 Materials: as required to achieve specified performance criteria; meeting specified reference standards and functionally compatible with adjacent materials and components.

.2 Air barrier membrane components and accessories must be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.

2.2 Membranes

.1 Self-adhered vapour permeable, water resistive air barrier consisting of a reinforced, modified polyolefin tri-laminate film surface and patented permeable adhesive technology with split-back poly-release film; having the following typical physical properties:

.1 Thickness: 0.58 mm (23 mils)

.2 Water Vapour Permeance (ASTM E96): 1658 ng/Pa.m2.s., (29 perms)

.3 Air Leakage of Air Barrier Assemblies (ASTM E2357): Pass

.4 Air Permeance (ASTM E2178): Pass

.5 Nail Sealability (ASTM D1970): Pass

.6 Dry Tensile Strength (ASTM D882):

.7 41 lbf /182N MD

.8 29 lbf /129N CD

.9 Surface Burning Characteristics (ASTM E84):

.1 Flame Spread: Class A

.2 Smoke Development: Class A

.10 Low Application Temperature: -7 degrees C.

.2 Acceptable Products:

.1 Blueskin VP160 by Henry Company;

.2 Sopraseal Stick VP by Soprema;

.3 Delta-Vent SA by Dörken Systems Inc.;

.4 Or approved equivalent.

2.3 Adhesive and primers

.1 As recommended by manufacturer.

2.4 Mastics and termination sealants

.1 As recommended by manufacturer.

3 Execution

3.1 Manufacturer's instructions

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

3.2 General

.1 Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for materials and installation.

3.3 Examination

.1 Examine all surfaces to ensure conformance to the manufacturer's recommended surface conditions.

3.4 Preparation

.1 Prepare substrate surfaces in accordance with air barrier material manufacturer's instructions.

.2 All surfaces which are to receive flexible air barrier must be smooth, clean, dry, frost-free and in sound condition. All moisture, frost, grease,

oils, loose mortar, dust, or other foreign materials which may impede the adhesion of the air barrier must be removed.

.3 New mortar must be cured 14 days and must be dry before air barrier membrane is applied.

.4 Concrete must be cured 28 days and dry before air barrier membrane is applied.

.5 Remove any and all sharp protrusions and repair any defects such as spalled or loose aggregate areas.

.6 Do not proceed with air barrier application until all substrate defects are repaired.

3.5 Installation

.1 Install air barrier materials continuously over substrate in accordance with manufacturer's instructions. Partial application is not acceptable, and the insulation specified elsewhere is not intended to perform as the sole air barrier.

.2 Prime surfaces and apply membrane in strict accordance with manufacturer's printed directions.

.3 Primed surfaces not covered by air barrier membrane during the same working day must be reprimed.

.4 Apply membrane by heating the surface in contact with the substrate with a trigger-activated propane torch, type as recommended by the manufacturer.

.5 Cut sheet membrane into manageable sizes, position membrane for alignment prior to removing protective film.

.6 Install membrane horizontally, in a shingle fashion starting at lowest point. Position membrane and remove protective film and press firmly into place. Ensure minimum 50 mm overlap at all end and side laps. Promptly roll the membrane surface and all laps with a countertop roller to ensure proper surface bond and effect the seal.

.7 Tie-in to window frames, door frames, roofing systems, cladding, concrete walls, and at the interface of dissimilar materials as indicated or as necessary to achieve a continuous air seal throughout the building

envelope. Seal with air barrier tape. Refer to manufacturer's standard details.

.8 All joints, interconnections, and penetrations of the air barrier components including lighting fixtures shall be indicated on manufacturer's standard details.

.9 Ensure all projections are properly sealed with a trowel or caulk application of specified sealant.

3.6 Inspection and repair

.1 Inspect membrane thoroughly before covering and make any corrections to punctures, tears, voids and other obvious defects which would impede the membrane from performing as intended.

.2 Notify Consultant when sections of work are complete so as to allow for review prior to installation of insulation. Remove, replace or repair materials not satisfactory to the Consultant and wait for re-inspection before covering work.

3.7 Cleaning and protection

.1 Proceed in accordance with Section 01 74 00.

.2 Protect air barrier materials from damage during installation and the remainder of the construction period, according to material manufacturer's written instructions.

.3 Coordinate with installation of materials which cover the air barrier assemblies, to ensure exposure period does not exceed that recommended by the material manufacturer.

.4 Clean adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and acceptable to the primary material manufacturer.

End of section

1 General

1.1 Section includes

.1 Asphalt shingles.

.2 Eave protection and sheathing paper.

.3 Flashings.

.4 Roof vents.

1.2 Reference standards

.1 Asphalt shingle roofing shall comply to the requirements of the Ontario Building Code, Part 9.

.2 Shingles shall be Factory Mutual fire tested, Class C and shall conform to CSA A123.1-M, CAN/CSA A123.5-M90, CAN/ULC S-107, ASTM E108 Class A, ASTM D3161 Class F, ASTM D3462 and ASTM D3018 and ASTM D7158 Class H.

1.3 Product handling and storage

.1 Deliver and store materials undamaged in original containers with manufacturer's label and seals intact. All materials shall be protected from moisture and shall not be placed in direct contact with the earth.

1.4 Submittals

.1 Submit to the Project Manager, duplicate samples of manufacturers standard colour.

.2 Range of full size specified shingles.

.3 Submit colour samples for pre-finished metals.

1.5 Warranty

.1 Furnish manufacturers’ warranty for the asphalt shingles for 30 years.

.2 Extended Warranty shall be in the name of the Regional Municipality of Durham.

2 Products

2.1 General

.1 Use materials as specified herein only unless approved by the Project Manager.

.2 All materials shall be compatible.

2.2 Asphalt shingles

.1 To CAN/CSA A123.5 -05 (R 2010), FM Class 4473, UL 2218 Class 4.

.2 Architectural 30 Year.

.3 Fibreglass based.

.4 10-year algae fungus resistance protection.

.5 Colour to be selected by the Region.

2.3 Eave protection

.1 Self-adhesive Bituthene membrane, 40 mils thick, in roll widths of 36 in. as manufactured by W.R. Grace & Co. of Canada Ltd or reviewed equal.

.2 Primer

.1 "Ice and Watershield" primer as manufactured by W.R. Grace & Co. of Canada Ltd

.3 Acceptable alternates:

.1 IKO “ArmourGard”

.2 W.R. Meadows Sealtight “Air-Shield”.

.3 Or approved equal.

2.4 Sheathing paper

.1 Synthetic underlayment to CAN/ CSA A220.1, ASTM E 108 Class A FRR to compatible with architectural shingle manufacturer.

2.5 Cement

.1 Plastic Cement to CAN/CGSB-37.5-M

.2 Lap Cement to CAN/CGSB-37.4-M

2.6 Flashings, valley flashings, drip edge

.1 24 gauge minimum, unless noted otherwise prefinished galvanized sheet steel, Stelco or Dofasco 5000 series or reviewed equal.

.2 Colour to be selected by Region.

2.7 Stack jacks (vent pipe flashings)

.1 Copper stack jacks supplied by Thaler Metal Industries Ltd. or Oatey or reviewed equal.

2.8 Turbine vents

.1 Maximum ventilation, Static Vent, Model #301 or reviewed equal.

.2 Colour to be selected by Region.

2.9 Nails

.1 Large head, galvanized steel or aluminum roofing nails of sufficient length to penetrate 0.75 in. into deck.

2.10 Roof exhaust vents

.1 CSA approved, 50 sq.in. of free venting area per vent minimum, bird and insect proof, impact resistant, heavy-duty.

3 Execution

3.1 Existing conditions

.1 Examine work of other trades and notify the Owner in writing that the work is acceptable or of any defects or discrepancies.

.2 Examine surfaces for inadequate anchorage, foreign material, moisture and unevenness which would prevent the execution and quality of application of the roofing system as specified. Do not proceed with application of the roof system until defects are corrected. Installation of any part of the work without the written acceptance of such surfaces shall require immediately removal of such installed work.

3.2 Workmanship

.1 Workmanship shall be of the highest quality. Use only competent installers and execute work in accordance with drawings and specifications.

.2 Regard the manufacturer's printed recommendations and specifications as the minimum requirement for materials, methods and workmanship not otherwise specified.

.3 Maintain roofing equipment in good working order.

.4 Unsuitable or damaged materials shall immediately be removed from the site.

3.3 Application

.1 Install drip edge along eaves, overhang 0.5 in. with minimum 4 in. flange extending onto roof decking. Nail to deck at 8 in. O.C.

.2 Install roll roofing at valleys, install metal flashings and apply eave protection, starter strip, underlayment and asphalt shingles all in accordance with referenced standards and manufacturer’s instructions.

.3 Install eave protection at roof edge. Extend eave protection minimum of 36 in. up the roof slope to a line not less than 12 in. inside the inner face of the interior wall.

.4 Install new roof vents in accordance with Ontario Building Code requirements and generally as shown on drawings.

.5 Calculate required area of roof ventilation in accordance with Ontario Building Code, Part 9, requirements and provide sufficient vents to meet requirements. Install roof vents in straight lines.

.6 Install valley flashings to extend minimum 6 in. each way, in continuous pieces, nailed to deck at 8 in. center-to-center.

.7 Install starter strip using one layer of shingles or smooth roll roofing.

End of section

1 General

1.1 Section includes

.1 This Section includes all items pertaining to composite metal panels.

1.2 Description

.1 General requirements:

.1 Division 1, General Requirements, is part of this specification and shall apply as if repeated here.

.2 Work furnished and included:

.1 Air/Vapour Barrier
.2 Subgirts
.3 Insulation
.4 Composite aluminum panels
.5 Related trims and extrusions
.6 Fasteners

.3 Related work not included:

.1 Studs
.2 Sheathing

1.3 Standards

.1 Design of cladding system in accordance with the latest edition of:

.1 CSA-S136 for the design of Cold Formed Steel Structural Members
.2 CAN3-S157 for the design of Strength Design in Aluminum
.3 National Building Code of Canada

1.4 Quality assurance

.1 Supplier shall design, supply, and fabricate work of this Section.

.2 Supplier/installer shall have a minimum of 10 years proven experience and must have completed at least 5 major aluminum wall panel projects

.3 All walls and openings are to be within ±3 mm (0.12”) of the location shown on architectural drawings. Also, the facade is to be plumb within 1:1000 of the overall height with a maximum of 25mm.

1.5 Design requirements

.1 Design system based on Rainscreen principle. Incorporate means of draining moisture to the exterior.

.2 Structural movement: Accommodate movement of supporting structural framing and without causing bowing, buckling, delamination, oil canning, excessive stress on fasteners, or any other detrimental effects.

.3 Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

.1 Temperature Change (Range): 20 deg C, ambient; 40 deg C, material surfaces Submittals

1.6 Performance requirements

.1 Air Infiltration: Air leakage through assembly of not more that 0.3 L/s per sq. m. (0.06 cfm/sq. ft.) of wall area when tested according to ASTM E 283 at the following test pressure difference:

.1 Test-Pressure Difference: 300Pa (6.24 lbf/sq.ft.).

.2 Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test pressure difference: 0.3 L/s per sq. m. (0.06 cfm/sq. ft.) at a pressure difference of 75Pa.

.2 Water Penetration under Dynamic Pressure: No water penetration when tested according to AAMA 501.1.

.3 Structural Performance: Metal wall panel assemblies shall withstand the effects of the following loads and stresses within limits and under conditions indicated, based on testing to ASTM E 330:

.1 Wind Loads: Design wall system to resist {wind loads, positive and negative, expected in this geographical region NBCC climatic data,

50-year probability} {### kPa} without causing rattling, vibration, or excessive deflection of panels, overstressing of fasteners, clips, or other detrimental effects on wall system.

.2 Deflection Limit: Panels must return to an essentially flat condition after design wind load is removed with permanent set not to exceed L/800.

.4 Fire-Performance:

.1 Surface-Burning Characteristics: Provide materials with the following surface burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

.1 Flame-Spread Index: 25 or less.

.2 Smoke-Developed Index: 450 or less.

.2 Non-combustible Characteristics: Provide core material with the following combustibility characteristics as determined by testing identical products per CAN/ULC-S134 or another testing and inspecting agency acceptable to authorities having jurisdiction...

.3 Panel flatness tolerance applies to even rises and falls across panel. Local bumps and depressions will not be accepted. Fabricate panels not exceeding the following tolerances:

.1 1.5 mm (0.06") in a convex direction, measured perpendicularly to normal plane.

.2 1.5 mm (0.06") in a concave direction, measured perpendicularly to normal plane.

.4 Maximum deviation from vertical and horizontal alignment of erected panels: 6 mm (0.24") in 6 m (20' 0").

.5 Maximum deviation from panel flatness shall be 3 mm (0.12") in 1.5 m (59") panel in any direction for assembled units (non-accumulative).

1.7 Samples

.1 Submit samples in accordance with Section 01 33 00.

.2 Submit duplicate, minimum 89 mm x 89 mm (3-½” x 3-½”) samples of each colour selected.

1.8 Shop drawings

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Indicate elevations, profiles, dimensions, and thickness of panels.

.3 Indicate location and detail of joints including joints necessary to accommodate thermal movement.

.4 Indicate attachment clips, joint extrusion system and installation details.

.5 Show fastening and anchoring details.

.6 Drawings shall be signed and sealed by a Professional Engineer, attesting to the ability of the metal panels assembly to withstand the specified loads.

.7 Panels shall be identified on the shop drawings as to building location to facilitate panel removal and replacement.

.8 Notes:

.1 ACM panels generally have a high span to thickness ratio compared to many other building components such as roof deck or floor slabs. Based on this, it is reasonable to expect large deflections in the central area of ACM panels. However, this large panel deflection has, in our experience, no significant effect on the performance of the wall. What is important is that the panel return to an essentially flat condition after the loading is removed. Vicwest recommends a limit of L/800 to control this.

.2 The flame-spread index is 0 FR core

.3 The smoke-developed index is 10 FR core

.4 This applies to projects where, by NBCC, is categorized as Non-Combustible Construction. On multistorey applications, when applying combustible components in a non-combustible construction building, CAN/ULC-S-134 is required to certify the material. A FR core is required to meet this section of the specification. In Ontario, the limiting height for the application combustible materials in non-combustible construction is 6 storeys (if sprinklered throughout)

.5 CAN/ULC-S134, "Fire Tests of Exterior Wall Assemblies" ensures that the flaming on or in the wall assembly shall not spread more

than 5 metres above the opening and/or the heat flux during the flame exposure on the wall assembly shall not be more than 35 kW / sq. m.

1.9 Maintenance data

.1 Provide maintenance data for cleaning and maintenance of panel finishes for incorporation into manual specified in Section 01 78 00.

.2 Submit instructions for repair and removal of panels.

1.10 Mock-up

.1 Erect mock-up panel approximately 4’ long x4’ high in location directed by Architect.

.2 Mock-up panel shall include all components of the wall system and if approved by Architect may be incorporated in to finished work.

.3 Notify 72 hours before installation of mock-up for inspection by Architect. Do not proceed with panel system work until mock-up has been approved.

1.11 Product delivery, handling and storage

.1 Protect finish and edges using a plastic film adhered to panel in accordance with panel manufacturer’s recommendations.

.2 Store components and materials in accordance with panel manufacturer’s recommendations.

1.12 Guarantee

.1 For work in this section, warranty by installer against defects or deficiencies in materials or workmanship shall be for a period of one year from date of substantial completion.

1.13 Warranty

.1 Provide a manufacturer’s written warranty: Furnish panel manufacturer’s written warranty covering failure of factory-applied exterior finish within the warranty period. Warranty period for finish: {5 years} {20 years} after the date of Substantial Completion. The values below are based on normal environments and exclude any aggressive atmospheric conditions.

.1 {Anodized Finish: Based on an applied thickness of 0.0004" anodized aluminum is warranted for a period of five (5) years against excessive nonuniform fading and pitting or corrosion, in accordance with AAMA 609.1.} .2 {Fluoro Ethylene Vinyl Ether (FEVE – containing Lumiflon® or Bonflon® resins) coating will not visibly (within 10 metres to the unaided make eye) crack, chip, or peel (lose adhesion) for twenty (20) years from date of application. This does not include minute fracturing that may occur during the normal fabrication process. Fluoro Ethylene Vinyl Ether (FEVE – containing Lumiflon® or Bonflon® resins) coating will not chalk more than a number eight (8) rating, in accordance with ASTM D-4214-98 method D659 at any time for twenty (20) years from date of installation (20.5 yrs from application); will not change colour more than five (5.0) Hunter ΔE units as determined by ASTM method D-2244-02.}

2 Products

2.1 Materials:

.1 Panel System: Dry joint system, using proprietary aluminum extrusions without the use of caulking at joints.

.1 Aluminum face sheets: Aluminum alloy 3105-H14, thickness 0.51 mm (0.02").

.2 Two sheets of aluminum bonded to either side of an extruded thermoplastic core, formed in a continuous process without the use of glue or adhesive between dissimilar materials. Bond integrity testing to adhere to ASTM D 1781.

.3 Panel thickness: 4 mm (0.16").

.4 Core material: Alpolic / FR Core, or approved equivalent.

.5 Proprietary aluminum perimeter extrusions and extrusion clips for attaching panels to the sub-structure.

.6 Joint filler strip: same material as panels.

.7 Tolerances:

.1 Panel Bow: Maximum 0.80% per lineal foot panel dimension (width or length).

.2 Panel Dimensions: Make allowance for field adjustments, in manner recommended by manufacturer, where final dimensions cannot be established by field measurement prior to panel manufacturing.

.3 Panel lines, breaks and angles to be sharp and true: panel surfaces to be free from warp or buckle.

.2 Subgirt System: Adjustable angles, Z-bars, and channel subgirts: manufactured from Z-275 galvanized steel and shall be designed to accommodate expansion and contraction, dynamic movements, and design load requirements.

.3 Semi-rigid insulation:

.1 Mineral wool board insulation conforming to requirements on CAN/CGSB S1.10-92, Mineral Fibre Board Thermal Insulation and ASTM C-612-83, Class 1, Type 1, unfaced, minimum RSI value of 0.70 per 25.4mm

.2 Thickness: 25.4mm.

.3 Acceptable manufacturers:

.1 Owen Corning

.2 Rockwool Inc.

.3 Or approved equivalent.

.4 Other: By contractor

.5 Insulation clips: impale type, perforated 50mm x 50mm (2” x 2”) cold rolled steel, spindle of length to suit thickness of insulation, with speed washers.

.6 Air/vapour barrier:

.1 Blueskin SA by Henry Company.

.2 Perm-a-Barrier System by W.R. Grace & Co. of Canada Ltd., with Perm-a-Barrier primer.

.3 Soprema Sopraseal Stick 1000.

.4 Or approved equivalent.

2.2 Panel finishes:

.1 Lumiflon fluoropolymer resin coating with 100% PVDF tested to meet or exceed applicable values expressed in AAMA 2605.

2.3 Colour

.1 Colour to be selected from the manufacturer's standard colour range. Composite Wall Panels Section 07 42 43 This specification was created by Vicwest to assist designers. It should be reviewed and modified as required to suit individual project conditions.

2.4 Accessories

.1 Complete Installation: Provide proprietary aluminum extrusions compatible with panel edges, manufacturer's standard profiles including vertical and horizontal joint closures and perimeter trim as required for a complete installation.

.2 Fasteners: as recommended by the panel manufacturer, concealed and noncorrosive

3 Execution

3.1 Examination

.1 Examine work of other Sections upon which work of this Section depends.

.2 Report any unsatisfactory conditions to Architect in writing. Do not start work until unsatisfactory conditions are rectified.

3.2 Wall panel system

.1 Erect panels and joint filler strip in accordance with system manufacturer's details and instructions and to meet specified design and performance requirements.

.2 Finished work shall be securely anchored, free of distortion and surface imperfections, uniform in colour and gloss.

.3 Use concealed fastenings only, except where exposed fastenings are specifically permitted by Architect in writing.

.4 Install panels plumb, true, level and in alignment to established lines and elevations.

.5 Where indicated on drawings or as required to complete work of this Section, supply and install closures, caps, fascia covers and trims with matching panel finish, where exposed.

3.3 Clean-up

.1 Remove protective film from panels

.2 Clean exposed panel surfaces in accordance with manufacturer's instructions.

.3 Repair and touch up with colour matching high grade enamel minor surface damage, only where permitted by the Architect and only where appearance after touch-up is acceptable to Architect.

.4 Replace damaged panels and components that, in opinion of the Architect, cannot be satisfactorily repaired.

End of section

1 General

1.1 Section includes

.1 Work of this section includes installing 2-ply Modified Bitumen membrane roofing over a concrete deck, including but not limited to the following:

- .1 Self-adhesive vapour retarder
- .2 Polyiso insulation in adhesive
- .3 Tapered Polyiso insulation in adhesive
- .4 Composite panel of asphaltic board and Base Sheet in adhesive
- .5 Self-adhesive or Torch-on Base Sheet Flashing
- .6 Torch-on Cap and Cap Sheet Flashing

1.2 Reference standards

.1 Perform roofing and sheet metal work in conformance with roofing manufacturer's written recommendations as well as requirements of ULC laboratories Class C, and Canadian Roofing Contractor’s Association (CRCA).

.2 CGSB 37-GP-56M-Latest Edition, Membrane Modified, Bituminous, Prefabricated, and Reinforced for Roofing.

.3 CAN/CGSB-51-26- Latest Edition, Thermal Insulation, and Isocyanurate, Board, Faced.

.4 ASTM D 6162, Standard Specification for SBS Modified Bitumen Sheet Materials using a combination of polyester and fibreglass reinforcement.

.5 ASTM D 6164, Standard Specification for SBS Modified Bitumen Sheet Materials using polyester reinforcement.

.6 CAN/CSA-A123.21-14 - Standard test method for the dynamic wind uplift resistance of membrane-roofing systems

1.3 Compatibility

.1 Provide all waterproofing materials by one manufacturer.

1.4 Technical documents

.1 Submit 1 pdf copy of the most current technical data sheets. These documents must describe the materials' physical properties and explanations about product installation, including installation techniques, restrictions, limitations and other manufacturer’s recommendations.

1.5 Shop drawings

.1 Submit shop drawings for the tapered insulation for the consultant review and approval.

.2 Submit shop drawings for all roof accessories (i.e. roof drain inserts, ductwork support stands, flashing, penetration sealants, etc.)

.3 Submit product data sheets on all roofing material for consultant review and approval

1.6 Quality assurance and environmental management

.1 Provide proof of ISO 9001 and ISO 14001 Certifications for all elastomeric bitumen products

1.7 Manufacturer’s representative

.1 Arrange for the roofing product manufacturer’s representative to visit the work site at the start of roofing installation.

.2 At all times, enable and facilitate access to the work site by the manufacturer’s representative.

1.8 Pre-Installation meeting

.1 Hold a pre-installation meeting prior to start of waterproofing works, with the roofing contractor's representative, the manufacturer and the Owner. The purpose of this meeting is to review particular installation conditions to each project. Prepare and submit a report after this meeting.

1.9 Storage and delivery

.1 Deliver and store materials in dry location in their original packaging, displaying the manufacturer's name, product name, weight, and reference standards, as well as all other indications or references considered standard.

.2 Store adhesives and waterproofing mastics at a minimum +5 °C. Store adhesives and solvent-based mastics at sufficiently high temperatures to ensure ease of application.

.3 Keep membrane materials stored in rolls standing on end, selvage edge up elevated from moisture at temperatures no less than 5 °C.

.4 Avoid material overloads that may affect the structural integrity of specific roof areas.

1.10 Extended warranty

.1 The membrane manufacturer will issue a written document in the Owner’s name, valid for a twenty 20-year period, stating that they will repair any leaks in the roofing membrane to restore the roofing system to a dry and watertight condition, to the extent that membrane manufacturing or installation defects caused water infiltration. The warranty must cover for the entire cost of the repair(s) during the entire warranty period. The warranty must be transferable, at no extra cost, to subsequent building owners starting from the date of acceptance. Refer to Section 01 78 37 for

2 Products

2.1 Adhesive

.1 Description: Low-rise two-part urethane adhesive with no solvents. Allows a complete cure in few minutes, with no temperature restrictions.

2.2 Vapour retarder

.1 Description: 1140 mm wide self-adhesive air/vapour barrier membranes composed of bitumen modified with thermoplastic polymers and high-

density polyethylene film. The self-adhesive under face is covered with a silicone release sheet.

.2 Water vapour permeability: 0.92 ng/Pa•s•m^2 (0.016 Perm)

2.3 Insulation

.1 Closed-cell, polyisocyanurate foam core integrally laminated to heavy-coated glass facers.

2.4 Asphaltic overlay board with laminated base sheet membrane

.1 SBS modified base sheet membrane and polyester reinforcement, factory-laminated on a semi-rigid asphaltic board. Board measures 0.91 m x 2.44 m (3 ft x 8 ft). Top surface covered with thermofusible poly film. Membrane side lap is 60% self-adhesive and 40% thermofusible. Total thickness 7mm. (Asphaltic board,4.8 mm + membrane 2.2 mm)

2.5 Primer

.1 Description: Stabilised bituminous emulsion primer used to enhance adhesion of membranes.

2.6 Insulation

.1 Closed-cell, polyisocyanurate foam core integrally laminated to heavy-coated glass facers, meeting requirements of CAN/ULC-S107-M87, ASTM E119, ASTM C1289-95 and FM Standard 4450/4470. Conforming to CAN/ULC-S770

.2 Minimum R Value: R30

2.7 Tapered insulation

.1 Closed-cell, polyisocyanurate foam core integrally laminated to heavy-coated glass facers, meeting requirements of CAN/ULC-S107-M87, ASTM E119, ASTM C1289-95 and FM Standard 4450/4470. Conforming to CAN/ULC-S770

2.8 Membranes

.1 Roof membrane Base Sheet Flashing:

.1 CGSB 37-GP-56M, Type 2 for covered roofing application, Class C, Plain surfaced, Grade 2

.2 Roofing membrane with glass and polyester reinforcement and SBS modified bitumen to ASTM D6162. Top face covered with thermofusible poly film, under side self-adhesive. Top face marked with 3 distinctive blue chalk lines to ensure proper roll alignment.

.2 Roofing membrane Cap Sheet and Cap Sheet Flashing:

.1 CGSB 37-GP-56M, Type 1 for exposed roofing application, Class A, Granule surfaced, Grade 2

.2 ULC certifications, Class C

.3 Roofing membrane with a composite of glass and polyester reinforcement and elastomeric bitumen to ASTM D6162. Top surface covered with ceramic granules, underface with thermofusible poly film.

.3 Cover Strip

.1 Description: Membrane strip of 330 mm (13 in) made of SBS modified bitumen with a composite reinforcement. Both faces are covered with a plastic thermofusible film. The strip ensures water-tightness in the end laps.

2.9 Waterproofing mastics

.1 Waterproofing products: Mastic made of synthetic rubbers, plasticized with bitumen and solvents.

2.10 Waterproofing of penetrations

.1 Description: One component polyurethane /bitumen resin to waterproof roof penetrations and complex details.

3 Execution

3.1 Surface examination and preparation

.1 Complete surface examination and preparation in conformance with recommendations in the Installation Manual, particularly for fire safety precautions.

.2 Do not begin any work before surfaces are smooth, dry, and exempt of ice and debris. Do not use calcium or salt for ice or snow removal.

.3 Do not install materials during rain or snowfall.

3.2 Method of installation

.1 Prepare surfaces and complete waterproofing work in conformance with manufacturer’s requirements.

.2 Install roofing elements on clean and dry surfaces, in conformance with manufacturer's instructions and recommendations.

.3 Complete roofing work in a continuous fashion as surfaces are prepared and weather conditions permit.

.4 Ensure watertight conditions for roofs at all times, including protection during installation work by other trades and progressive protection as work is completed (e.g. vents, drains, etc.)

3.3 Cleaning

.1 Immediately before roofing materials are applied, clean decks of roughness, rubbish, dust, dirt, oil, grease, snow and ice.

3.4 Equipment for work execution

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

.2 Use torches recommended by membrane manufacturer

3.5 Installation of sheathing board (only steel deck)

.1 Install sheathing board with adhesive in continuous strips spaced 30 cm (12 in.) on the field. Decrease the spacing between ribbons to a minimum of 15 cm (6 in.).

.2 Ensure sheathing is immediately protected with membrane

3.6 Application of asphalt primer

.1 Roofing substrates of wood, metal, concrete, masonry or gypsum board surfaces will receive a coat of asphalt primer at a rate of 0.2 to 0.3 L/m^2 (none required for factory-painted metals). All surfaces to be primed must be free of rust, dust or any residue that may hinder adherence. Cover primed surfaces with roofing membrane as soon as possible. Application temperature limit -10 °C.

3.7 Installation of vapour retarder

.1 Unroll vapour retarder membrane dry onto substrate for alignment purposes. Overlap side laps by 75 mm and end laps by 150 mm. Laps shall be staggered a minimum of 300 mm. Begin work at bottom of slopes.

.2 Weld vapour retarder sheet to primed concrete surface with torch recommended by membrane manufacturer.

.3 The roof vapour retarder must meet and overlap the air/vapour barrier on adjoining walls to ensure total continuity. Adhesive bitumen and membrane must not exceed base sheet by more than 25 mm.

3.8 Insulation installation

.1 Apply 1 layer of 100mm insulation to vapour retarder with adhesive in conformance with manufacturer's written recommendations.

.2 Install only as much insulation as can be covered in the same day.

.3 Around the drains lower insulation by 25mm Bevel the edge of the 75mm. insulation on a 45° angle.

.4 Install tapered insulation in adhesive where indicated on drawings.

3.9 Installation of tapered insulation

.1 Install tapered insulation as per Drawings

3.10 Base-sheet flashing installation

.1 Apply primer to the substrate at a rate of 0.25 L/m^2. Allow primer to dry before installation of Base Sheet

.2 Install reinforcing gussets at all inside and outside corners

.3 Install base sheet flashing in one- (1) metre widths to cover roofing substrate over 100 mm. Overlap side laps by 75 mm. Stagger side laps by at least 100 mm from base sheet overlaps on roof to avoid excessive layering.

.4 Apply base sheet flashing directly onto substrate by removing siliconed paper cover sheet. Proceed from top to bottom. Once in place, apply pressure manually in a uniform fashion to obtain homogenous adherence over entire surface. Preferably seal seams with rubber roller. Nail outside edge at 300 mm on centre.

.5 Avoid forming wrinkles, air pockets or fishmouths.

.6 Always seal overlaps at the end of the workday.

3.11 Roof cap sheet installation

.1 Once base sheet is applied, and no defects are apparent, proceed with cap sheet installation.

.2 Begin with double-selvage starter roll. If starter roll is not used, side laps covered in granules must be degranulated by embedding side laps in torch-heated bitumen over a 100 mm width.

.3 Unroll cap sheet at drain. Carefully align first side lap (parallel to roof edge).

.4 Weld cap sheet onto base sheet with torch recommended by membrane manufacturer. During application, simultaneously melt both designated contact surfaces so a bead of bitumen is apparent as cap sheet unrolls.

.5 Avoid overheating.

.6 Make sure joints between the two layers are staggered by at least 300 mm.

3.12 Cap sheet flashing installation

.1 Install this cap sheet in one-metre-wide strips. The side joints must overlap by 100 mm and must be staggered by at least 100 mm with respect to the joints of the cap sheet on the field surface to avoid areas of excessive membrane thickness. The overlaps on the field surface must be 50 mm wider than those of the base sheet membrane on the upstands and parapets. At end laps, angle-cut the corners that will be covered by following roll.

.2 Use a chalk line to draw a straight line on the field surface 150 mm from the upstands and parapets.

.3 Use a propane torch and round-nose trowel to embed the surface granules starting from the chalk line on the field surface to the bottom edge of the upstand or parapet as well as on the granulated vertical surfaces that are to be overlapped.

.4 Torch this cap sheet directly to the base sheet membrane, proceeding from bottom to top. This technique softens both membranes in order to obtain even, continuous weld.

.5 During installation, be careful not to overheat the membrane or to create excessive bitumen bleeding at the joints.

.6 Once cap sheet is installed, carefully inspect all joints and surfaces. Take great care to ensure asphalt does not spread out over exposed part of cap sheet.

.7 If there are marks of asphalt or excessive asphalt seepage, reheat these areas with a torch and apply matching factory provided granules before bitumen cools to provide clean appearance. Press granules in place with a damp sponge

End of section

1 General

1.1 Section Includes

.1 Fabricate and install sheet metal flashings and membrane underlayment.

.2 Fabricate and install all sleeves and storm collars.

1.2 Reference standards

.1 ASTM A 653/A653M-04a, Standard Specification for Sheet Steel, Zinc Coated (Galvanized) by the Hot Dipped Process, General Requirements.

.2 CGSB 93-GP-3M, Sheet, Steel, Galvanized Pre-finished Residential, Reaffirmed December 1985.

.3 ASTM A792/A792M, Standard Specifications for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.4 The Aluminum Association Inc. (AA) – AA DAF45, Designation System for Aluminum.

1.3 Coordination

.1 Co-ordinate work under this section with work of related sections.

1.4 Samples

.1 Submit to the Owner for review prior to sheet metal fabrication and installation, a sample of all Products.

.2 Samples shall be in accordance with Contract Documents.

1.5 Quality assurance

.1 Work of this section shall be carried out by specialists having a minimum five years related experience.

.2 Work shall be performed in accordance with practices and details of the Sheet Metal & Air Conditioning Contractors' National Association's Architectural Sheet Metal Manual, unless otherwise required in the Contract Documents.

1.6 Mock-ups

.1 Construct full size mock-ups in 2440 mm (8 ft.) lengths of the prefinished sheet metal cap and counter flashings for typical eave, gable, and wall conditions. Mock-ups to include all typical components, and specified colour.

.2 Locate mock-ups at specific areas designated by the Owner.

.3 Mock-up will serve for initial review purposes by the Owner and the DRLHC and when accepted, shall represent the minimum standard for work. Mock-up may be included as part of final work.

.4 All materials used for mock-up must be in complete accordance with the Contract Documents.

1.7 Delivery and storage

.1 Deliver and store Products to manufacturer's instructions and CSSBI guidelines.

.2 Do not store products on roof.

.3 Store Products under cover on elevated platforms, protected from weather and construction activities.

.4 Remove and replaced damaged products.

1.8 Warranty

.1 Defective sheet metal installation covered under the warranty shall include but not be limited to, loss of securement, corrosion, fading of finish, change of colour and staining of adjoining or adjacent materials or surfaces.

.2 Carry out all replacement and repair work during the warranty period as directed by the Project Manager and at no additional cost to the Region.

.3 Inspect the sheet metal installation 60 days before expiry of warranty and correct defects within 15 days of inspection. This inspection shall be performed at no additional cost to the Region.

2 Products

2.1 Materials

.1 Prefinished steel metal: Galvanized steel, 0.71 mm (24 ga) core nominal thickness, Z275 zinc coating to ASTM 653/A653M-04 with a prefinished coat. Finish to be Stelco's 8000 series or an approved equivalent. Colour to be approved by the Project Manager from the 12 standard colours listed in CSSBI's General Colour Card.

.2 Starter strips: Fabricated from prefinished steel, 0.87 mm (22 ga) core nominal thickness, Z275 zinc coating to ASTM A525M-80. Starter strips to be continuous.

.3 Banding Strip: 3 mm x 25 mm (1/8 x 1 in.) Aluminum Bar.

.4 Solder: to ASTM B32-04, lead free.

.5 Flux: Commercial preparation suitable for materials to be soldered.

.6 Isolation coating: alkali resistant bituminous paint.

.7 Nails: to CSA B111-1974 (R2003), hot dipped galvanized steel flat head roofing nails of length and thickness to suit application.

.8 Fasteners for masonry and concrete: Tapcon fasteners with "Climaseal" corrosion resistant finish, or an approved equivalent, of sufficient length to provide a minimum 38 mm (1.5 in.) penetration into substrate.

.9 Touch-up paint: As recommended by the prefinished sheet metal manufacturer.

.10 Isolation coating: Alkali resistant bituminous paint.

.11 Eavestrough Spacers and Brackets: to be compatible with eavestrough and as recommended by eavestrough Manufacturer.

2.2 Fabrication

.1 Shop fabricate flashings and trim in accordance with applicable requirements of SMACNA Architectural Manual and in accordance with the Contract Documents. Form sheet metal on bending brake, shaping, trimming and hand seaming on bench.

.2 Form sections square, true, and accurate to size, free from distortion, oil canning and other defects detrimental to appearance and performance, and to dimensions indicated / required.

.3 Fabricate metal flashings and starter strips in 2400 mm (8 ft.) maximum lengths.

.4 Metal drip edge flashings are required at all eaves, rakes and gable ends. Fascia , barge/ rake /gable ends shall be covered with new prefinished sheet metal flashing to match existing profile and colour.

.5 Provide an "S-Lock" joint at all end joints.

.6 Hem all exposed edges at least 12 mm (0.5 in.) for appearance and stiffness and fabricate 19 mm (0.75 in.) drip edge.

.7 Mitre and form standing seams at all corners. Make allowance for movement at joints.

.8 Apply isolation coating to metal surfaces to be embedded in concrete or mortar joints.

3 Execution

3.1 Protection

.1 Protect the work of this Section from damage. Damaged work which cannot be satisfactorily repaired, restored or cleaned, shall be replaced at no cost to the Region.

3.2 Installation

.1 Install starter strips, drip edge flashings, fascia flashings, roof divider flashings, step flashings, and other miscellaneous sheet metal work in accordance with the Contract Documents.

.2 Do not use exposed fasteners unless approved before installation or where shown on Drawings.

.3 Provide membrane underlayment beneath sheet metal flashings at all locations, except where membrane flashings are present.

.4 Provide continuous starter strips at fascia and gable end / rake flashings which are required to present a true, non-waving, leading edge. Fasten starter strips to substrate at a minimum of 305 mm (12 in.) on centre.

.5 End joints where adjacent lengths of metal flashing on fascia and rake/ gable end meet shall be made using an "S-lock" joint. This shall be executed by inserting the end of one length in a 25 mm (1 in.) deep "S" lock formed in the end of the adjacent length. Concealed portion of the "S" lock shall extend 25 mm (1 in.) outwards and shall be nailed to substrate. Face nailing of joints will not be permitted.

.6 Insert top edge of sheet metal flashing under cap flashings to form weather tight junctions.

.7 Install wall counter flashing.

3.3 Sealants

.1 Apply sealant at all junctions between sheet metal counter flashing and reglet, and at joints in eaves trough, in accordance with Section 07 92 00 – Joint Sealants.

3.4 Cleaning

.1 Daily as the work proceeds and on completion, remove all surplus materials and debris resulting from the foregoing work.

.2 Remove all stains, caulking or other adhesive from all affected surfaces.

End of section

1 General

1.1 Section includes

.1 Fire stopping and smoke seals within mechanical assemblies and electrical assemblies are specified in Division 23 and 26 respectively.

.2 Coordinate work of this section with other sections as required to properly execute the work and as necessary maintain satisfactory progress of the work of other sections.

1.2 References

.1 Underwriter's Laboratories of Canada (ULC)

.1 CAN-S115, Fire Tests of Firestop Systems.

1.3 Definitions

.1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.

.2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.

.3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.

.4 Tightly Fitted; (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): penetrating items that are cast in place in buildings of non-combustible construction or have "0" annular space in buildings of combustible construction.

.1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.4 Submittals

.1 Prior to start of work submit the following:

.1 Duplicate 300 x 300 mm samples showing actual firestop material proposed for project.

.2 Shop drawings to show proposed material, reinforcement, anchorage, fastenings, and method of installation. Construction details should accurately reflect actual job conditions.

.3 Manufacturer’s engineering judgement identification number and drawing details when no ULC or cUL system is available. Engineering judgement must include both project name and contractor’s name who will install firestop system as described in drawing.

.4 Manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation. Include manufacturer’s specifications, training letter, and technical data for each material including the composition and limitations, documentation of ULC or CUL firestop systems to be used.

.5 Material safety data sheets provided with product delivered to job site.

1.5 Manufacturer’s representative

.1 A manufacturer’s representative is to be on site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures and at commissioning stage to certify acceptance completed installation. Training will be done as per manufacturer’s written recommendations published in their literature and drawing details.

1.6 Quality assurance

.1 Qualifications:

.1 Installer: person specializing in fire stopping installations with minimum five (5) years documented experience approved by the fire stopping manufacturer.

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

.2 All fire stopping materials for this project to be supplied by a single manufacturer.

2 Products

2.1 Materials

.1 Use only firestop products that have been ULC or cUL tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements and fire-rating involved for each separate instance.

.2 Fire stopping and smoke seal systems: in accordance with CAN-S115.

.1 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN-S115 and not to exceed opening sizes for which they are intended.

.2 Firestop system rating: as indicated on drawings.

.3 Service penetration assemblies: certified and tested by ULC or cUL in accordance with CAN-S115.

.4 Service penetration firestop components: certified and tested by ULC or cUL in accordance with CAN-S115.

.5 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.6 Non-curing, re-penetrable intumescent sealants, caulking or putty material for use with flexible cables or cable bundles.

.7 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal. Consult with Owner’s Representative and damper manufacturer prior to installation ULC or cUL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

.8 Intumescent sealants or caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe. No silicone-based firestop is allowed to be applied on plastic pipes.

.9 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.10 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.11 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.12 Sealants for vertical joints: non-sagging.

3 Execution

3.1 Preparation

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.2 Installation

.1 Install fire stopping and smoke seal material and components in accordance with ULC certification or UL Products Certified for Canada (CUL) and manufacturer's instructions.

.2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.4 Tool or trowel exposed surfaces to a neat finish.

.5 Remove excess compound promptly as work progresses and upon completion.

3.3 Inspection

.1 Notify Owner’s Representative when ready for inspection and prior to concealing or enclosing firestopping materials and service penetration assemblies.

3.4 Schedule

.1 Firestop and smoke seal at:

.1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.

.2 Edge of floor slabs at curtain wall and precast concrete panels.

.3 Perimeter of fire-resistance rated masonry and gypsum board partitions.

.4 Intersection of fire-resistance rated masonry and gypsum board partitions.

.5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.

.6 Penetrations through fire-resistance rated floor slabs, ceilings, and roofs.

.7 Openings and sleeves installed for future use through fire separations.

.8 Around mechanical and electrical assemblies penetrating fire separations.

.9 Rigid ducts: greater than 129 cm^2: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

3.5 Clean up

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

.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

End of section

1 General

1.1 Section includes

.1 Joint sealants.

1.2 Reference standards

.1 ASTM International (ASTM)

.1 ASTM C510-16 Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants

.2 ASTM C661-15 Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer

.3 ASTM C719-14 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)1, 2

.4 ASTM C794-18 Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants

.5 ASTM C834-17 Standard Specification for Latex Sealants

.6 ASTM C920-18 Standard Specification for Elastomeric Joint Sealants

.7 ASTM C1087-16 Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems

.8 ASTM C1193-16 Standard Guide for Use of Joint Sealants

.9 ASTM C1247-14 Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids

.10 ASTM C1248-18 Standard Test Method for Staining of Porous Substrate by Joint Sealants

.11 ASTM C1311-14 Standard Specification for Solvent Release Sealants

.12 ASTM C1330-18 Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.

.13 ASTM D412-16 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

.14 ASTM D624-00(2012) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

.15 ASTM D2203-01(2018) Standard Test Method for Staining from Sealants

.16 ASTM D2240-15e1 Standard Test Method for Rubber Property—Durometer Hardness

.2 U. S. Environmental Protection Agency (EPA)

.1 EPA 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings.

.3 South Coast Air Quality Management District (SCAQMD) California State

.1 SCAQMD Rule 1168-03: Adhesives and Sealants.

1.3 Submittals

.1 Provide submittals in accordance with Section 01 33 00.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Manufacturer's Data: Submit manufacturer's literature describing each material to be used in the work of this Section.

Literature shall contain a statement that the material complies with the specified standard.

.2 Samples: Submit for approval and colour selection sample of each type of compound, recommended primers and joint filler or fillers proposed to be used.

.3 Mock-Up:

.1 If requested by the Consultant, construct mock-ups where directed to show location, size, shape, colour and depth of joints complete with back-up material, primer and sealant. Mock-up may be part of finished work.

.2 Allow 24-hours for inspection of work before proceeding with work.

.4 Safety Data Sheets: Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on Site for reference by workers.

1.4 Quality assurance

.1 Adhere to Manufacturer's recommendations for mixing or preparation of materials listed in this Section.

.2 Pot life or installation times shall not be exceeded.

.3 Integral materials which compose a joint detail shall be compatible.

.4 Component parts, where possible, shall have the same manufacturer.

.5 A representative of sealant material manufacturer shall visit the site during application to ensure that all Work is carried out according to the manufacturer's printed instructions.

1.5 Site conditions

.1 Apply sealants only to completely dry surfaces, and at air, substrate and material temperatures above minimum established by manufacturer's written specifications.

1.6 Delivery, storage handling and protection

.1 Deliver all materials to the jobsite in their original, unopened containers, with all labels intact.

.2 Receive and store materials as recommended by materials manufacturer.

.3 Maintain containers and labels in undamaged condition.

1.7 Warranty

.1 Provide a written warranty endorsed and issued in the name of the Owner stating that all sealant work of this Section is warranted against leakage, cracking, crumbling, melting, running, deterioration, shrinkage, loss of cohesion, loss of adhesion, staining of adjoining or adjacent work or surfaces, or failure to provide intended seal for a period of five years from the Date of Substantial Performance of the Work, and that any defects will be made good including, related materials and installation at no additional cost to the Owner.

2 Products

2.1 Materials – general

.1 VOC Content for Interior Applications: Provide sealants and sealant primers complying with the following VOC content limits per 40 CFR 59, Subpart D (EPA Method 24):

.1 Architectural Sealants: 250 g/L.

.2 Sealant Primers for Nonporous Substrates: 250 g/L.

.3 Sealant Primers for Porous Substrates: 775 g/L.

.2 Low-Emitting Sealants for Interior Applications: Provide sealants and sealant primers complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

.3 Compatibility: Provide joint sealants and accessory materials that are compatible with one another, and with adjacent materials, as demonstrated by sealant manufacturer using ASTM C1087 testing and related experience.

.4 Joint Sealant Standard: Comply with ASTM C920 and other specified requirements for each joint sealant.

.5 Stain Test Characteristics: Where sealants are required to be non-staining, provide sealants tested per ASTM C1248 as non-staining on porous joint substrates specified.

2.2 Urethane joint sealants

.1 UJS#1: Single-Component, Nonsag, Moisture-Cure, Polyurethane Joint Sealant: ASTM C920, Type S, Grade NS, Class 50, Use NT; Greenguard certified.

.1 Basis of Design Product: Tremco Dymonic 100 or approved equivalent.

.2 Volatile Organic Compound (VOC) Content: 40 g/L maximum.

.3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.

.4 Tensile Strength ASTM D412: 350 to 450 psi

.5 Percent Elongation ASTM D412: 800 to 900%

.6 Modulus at 100% ASTM D412: 75 to 85 psi

.7 Tear Strength ASTM D412: 65 to 75 psi

.8 Smoke Development ASTM E84: 5

.9 Colour: As selected by Consultant from manufacturer's standard line.

2.3 Silicone joint sealants

.1 SJS#1: Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 100/50, Use NT; SWRI validated.

.1 Basis of Design Product: Tremco Spectrem 1 or approved equivalent.

.2 Volatile Organic Compound (VOC) Content: 1 g/L maximum.

.3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.

.4 Staining, ASTM C1248: None on concrete, marble, granite, limestone, and brick.

.5 Colour: As selected by Consultant from manufacturer's standard line.

3 Execution

3.1 Inspection

.1 Examine joint profiles and surfaces to determine if work is ready to receive joint sealants. Verify joint dimensions are adequate for development of sealant movement capability. Verify joint surfaces are clean, dry, and adequately cured. Proceed with joint sealant work once conditions meet sealant manufacturer's written recommendations.

3.2 Preparation

.1 Joint Surface Cleaning: Clean joints prior to installing joint sealants using materials and methods recommended by sealant manufacturer.

.2 Comply with ASTM C1193.

.1 Remove curing compounds, laitance, form-release agents, dust, and other contaminants.

.2 Clean nonporous and porous surfaces utilizing chemical cleaners acceptable to sealant manufacturer.

.3 Protect elements surrounding the Work of this section from damage or disfiguration. Apply masking tape to adjacent surfaces when required to prevent damage to finishes from sealant installation.

3.3 Application

.1 Sealant and Primer Installation Standard: Comply with ASTM C 1193 and manufacturer's written instructions.

.2 Joint Backing: Select joint backing materials recommended by sealant manufacturer as compatible with sealant and adjacent materials. Install backing material at depth required to produce profile of joint sealant allowing optimal sealant movement.

.3 Install joint backing to maintain the following joint ratios:

.1 Joints up to 13 mm wide: 1:1 width to depth ratio.

.2 Joints greater than 13 mm wide: 2:1 width to depth ratio; maximum 13 mm joint depth.

.4 Install bond breaker tape over substrates when sealant backings are not used.

.5 Masking: Mask adjacent surfaces to prevent staining or damage by contact with sealant or primer.

.6 Joint Priming: Prime joint substrates when recommended by sealant manufacturer or when indicated by preconstruction testing or experience. Apply recommended primer using sealant manufacturer's recommended application techniques.

.7 Liquid Sealant Application: Install sealants using methods recommended by sealant manufacturer, in depths recommended for application. Apply in continuous operation from bottom to top of joint vertically and horizontally in a single direction. Apply using adequate pressure to fill and seal joint width.

.8 Tool sealants immediately with appropriately shaped tool to force sealants against joint backing and joint substrates, eliminating voids and ensuring full contact.

.9 Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

.10 Tool exposed joint surface concave using tooling agents approved by sealant manufacturer for application.

.11 Cleaning: Remove excess sealant using materials and methods approved by sealant manufacturer that will not damage joint substrate materials.

.12 Remove masking tape immediately after tooling joint without disturbing seal.

.13 Remove excess sealant from surfaces while still uncured.

3.4 Schedule

.1 Exterior concealed transition joints in air barrier.

.1 SJS#1: Single-component neutral-curing low-modulus silicone sealant.

.2 UJS#1: Single-component non-sag urethane sealant.

.3 Compatibility: Compatible with air barrier components specified in Section 07 27 00.

.2 Exterior concealed watertight joints in cladding systems.

.1 UJS#1: Single-component non-sag urethane sealant.

.3 Exterior perimeter joints at frames of doors, windows and storefront frames.

.1 UJS#1: Single-component non-sag urethane sealant.

.4 Exterior joints between different materials listed above.

.1 UJS#1: Single-component non-sag urethane sealant.

.5 Interior perimeter joints of exterior aluminum frames.

.1 UJS#1: Single-component non-sag urethane sealant.

3.5 Field Quality Control

.1 Field-Adhesion Testing: Perform adhesion tests in accordance with manufacturer's instructions and with ASTM C1193, Method A.

.1 Perform 5 tests for the first 300 m of joint length for each kind of sealant and joint substrate, and one test for each 300 m of joint length thereafter or 1 test per each floor per building elevation, minimum.

.2 For sealant applied between dissimilar materials, test both sides of joint.

.2 Remove sealants failing adhesion test, clean substrates, reapply sealants, and re-test. Test adjacent sealants to failed sealants.

.3 Submit report of field adhesion testing to Architect indicating tests, locations, dates, results, and remedial actions taken.

3.6 Cleaning and protection

.1 Remove all waste materials from site. Sealant shall be cleaned of all foreign material as recommended by the sealant manufacturer. Leave work in a condition satisfactory to the Consultant.

End of section

1 General

1.1 Section includes

.1 Glass and glazing materials and accessories to complete the fabrication and installation of doors and windows

1.2 Reference standards

.1 ASTM International (ASTM):

.1 ASTM C162-05 (2015), Standard Terminology of Glass and Glass Products.

.2 ASTM C542-05(2017) Standard Specification for Lock-Strip Gaskets

.3 ASTM C1048-18 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass

.4 ASTM C1135-15 Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants

.5 ASTM C1184-18e1 Standard Specification for Structural Silicone Sealants

.6 ASTM C1249-18 Standard Guide for Secondary Seal for Sealed Insulating Glass Units for Structural Sealant Glazing Applications

.7 ASTM C1376-15 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass

.8 ASTM C1503-18 Standard Specification for Silvered Flat Glass Mirrors

.9 ASTM D790-17 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

.10 ASTM D1003-13 Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics

.11 ASTM D1929-16 Standard Test Method for Determining Ignition Temperature of Plastics

.12 ASTM D2240-15e1 Standard Test Method for Rubber Property—Durometer Hardness

.13 ASTM E84-18b Standard Test Method for Surface Burning Characteristics of Building Materials

.14 ASTM E330/E330M-14 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

.15 ASTM E1300-16 Standard Practice for Determining Load Resistance of Glass in Buildings

.2 American National Standards Institute (ANSI).

.1 ANSI Z97.1 - American National Standard for Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

.3 National Fire Protection Association

.1 NFPA 80 Standard for Fire Doors, Fire Windows.

.4 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-12.1-M90 Tempered or Laminated Safety Glass.

.2 CAN/CGSB-12.2-M91 Flat, Clear Sheet Glass.

.3 CAN/CGSB-12.3-M91 Flat, Clear Float Glass.

.4 CAN/CGSB-12.8-97 Insulating Glass Units.

.5 CSA Group (CSA)

.1 CSA A440-17 North American Fenestration Standard/Specification for Windows, Doors, and Skylights

.6 Consumer Product Safety Commission

.1 CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials.

.7 Environmental Choice Program (ECP).

.1 CCD-045-95 Sealants and Caulking.

.8 Flat Glass Manufacturers Association (FGMA).

.1 FGMA Glazing Manual - 1997.

.9 Glass Association of North America (GANA)

.1 GANA Glazing Manual 50th Anniversary Edition-2008.

.2 GANA Laminated Glazing Reference Manual - 2009.

.3 GANA Sealant Manual-2008.

.4 GANA Guide to Architectural Glass (2010).

.5 GANA/PGC International Protective Glazing Manual (2010).

.10 South Coast Air Quality Management District, California State (SCAQMD)

.1 SCAQMD Rule 1168-03, Adhesives and Sealants Applications.

.11 Ontario Ministry of Municipal Affairs and Housing (MMAH)

.1 Ontario Building Code

.2 MMAH Supplementary Standard SB-10, Energy Efficiency Requirements

1.3 Submittals

.1 Provide submittals in accordance with Section 01 33 00.

.2 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

.3 Product Data: Submit manufacturer's printed product literature, specifications and data sheets.

.4 Certificates: submit product certificates signed by manufacturer certifying materials and assemblies comply with specified performance characteristics and criteria and physical requirements.

.5 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.6 Samples: Submit duplicate 300 x 300 mm size samples of glass and sealant material.

.7 Manufacturer's Instructions: Submit manufacturer's installation instructions.

.8 Provide maintenance data for glazing for incorporation into Operation and Maintenance Manual specified in Section 01 78 00 – Closeout Submittals.

1.4 Quality assurance

.1 Perform work in accordance with FGMA Glazing Manual and Laminators Safety Glass Association Standards Manual for glazing installation methods.

.2 Installer: Company specializing in the installation of structural glazing with five (5) years proven experience and approved by the manufacturer for installation of their products.

.3 Safety glass products shall comply with the testing requirements of CAN/CGSB-12.1-M, Type 1 for Laminated Glass and Type 2 for Tempered Glass.

.4 Comply with published recommendations of glass product manufacturers and organizations below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this section or referenced standards.

.1 GANA Publications

.2 AAMA Publications

.3 IGMA/IGMAC Publications

.5 Provide safety glass permanently marked with the company name or logo and CAN/CGSB-12.1-M if the product meets categories 1 and 2, or mark as CAN/CGSB 12.1-M-1 if the product meets the requirements of Category 1 only.

.6 Insulating Glass products are to be permanently marked either on spacers or at least one insulating unit component with appropriate certification label of the Insulating Glass Manufacturers Alliance (IGMA) or Insulating Glass Manufacturers Association of Canada (IGMAC)

.7 Single-source fabrication responsibility: All glass fabricated for each type shall be processed and supplied by a single fabricator.

.8 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.9 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 System description

.1 Performance Requirements: Provide continuity of building enclosure vapour and air barrier using glass and glazing materials as follows:

.1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.

.2 Insulating glass units in combination with aluminum window framing specified elsewhere shall be designed by the supplier to comply with energy efficient requirements specified in MMAH Supplementary Standard SB-10. Submit engineered shop drawings, calculations and certificates certifying compliance with that standard.

1.6 Design requirements

.1 Design glass, glazing channels, connections, attachments and glazing accessories to withstand loads designated by the Ontario Building Code and to accommodate all building deflections.

.2 Size glass to withstand wind loads, dead loads and positive and negative live loads acting normal to plane of glass to a design pressure of 1.2 kPa as measured in accordance with ANSI/ASTM E330.

.3 Limit glass deflection to 1/200 with full recovery of glazing materials.

.4 Glass thicknesses indicated are minimum and are for detailing only. Confirm glass thickness by analyzing project conditions, including in-service conditions and loads. Provide glass lites for various size openings in nominal thicknesses indicated but not less than required to meet performance requirements of referenced standards including energy efficiency requirements of MMAH-SB-10 (OBC 2012). Coordinate glass thicknesses with manufacturers of framing systems.

1.7 Site conditions

.1 Install glazing when ambient temperature is 10 ° C minimum. Maintain ventilated environment for 24 hours after application.

.2 Maintain minimum ambient temperature before, during and for 24 hours after installation of glazing compounds.

1.8 Delivery, storage handling and protection

.1 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

.2 Provide glass units with interleaving protection between lites. Keep glass and interleaving dry and store cases in clean, cool, dry areas with temperatures above the dew point. Circulation of cool, dry air in storage areas is essential. Open cases and inspect units periodically for moisture accumulation.

.3 Do not store glass in direct sunlight without an opaque protective covering over same.

1.9 Warranty

.1 Warrant insulating glass units for ten (10) years from date of Substantial Performance of the Work against seal failure, interpane dusting, or interpane misting.

.2 Warrant low-emissivity coatings when applied to the second or third surfaces of an insulating glass unit, for ten (10) years from date of Substantial Performance of the Work against peeling or coating deterioration due to product failure.

2 Products

2.1 Materials- flat glass

.1 Tempered Safety Glass: To CAN/CGSB-12.1-M, transparent, 6.4 mm thick unless indicated otherwise. Type 2-tempered.

.1 Class B-float.

.2 Category 1 11.

.3 Edge treatment: ground, bevel edge.

2.2 Insulating glass units

.1 Performance requirements for insulating glass units specified herein are the minimum permitted requirements. Provide engineered shop drawings and calculations showing that glazed assemblies including framing and

glazing products in combination, meet or exceed the minimum requirements of MMAH Supplementary Standard SB-10.

.2 Insulating Glass Units: To CAN/CGSB-12.8-M, double glazed sealed units, 25 mm overall thickness.

.1 Glass: CAN/CGSB-12.1 (tempered)

.2 Glass thickness: minimum 6.4 mm each light

.3 Inter-cavity space thickness: 12.7 mm with low conductivity spacers.

.4 Glass coating: surface number 2, low "E"

.5 Inert gas fill: argon.

2.3 Accessories

.1 Select appropriate glazing sealants, tapes, gaskets and other glazing materials of proven compatibility with other materials that they contact. These include glass products, insulating glass unit seals and glazing channel substrates under installation and service conditions, as demonstrated by testing and field experience.

.2 Setting blocks: Neoprene 80-90 Shore A durometer hardness to ASTM D 2240, to suit glazing method, glass light weight and area.

.3 Spacer shims: Neoprene 50-60 Shore A durometer hardness to ASTM D 2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self-adhesive on one face.

.4 Glazing tape:

.1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D2240; coiled on release paper; black colour.

.2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2%, designed for compression of 25%, to effect an air and vapour seal.

.5 Glazing splines: resilient polyvinyl chloride, extruded shape to suit glazing channel retaining slot, colour as selected.

.6 Lock-strip gaskets: to ASTM C542.

.7 Glazing Gaskets: To ASTM C864.

.8 Sealant: as specified in Section 07 92 00 – Joint Sealants.

3 Execution

3.1 Installation - general

.1 Perform work in accordance with GANA Glazing Manual for glazing installation methods.

.2 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 Inspection

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.3 Preparation

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.4 Installation - exterior wet/dry method

.1 Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.

.2 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.

.3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against tape and heel head of sealant with sufficient pressure to attain full contact at perimeter of light or glass unit.

.5 Install removable stops with spacer strips inserted between glazing and applied stops 6 mm below sight line.

.6 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.

.7 Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.5 Cleaning and protection

.1 Remove all waste materials from site.

.2 Perform cleaning to remove construction and accumulated environmental dirt.

.3 Remove traces of primer, caulking.

.4 Remove glazing materials from finish surfaces.

.5 Remove labels after work is complete.

.6 Clean glass using approved non-abrasive cleaner in accordance with manufacturer’s instructions.

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

End of section

1 General

1.1 References

.1 Canadian Standards Association (CSA International).

.1 CSA-B44-2010, Safety Code for Elevators and Escalators.

.2 CAN/CSA-B651-12, Accessible Design for the Built Environment.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

.3 National Building Code (NBC).

.1 National Building Code of Canada 2010.

1.2 System description

.1 One hydraulic passenger elevator type

.1 Elevator machine space located at the ground floor level of in hoistway.

.2 Barrier-Free in accordance with CAN/CSA B651, Barrier-Free Design.

.3 Bilingual Markings:

.1 Provide identification and instructions on operating panels and on signal equipment in English and French except where design is such that inference is obvious and readily understood.

.2 Design and construct elevator in accordance with CSA-B44, local codes and regulations.

1.3 Performance requirements

.1 Select and install passenger elevator components to form complete, operating elevator system meeting the following performance characteristics:

.1 Service: general purpose passenger elevator.

.2 Application: as per drawings.

.3 Operation: microprocessor single car.

.4 Quantity: one.

.5 Rated net capacity: 2041 kg.

.6 Rated speed: 46 m/min.

.7 Travel distance (nominal): 3.0 m.

.8 No. of stops: 2.

.9 No. of openings: 2 front, 0 rear.

.10 Inside car dimensions: 2411 mm wide x 11665 mm front to back.

.11 Cab Height: 2362 mm (nominal).

.12 Hoistway and car entrance frame opening sizes: 1219 mm wide x 2134 mm high. (Drawings 1100 mm x 2134)

.13 Door type: single.

.14 Door operation: centre opening in single speed.

.2 Hall Calls:

.1 Provide smooth acceleration and deceleration of car without perceptible steps so adjusted as not to cause passenger discomfort.

.2 Permit doors to start opening in advance of stop at floor level such that doors are at least 3/4 open when car is stopped level with floor.

.3 Requires visible and audible signaling at each hoistway to indicate which car is answering a call and the direction of travel.

.4 Audible signals to verbally state 'Up' for the Up direction and ‘Down’ for the 'Down' direction.

.5 Audible signal or verbal annunciator to be 10 db above ambient to a maximum of 80 db.

.3 Roller Guides:

.1 Provide guide operation which is inaudible to passengers in car or outside hoistway with car operating at rated speed and car fan turned off.

.4 Compensation:

.1 Select compensating chain materials to minimize noise.

.2 Limit total variation of motor current to 5% between full trip up and full trip down with rated load.

.5 Motor:

.1 Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating shall be selected specified speed and load. Provide “soft start” motor VFD driven.

.6 Next Stop Feature:

.1 In case of over-speed, tripping of overload relay, or opening of motor-generator switch in corridor control panel, stop car at next floor rather than make emergency stop between floors when serving between local floors.

.7 Automatic Self Levelling Feature:

.1 Install self-levelling feature which will automatically bring car to floor landings. Correct for over-travel, independent of operating device.

.2 Maintain car floor level within 10 mm of landing floor with two-way automatic maintaining levelling device.

.8 Home Landing:

.1 Not applicable

.9 Light Intensity:

.1 215 lx maximum measured 0.75 m above floor. Totally enclose and conceal wiring and ballasts from view within car and finish ceiling cavity white.

.10 Ventilation:

.1 Ventilate by two (2) speed exhaust air handling unit through roof concealed perforations at base. Limit total fan noise to 55dB on "A" scale of General Radio Sound Level meter type 1551A from reading 0.9 m above floor with fan on high speed.

.11 Tolerances:

.1 Car movement on guide rails: smooth movement, with no perceptible lateral or oscillating movement or vibration.

.12 Machine room: located adjacent to hoistway.

.13 Door Control Features: Elevator doors shall be provided with a reopening device that will stop and reopen the car door and hoistway door automatically should the door become obstructed by an object or person. Device shall be multi-beam light array across door opening to detect an opaque object equal to or greater than 33mm in diameter from sill to 1800 above sill and secondary three dimensional infrared multi-beam array across door opening. Device shall reopen doors when it detects a person or object entering or exiting the car in the area between the hoistway doors or the entryway area adjacent to the hoistway doors. Maximum zone penetration not to exceed 500mm into hallway.

.14 Car position indicators:

.1 Requires both audible and visible car floor location indicators.

.2 Audible signals to verbally state 'Up' for the Up direction and ‘Down’ for the 'Down' direction.

.3 Audible signals to verbally state each floor landing (ex. ‘First Floor’)

.4 Audible signal or verbal annunciator to be 10 db above ambient to a maximum of 80 db.

1.4 Submittals

.1 Submittals in accordance with Standards

.2 Product Data: submit manufacturer's printed product literature, specifications and data sheet.

.3 Shop Drawings:

.1 Submit shop drawings to indicate project layout, including details and the following information:

.1 Size and location of machine and controller.

.2 Size and location of car, hoisting beam, guide rails, buffers stands and other components in hoistway.

.3 Rail bracket spacing and maximum loads on guide rails.

.4 Reactions at points of support.

.5 Weights of principal components.

.6 Top and bottom clearance and over travel of car.

.7 Location of circuit breaker, switchboard panel or disconnect switch, light switch and feeder extension points in machine room.

.8 Location in hoistway and machine space for connection of travelling cables for car light and telephone.

.9 Location and size of access doors.

.10 Loads on hoisting beams.

.11 Expected heat generation of equipment in machine space.

.12 Shop drawings submitted stamp by qualified professional engineer registered in Province of Ontario.

.13 Include on general arrangement drawings:

.1 Type, size, location of hoistway entrances showing details of fastening to hoistway structure.

.4 Samples:

.1 Submit two samples, complete with colour schemes, 150 x 150 mm in size, illustrating: floor material, car interior, car ceiling, car door, hoistway entrance door and frame finishes.

.5 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.6 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.7 Instructions: submit manufacturer’s installation instructions.

.8 Manufacturers Field Services: submit copies of manufacturers field reports.

.9 Closeout Submittals:

.1 Submit the following in accordance with Standards:

.1 Record actual locations of equipment, names of equipment manufacturers and suppliers, concealed conduit and boxes, concealed devices, and disconnects.

.2 Operation and Maintenance Data:

.1 Include description of elevator system's method of operation and control including, motor control system, door operation, signals, firefighter's service, emergency power operation, and special or non-standard features provided.

.2 Provide parts catalogues with complete list of equipment replacement parts with equipment description and identifying numbers.

.3 Legible schematic wiring diagrams covering electrical equipment installed, including changes made in final work, with symbols listed corresponding to identity or markings on both machine room and hoistway apparatus.

.4 Instruct Departmental Representative in maintenance of special finishes.

1.5 Quality assurance

.1 Qualifications:

.1 Installer Qualifications: company or person experienced in performing work of this section specializing in installation of work similar to that required for this project, with minimum five years documented experience and approved by elevator systems manufacturer.

.2 Pre-Installation Meetings:

.1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building subtrades.

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

.3 Health and Safety:

.1 Do construction occupational health and safety in accordance with Health and Safety Requirements.

1.6 Delivery, storage and handling

.1 Deliver, store and handle components in accordance with manufacturer's written instructions.

.2 Packing, Shipping, Handling and Unloading:

.1 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

.3 Storage and Protection:

.1 Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

.4 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 00.

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

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, and packaging material for recycling in accordance with Section 01 74 00.

.4 Divert unused metal materials from landfill to recycling facility as approved by Departmental Representative.

1.7 Warranty

.1 For elevator materials, components and systems the 12 month warranty period is extended to 36 months.

.1 Extended warranty period must include warranty against:

.1 Blistering, spalling or peeling of paint due to improper surface preparation or material application.

.2 Opening of joints due to improper design or use of ineffective fastening devices.

.3 Separation, cracking or splitting of plastic laminate due to improper application to core material, or to method of fabrication which gives rise to areas of high stress concentration or which restricts normal expansion or contraction of plastic laminate.

.2 Manufacturer’s Warranty: submit, for Departmental Representative's acceptance, manufacturer's standard warranty document executed by authorized company official.

1.8 Maintenance Service

.1 Furnish complete service and maintenance of elevator system components during elevator contract warranty period.

.2 Systematically; monthly examine, clean, adjust, and lubricate equipment as per planned maintenance tasks and frequencies.

.3 Maintenance to include systematic examination, adjustment and lubrication of elevator equipment; repair or replace parts whenever required. Use genuine parts produced by the manufacturer of specific equipment. Replace wire rope as necessary to maintain required factor of safety.

.4 Perform work without removing cars during peak traffic periods.

.5 Provide emergency call back service during working hours for this maintenance period.

.6 Maintain locally, near place of work, an adequate stock of parts for replacement or emergency purposes and have qualified installation

personnel available to ensure fulfillment of this maintenance service without unreasonable loss of time.

.7 Perform maintenance work using competent personnel, under supervision and in direct employ of elevator manufacturer.

.8 Do not assign or transfer maintenance service to any agent or subcontractor without prior written consent of Departmental Representative.

2 Products

2.1 Materials

.1 Materials: as required to achieve specified performance criteria; functionally compatible with adjacent materials and components.

2.2 Hoistway Entrances

.1 Frames: Entrance frames shall be of bolted construction for complete one-piece unit assembly. All frames shall be securely fastened to fixing angles mounted in the hoistway and shall be UL fire rated steel. Additional sill angle support to be provided. Sills shall be extruded aluminum.

.2 Doors: Entrance doors shall be satin stainless steel face, with vertical internal channel reinforcements.

.3 Fire Rating: Entrance and doors shall be UL fire rated for 1 hour.

.4 Entrance Finish: satin stainless steel

.5 Entrance Markings: Entrance jambs shall be marked with 4” x 4” (102 mm x 102 mm) plates having raised floor markings with Braille adjacent. Markings shall be provided on both sides of the entrance.

.6 Sight Guards: Black sight guards will be furnished with any metal finish door. Powder coated matching sight guards will be furnished with powder coated doors.

2.3 Car Cab

.1 Enclose car sides except entrance suitable for removing or resurfacing for maintenance purposes.

.2 Floor to accept ceramic tile specified in Section 09 30 13, flush with sill and securely fastened at front edge.

.3 Walls: finish with raised plastic laminate panels, installed horizontally. All cab that is not raised panels to be satin stainless steel. Designer to select plastic laminate from manufacturer’s full range.

.1 Panels: removable, retained securely with hidden fastenings. Design for removal of panels from inside car. Face panels with materials of flame spread rating of 25 or less and trim edges.

.4 Ceiling: suspended ceiling, 2340mm height.

.1 Finish: satin stainless steel panels with downlights or lights recessed in canopy.

.5 Loudspeaker and protective grille: in car top and shielded wiring connected to controller.

.6 Operating panel and face plate: illuminated call buttons.

.7 Indicator panel: above operating panel with illuminated position indicators.

.8 Bumper rail: 38 mm diameter tubular stainless steel with no. 4 (satin) finish.

.9 Pad hooks: mounted at 2300mm height.

.10 Wall mats: one set canvas covered, padded with fill material and sewn.

.11 Where required by enforcing authority furnish license holders in each elevator car to suit certificate issued by enforcing authority. Design holder with hidden or tamper proof fastening.

.12 Telephone cabinet in car with telephone symbol 75 mm in height and wording "In case of emergency, lift receiver, wait for answer" engraved in letters at least 6 mm high on orange phosphorescent paint. Identify elevator and name of building on back of cabinet cover. Include telephone wiring within elevator hoistway.

.13 Car doors and frames: doors of sandwich panel construction. Frames of rolled sections, rigid construction.

.14 Clear height under car ceiling: 2.44 m.

.15 Clear car entrance height: 2.30 m.

2.4 Power Supply

.1 Equipment Power: as per manufacturer's instructions

.2 Lighting: 120V, single phase, 60 Hz, alternating current.

.3 Protect elevator equipment against damage or malfunction due to change to or from normal power supply and emergency power supply.

.4 Solid State Starting: Provide an electronic starter featuring adjustable starting currents.

2.5 Emergency battery back up power supply

.1 In the event of normal power supply failure, arrange for the elevator system to lower form an emergency power supply.

.2 Provide battery back up emergency power supply for emergency operation as follows:

.1 Lower the elevator to the Ground Floor landing for exiting at grade. Automatically open door and remain open until regular door time has expired.

.2 Upon restoration of normal power supply, the elevator automatically resumes normal operation.

3 Execution

3.1 Manufacturer's Instructions

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

3.2 Installation

.1 Install machine room, and other elevator materials and components in accordance with CSA-B44, local codes, regulations and manufacturer's written instructions.

.2 Modify existing hoistway for new elevator installation.

3.3 Field quality control

.1 Manufacturer's Field Services:

.1 Have manufacturer of products, supplied under this Section, review Work involved in the handling, installation/application, protection and cleaning, of its product and submit written reports, in acceptable format, to verify compliance of Work with Contract.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, at stages listed:

.1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of

this Section depends, is complete but before installation begins.

.2 Once during progress of Work at 60% complete.

.3 Upon completion of the Work, after cleaning is carried out.

.4 Obtain reports, within 5 days of review, and submit, immediately, to Departmental Representative.

3.4 Site tests

.1 Perform and meet tests required by CSA-B44.

.2 Supply instruments and execute specific tests.

.3 Furnish test and approval certificates issued by jurisdictional authorities.

.4 At agreed time during twelve month warranty period, and with building normally occupied using normal building traffic, conduct tests to verify performance. Furnish event recording of hall call registrations, time initiated, and response time throughout entire normal working day.

3.5 Cleaning

.1 Remove protective coverings from finished surfaces and components.

.2 Clean surfaces and components ready for inspection.

3.6 Adjustments

.1 Adjust door opening and closing times to suit handicapped users in accordance with Departmental Representative instructions.

.2 Adjust control system to cause elevators to answer hall calls during working day within performance criteria specified.

.3 Adjust for smooth acceleration and deceleration of car as so not to cause passenger discomfort.

.4 Adjust automatic floor levelling feature at each floor.

End of section

1 General

1.1 General requirements

.1 Comply with Division 1, General Requirements and all documents referred to therein.

1.2 Application

.1 This Section applies to and is part of all Sections of Division 16.

1.3 Definitions

.1 Wherever the term "This Sub-Contractor" is used in this Division, it means the firm having a subcontract with the "Contractor" to perform, supervise and coordinate all work of this Division.

.2 Wherever the term "The Consultant" is used it means Daniel Karpinski Architect,

.3 Wherever the term "install" (and tenses of "install") is used it means install and connect complete.

.4 Wherever the term "supply" is used it means supply only.

.5 Wherever the term "Provide" is used in relationship to equipment, piping etc., in this Division, it means "Supply, Install and Connect".

.6 Whenever "Drawings and Specifications" are referred to herein, it means "the Contract Documents".

.7 Wherever the terms "Authorities" or "Authorities having jurisdiction" are used in this Division, they shall mean any and all current laws and/or by-laws of any federal, provincial or local authorized agencies having jurisdiction over the sum total or parts of the work including, but not restricted to the Municipal Planning and Building Department, Municipal Fire Department, Plumbing Regulations, Gas Utilization Code, The Construction Safety Act, Municipal Public Works Department, Federal and/or Provincial Fire Marshall, the Gasoline Handling Act, the Canadian Electrical Code with Ontario Supplement with the Ontario Building Code.

.8 Wherever the term "Work" is used in this Division it means all equipment, permits, materials and labour to provide a complete electrical installation as required and detailed in the Drawings and Specifications.

1.4 Work included

.1 Sections of Division 16 are not intended to delegate functions nor to delegate work and supply to any specific trade and the Work shall include all labour, materials, equipment, and tools required for a complete and working installation as described, but not necessarily limited to items in the following Sections:

.1 Section 16 00 10 Electrical General Requirements

1.5 Permits, fees and inspections

.1 Apply for, obtain, and pay for all permits, licenses, inspections, examinations, and fees required for Work of Division 16. If the municipality is structured as a "single permit jurisdiction", the Contractor will apply, pay for and obtain the municipal building permit. In this case, the Division 16 contractor has no financial obligation for permit application except for permits not covered in the "single permit".

.2 Arrange for inspection of all Work by the Authorities having jurisdiction over the Work. On completion of the Work, present to the Consultant the final unconditional certificate of approval of the inspecting Authorities.

.3 Comply with the requirements of the latest edition of the applicable CSA standards, the requirements of the Authorities, Federal, Provincial and Municipal Codes, the applicable standards of the Underwriters' Association and all other Authorities having jurisdiction. These codes and regulations constitute an integral part of these specifications.

.4 In case of conflict, the codes take precedence over the Contract Documents. In no instance reduce the standard or scope of work or intent established by the drawings and specifications by applying any of the codes referred to herein.

.5 Before starting any work, submit the required number of copies of drawings and specifications to the Authorities for their approval and comments. Comply with any changes requested as part of the contract, but notify the Consultant immediately of such changes. Prepare and furnish any additional drawings, details or information as may be required.

1.6 Contract drawings

.1 The Drawings for Electrical work are performance drawings, diagrammatic, intended to convey the scope of work and indicate general arrangement and approximate location of apparatus, fixtures and pipe runs. The Drawings do not intend to show architectural and structural details.

.2 Do not scale Drawings. Obtain information involving accurate dimensions from dimensions shown on Architectural and Structural drawings, and by site measurement.

.3 Make, at no additional cost, any changes or additions to materials, and/or equipment necessary to accommodate structural conditions (conduits or ducts around beams, columns etc.)

.4 Alter, at no additional cost, the locations of materials and/or equipment as directed that do not necessitate additional material.

.5 Install ceiling mounted components (e.g. light fixtures, speakers, heat or smoke detectors) in accordance with reflected ceiling drawings.

.6 Confirm on the site the exact location and mounting elevation of outlets and fixtures as related to architectural and structural details.

1.7 Examination of site and documentation

.1 Prior to submitting tender, carefully examine conditions at the site which could affect the Work. Refer to and examine all contract documents.

.2 Be responsible for any damage done to existing underground services caused by neglect to determine and mark out the location of such services prior to excavation work commencing.

.3 Refer also to room finish schedules to determine finished, partially finished and unfinished areas of the building.

.4 Ensure that materials and equipment are delivered to the site at the proper time and in such assemblies and sizes so as to enter into the building and to be moved into the spaces where they are to be located without difficulty. Be responsible for any cutting and patching involved in getting assemblies into place.

.5 Visit and inspect the site of the work to verify location and elevation of existing services which may affect the Tender and Work of this Division (water, electrical, sanitary, storm sewers, equipment, ductwork, piping, structure, etc.)

1.8 Construction drawings

.1 Prepare drawings in conjunction with all trades concerned, showing sleeves and openings for passage through structure, and all inserts, equipment bases, sumps, pits and supports, and relate these to suitable grid lines and elevation datum.

.2 When requested, provide weights of major items of equipment.

.3 Prepare interference and co-ordination drawings for all areas where the work of this Division could conflict with and/or obstruct the work of other trades and/or other Sections of this Division. Submit drawings for acceptance by the Consultant.

1.9 Shop drawings

.1 Conform with the Ontario Standards.

.2 Submit shop drawings for items and equipment specified in sections of Division 16.

.3 Present a schedule of shop drawings not later than two weeks after the award of the Contract, indicating drawing submission and equipment delivery dates.

.4 In addition to project identification, data, etc. the form of stamp used in drawing review will contain the following format:

.1 Drawing: Reviewed ( )

.2 Reviewed as modified ( )

.3 Revise and Resubmit ( )

.4 Not reviewed ( )

.5 This stamp will be applied by the Consultant to each and every shop drawing.

.5 This review by the Consultant is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean

that the Consultant approved the detail design inherent in the shop drawings, responsibility for which shall remain with this Subcontractor submitting same, and such review shall not relieve this Subcontractor of his responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the contract documents. This Subcontractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the work of all sub-trades as well as compliance with codes and inspection authorities such as CSA, etc.

.6 For equipment provide performance, physical and operating data as described in the specifications and listed in equipment schedules.

.7 Identify the equipment by system name and number e.g. "lighting fixture type F3," "distribution panel DSHA" etc.

.8 Bind one complete set of checked shop drawings in each operating and maintenance instruction manual.

1.10 Record drawings

.1 Obtain a set of white prints and as the job progresses, mark this set to accurately indicate installed work. Show location by dimension from walls or columns for all buried services as well as invert depths, etc. Always have these white prints available for inspection at the site, and present for scrutiny at each job meeting.

.2 Transfer all information from the white prints to the set of sepias supplied by the Consultant on completion of the work.

.3 The Consultant will prepare a final CADD record of the project using the above drawings and with the assistance of the contractor.

1.11 Product standards and alternatives

.1 Provide new material and equipment as specified and to acceptance of the Consultant. Manufacturer's names are listed to set a standard of quality, performance, capacity, appearance and serviceability. Other acceptable manufacturers are also listed, and their names may be used in the submission of the Tender subject to conditions stipulated in paragraph .3 of this article.

.2 Where no other acceptable manufacturers are indicated, provide the exact make specified. Requests for acceptance of manufacturers not listed must be submitted not less than seven working days prior to closing date of the tender, and submissions must bear proof of acceptance by the Consultant if used in the tender.

.3 Assume full responsibility for ensuring that when providing other acceptable manufacturers all space, weight, connections, power and wiring requirements, etc. are considered, and costs therefore included in the tender. Equipment requiring greater than specified energy requirements or unduly limiting service space requirements will not be accepted.

.4 All electrical equipment, material, wiring and devices to conform to the Canadian Electrical Code for the purpose for which they are to be used and bear the approval of the CSA or have special approval of the inspection authority. All equipment to be designed and manufactured in accordance with applicable EEMAC and ANSI specifications.

1.12 Temporary Service

.1 Temporary power is not included in the work of Division 16.

.2 Do not use any of the permanent Electrical Systems during construction unless specific written approval is obtained from the Consultant.

.3 The use of permanent facilities for temporary construction service will not affect in any way the commencement day of the warranty period.

1.13 Patents

.1 Pay all royalties and licence fees, and defend all suits or claims for infringement of any patent rights, and save the Owner and Consultant harmless of loss or annoyance on account of suit, or claims of any kind for violation or infringement of any letters, patent or patent rights, by this Subcontractor or anyone directly or indirectly employed by him or by reason of the use by him or them of any part, machine, manufacture or composition of matter on the work, in violation or infringement or such letters, patent or rights.

1.14 Rights Reserved

.1 Rights are reserved to furnish any additional detail drawings, which in the judgement of the Consultant may be necessary to clarify the work, and such drawings shall form a part of this contract.

1.15 Equipment nameplates

.1 Provide apparatus (including electric motors) with proper nameplates affixed thereto, showing the size, name of equipment, serial number and all information usually provided, which also includes voltage, cycle.

1.16 Expediting

.1 Continuously check and expedite delivery of equipment and materials. If necessary, inspect at the source of manufacture.

.2 Continuously check and expedite the flow of necessary information to and from all parties involved.

.3 Immediately inform the Consultant in case information is required from him.

.4 Provide delivery records updated monthly.

1.17 Superintendence

.1 Maintain at the job site, at all times, qualified personnel and supporting staff, with proven experience in erecting, supervising, testing and adjusting projects of comparable nature and complexity.

.2 The supervising personnel and their qualifications are subject to the approval of the Consultant.

1.18 Trial usage and tests

.1 The Owner has the privilege of the trial usage of electrical systems or parts thereof for the purpose of testing and learning the operational procedures.

.2 Assist in trial usage over a length of time as deemed reasonable by the Consultant at no extra cost and do not waive any responsibility because of trial usage.

.3 Trial usage shall not be construed as Substantial Completion of the Work.

.4 Provide and pay for all testing required on the system components where, in the opinion of the Consultant manufacturers ratings or specified performance is not being achieved.

1.19 Cleaning

.1 Before energizing any systems, inspect and clean the inside of panel boards, switchgear and cabinets to ensure that they are completely free from dust and debris.

.2 Clean all polished, painted and plated work bright. Clean all lighting fixtures.

.3 Remove all debris, surplus material and all tools.

.4 Carry out additional cleaning operating of systems as specified in other sections of this Section.

1.20 Completion

.1 Leave Electrical work in specified working order.

1.21 Warranties

.1 Provide warranty certificates, wherever given or required, in excess of the normal warranty period showing the name of the firm giving the warranty, dated and acknowledged, on specific equipment and systems.

1.22 Instruction to Owners

.1 Instruct the Owner's representatives in all aspects of the operation of systems and equipment.

.2 Arrange for and pay for services of service engineers and other manufacturers' representatives required for instruction on specialized portions of the installation.

.3 Submit to the Consultant at the time of final inspection a complete list of systems stating for each system:

.1 Date instructions were given to the Owner's staff.

.2 Duration of instruction.

.3 Name of persons instructed.

.4 Other parties present (manufacturer's representative, consultants, etc.).

.4 Signature of the Owner's staff stating that they properly understood the system installation, operation and maintenance requirements.

1.23 Documentation and systems acceptance

.1 Assemble three copies of operating and instruction manuals in three ring binders with index tabs each containing this subcontractor's and supplier’s names and telephone numbers.

.2 Each manual shall contain the following data:

.1 A set of as-built prints;

.2 Letters of Owners Instructions (Refer to Section 1.22);

.3 Final Hydro Certificate;

.4 A copy of each "reviewed" shop drawing;

.5 Complete explanation of operation principles and sequences;

.6 Complete part lists with numbers;

.7 Recommended maintenance practices and precautions;

.8 Complete wiring and connections diagrams.

.9 Certificate of warranty.

.10 Representative certificates for: Fire Alarm System, Emergency Lighting System

.3 Ensure that operating and maintenance instructions are specific and apply to the models and types of equipment provided.

1.24 Owner Right to Relocate Electrical Items

.1 The Owner reserves the right to relocate electrical outlets at a later date, but prior to installation, without cost, assuming that the relocation per outlet does not exceed 3000mm from the original location. No credits shall be anticipated where relocation per outlet of up to and including 3000mm reduces materials, products and labour.

.2 Should relocations per outlet exceed 3000mm from the original location the Contract Price will be adjusted accordingly.

.3 Necessary changes, due to lack of co-ordination, and as required and when approved, shall be made at no additional cost, to accommodate structural and building conditions. The location of pipes and other equipment shall be altered without charge to the Owner, if approved, provided the change is made before installation.

1.25 Electrical list of manufacturers, subtrades and prices

.1 The electrical work will be a part of GC work and should be included in GC bid documents.

1.26 Cash allowances

.1 Cash allowances are carried by Division One.

1.27 Municipal and Utility Services

.1 Coordinate, arrange, and pay for (from cash allowances) all utility connections and fees as required and shown on the drawings, complete with all required metering. Install all metering equipment in accordance with municipal or utility requirements.

1.28 Phasing and Scheduling of Work

.1 Refer to Division 1 for a detailed description of the phasing and scheduling of the work. Execute work in accordance with the phasing and construction schedule. Provide all necessary temporary connections and equipment to provide functional, operational systems during construction period when part of the building will be occupied and construction is still continuing in other portions.

1.29 Materials Furnished by Others

.1 Where materials are furnished by others for installation under this Division, the Sub-Contractor shall notify the supplier of dates he will be ready for delivery as specified in the General Conditions. The Sub-Contractor shall receive, unload, handle, store, protect and insure the material until ready for actual installation. Upon receipt of material furnished by others, the Sub-Contractor shall spot-check or check the entire shipment and promptly advise the Architect/Engineer in writing of any damage and/or missing components. Any material which is subsequently lost or damaged

due to negligence on the part of the Sub-Contractor shall be promptly replaced (or repaired to the satisfaction of the Owner) at the Sub-Contractor's expense.

1.30 Connections to Equipment Furnished by Others

.1 Where the Drawings indicated equipment to be furnished by others, provide Electrical rough in for each unit pursuant to its shop drawings, and make final connections, disconnect switches and other electrical facilities for a complete installation.

2 Products – not used

3 Execution – not used

End of section

1 General

1.1 Section includes

.1 Fire alarm control panel.

.2 Fire alarm initiating and signaling devices.

.3 Auxiliary fire alarm equipment and wiring.

1.2 Related requirements

.1 Section 26 05 21 – Wires and cables (0 – 1000V).

1.3 Reference standards

.1 The 2012 Ontario Building Code (OBC) Division “A”, sentence 1.1.2.6.(1) The project involves alterations to the existing building fire alarm system as per the 2012 OBC, Division “B”, sentence 11.3.1.1.(1).

.2 CAN/ULC-S524-14 - Standard for the Installation of Fire Alarm Systems.

.3 CAN/ULC-S537-13 - Standard for the Verification of Fire Alarm Systems.

.4 2018 Ontario Electrical Safety Code (27th Edition).

1.4 Submittals

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheets. Include product characteristics, performance criteria, and limitations.

1.5 System description

.1 There is a sole source requirement for the products within this section. Refer to Products below for suppliers and equipment.

.2 Refer to drawings for control schematics for system architecture.

.3 Work covered by sections referred to above consist of fully operational Fire Alarm System, including, but not limited to, following:

.1 Control panel.

.2 Complete operating and maintenance manuals.

.3 Training of personnel.

.4 Acceptance tests, technical support during commissioning, full documentation.

.4 Design Requirements:

.1 Design and provide conduit and wiring linking elements of system.

.2 Supply sufficient devices of types to meet project requirements.

2 Products

2.1 Control panel

.1 Control panel is to be configured as a single staged system equipped with an alarm and supervisory LED Annunciator.

.2 A new fire alarm annunciator panel shall be equipped with an alarm and supervisory LED annunciation, shall be installed in the main entrance vestibule.

2.2 Horn devices

.1 New horn devices to be selectable type horn or horn/strobe signal devices. All visual strobe candela settings are to be pre-set as denoted on the drawings.

2.3 Synchronize modules

.1 Supply and install Synchronize Modules to accommodate all horn and horn/visual strobe signal circuits as required. All new signal devices are to be pre-set to a temporal pattern signal at the device and configured a continuous signal at the control panel.

2.4 Smoke detectors

.1 Provide smoke detectors with conventional Mircom Photo Electric type smoke detectors.

2.5 Heat detectors

.1 Provide new Mircom type.

2.6 Sprinkler flow and supervisory valve switches

.1 NA

2.7 End of line resistors

.1 NA

2.8 Manual pull stations

.1 NA

3 Execution

3.1 General

.1 Execute work in accordance with all project requirements and/or control guidelines.

3.2 Manufacturer's instructions

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

3.3 Existing system

.1 NA

3.4 Sequence of operation

.1 NA

3.5 Acceptance Tests

.1 The installing contractor shall hire a third-party company to provide the verification as per CAN/ULC-S537-13, Section 6, system modifications.

.2 The verification shall utilize the control panel for shorts, opens and ground faults.

.3 Once reviewed and accepted, the design engineer will attend the site to conduct a final acceptance review of the installation.

.4 Once the site review is accepted, the design engineer will provide an acceptance letter as part of a package for the scheduled AHJ site review.

.5 The installing contractor shall provide at least two separate tests, one for the design engineer and the other for the final acceptance test for the AHJ.

.6 (Where required) the installing contractor is responsible for completing CAN/ULC-S1001-11 Integrated System Testing of Fire Protection and Life Safety Systems.

3.6 Documentation

.1 The installing contractor is required to provide the following documentation to be reviewed by the design engineer prior to the site review test. Once approved the final documentation including the design engineer's letter of acceptance will be forwarded to the local Building Department prior to final inspection to close out the permit:

.1 Equipment data sheets including manufacturer specifications for all new equipment.

.2 Copy of the CAN/ULC-S537 verification report as per Section 7, System Modifications.

.3 (Where required) copy of the CAN/ULC-S1001-11 Integrated System Testing Fire Protection and Life Safety Systems Report.

.4 Letter from the installation contractor stating that the system was installed per CAN/ULC-S524:2014.

.5 Copy of the Electrical Safety Association (ESA) Certificate.

.6 Copy of the manufacturer's warranty letter.

3.7 Cutting and patching

.1 All cutting and patching of existing walls are to be the responsibly of the awarded contractor hired to provide all cutting and patching work.

.2 All cutting and patching is to comply with the Designated Substance Survey (DSS) document that is supplied to the awarded contractor by the Regional Municipality of Durham.

3.8 Firestopping

.1 The awarded contractor hired to provide fire stopping repair and/or installation is required to notify the consultant of all locations where an opening has been made through a fire separation within the building.

.2 The contractor is required to provide the consultant with information on the product(s) being used (i.e. manufacturer's data sheets, SDS, etc.) and ULC listed design(s) prior to installation.

.3 The awarded contractor is responsible for supply and install of the appropriate firestopping materials.

End of section

1 General

1.1 Section includes

.1 This section includes site clearing, rough grading, excavation and backfilling, including all demolition and removal of work shown on the drawings.

1.2 Quality assurance

.1 All aspects of wall installation are to be certified by a geotechnical engineer.

1.3 Product delivery, storage & handling

.1 Stockpile fill materials in locations designated by the Owner.

2 Products

2.1 Materials

.1 General fill material: Clean, free from debris, organic matter and other deleterious material.

.2 Granular fill material: As called for on the drawings and conforming in all respects with OPSS 1000 and 1010, latest edition.

3 Execution

3.1 Demolition, site clearing & removals

.1 Excavate to remove the existing walls & paving where shown on the drawings and dispose of material off the site.

.2 Removal includes granular base course material to existing sub-grade unless approved by the Owner for re-use on the site.

.3 Remove material without damaging adjacent pavements which are to remain. Make clean, sharp saw cut before starting removal work. Be responsible for making good damaged surfaces.

.4 Remove other materials and surfaces as indicated on the drawings.

3.2 Rough grading

.1 Cut back areas that are to be lowered to the grades shown on the drawings.

.2 Provide finished rough grade parallel to finished grade, allowing for the placing of the specified surface material and base and to a tolerance of plus or minus 50 mm, and compacted to 98% Standard Proctor Dry Density under areas to be paved.

3.3 General excavation

.1 Stake out the locations of all items requiring excavation and obtain the approval of the Owner before commencing work.

.2 Dispose of excavated material off site unless it is approved for use as fill material or backfilling material by the Owner.

.3 Excavate to the elevations and dimensions indicated or required for construction work. All depths detailed are shown as depth after compaction.

.4 Obtain the approval of the Owner of all excavations before proceeding with construction activities.

.5 Test subsoil as required by the certifying engineer and report results immediately to the owner.

.6 Required excavations exceeding that shown on the drawings, if authorized in writing by the Owner, will be paid as extra to the contract price in accordance with the General Conditions. Quantities will be calculated in place. Truck load measurement is not acceptable.

.7 Fill extra excavations with concrete or as directed.

.8 Correct unauthorized excavations at no extra cost.

3.4 Backfilling

.1 Do not commence backfilling until work has been approved by the Owner.

.2 Ensure areas to be backfilled are free of debris, snow, ice water or frozen ground.

.3 Place specified fill materials in continuous horizontal layers not exceeding 225 mm loose depth and compact to 98% Standard Proctor Dry Density.

.4 Make good any settlement or subsequent damage to adjacent structures or to other work under this contact caused by improper or inadequate compaction.

End of section

1 General

1.1 Section includes

.1 Design and installation of temporary shoring and hoarding work as required carrying out the work to the full intent of the Drawings and Specifications.

.2 Shoring work to be designed and installed by the Contractor to support the existing structure, soil, etc. as required prior to commencing construction of retaining walls.

1.2 Quality assurance

.1 Provide at least one person, in charge of execution, thoroughly familiar with shoring work, and the best methods of installing them.

1.3 Submittals

.1 Submit ACAD file, plus PDF file of drawings showing details of any proposed shoring work systems, prior to the commencement of work.

.2 Drawing submitted to show the plan location of all shores, together with elevations and cross sections, to fully and adequately describe the shoring for the intended work. The nature and intensity of the applied loads, their points of applications, their bearing pressures, and the type of shores or shores together with their ultimate and safe working loads to be clearly indicated on the plans. The procedural sequence to be followed for shoring installations is also be shown. The submitted drawings to bear signature and stamp of the professional engineer registered in the Province of Ontario who designed the work.

.3 Drawings submitted will be reviewed only for general compliance with the design intend and for general dimensions, with any comments made following that review being intended to assist the Contractor in preventing errors.

.4 Review of the drawings submitted does not relieve the Contractor of the responsibility for the design, adequacy and safety of all shoring support.

.5 Submit written confirmation, signed by the Engineer responsible for the shoring design, that he/she has inspected the shoring installation and the installation meets the design intent.

2 Products

2.1 Materials

.1 Select materials for shoring and hoarding work which comply with the requirements of the Ontario Building Code and other applicable regulations and bylaws.

3 Execution

3.1 Temporary shoring and hoarding work

.1 Assume full responsibility for the design, adequacy, and safety of all temporary shoring, hoarding and support structures.

.2 Shoring, hoarding and support structures to be designed and constructed to comply with the requirements of the Ontario Building Code and other applicable regulations and bylaws.

.3 Engage the services of the Professional Engineer registered in the Province of Ontario, experienced in this type of work, to design the shoring, hoarding and support system and prepare all necessary drawings. Employ the same Engineer to inspect the site installation of the shoring and satisfy him that the installation is according to his design.

.4 The location, type and sizing of the shoring system required limiting displacement of adjacent existing structures and ground surface to tolerable amounts is the responsibility of the Contractor.

.5 Any shoring and hoarding required to be inclusive to the contract and no further or separate payment to be made.

End of section

1 General

1.1 Section includes

.1 This section specifies asphalt paving.

1.2 Quality assurance

.1 The contractor must have a minimum of 5 years' experience in asphalt paving work.

.2 Plants providing asphalt paving mixture under this contract must conform to OPSS 310-04-02 to 04 inclusive.

.3 Spreading equipment must meet the requirements of OPSS 310-04-05 to 07 inclusive.

.4 All asphalt paving work must be carried out to the OPSS 310-05-01 to 07 inclusive.

.5 Provide a copy of all subsections, listed above, on site at all time.

.6 Testing of asphalt cement, when required by the Owner, will be carried out, at no extra cost to the contract and will be executed in accordance with ASTM D-140, latest edition.

.7 Testing of asphalt emulsion, when required by the Owner, will be carried out, at no extra cost to the contract and will be carried out in accordance with ASTM-D244. Sampling procedures will follow ASTM-D140.

.8 Engage an independent, approved testing firm to carry out compaction tests on the completed granular base, one test per 50 m2 of area. Submit 2 copies of the test results to the Owner and obtain his approval prior to commencing asphalting operations. Pay all testing costs.

.9 Ensure that asphalt cement, asphalt primer and asphalt emulsion conform to the standards set out in the drawings and specifications.

1.3 Product delivery, storage & handling

.1 Store granular materials in areas designated by the Owner.

.2 Minimum temperature of asphalt is to be 1300C immediately after spreading and prior to rolling.

1.4 Job conditions

.1 General Do not commence paving operations unless the surface temperature is steady at,or rising above 20C.

.2 Proceed with paving operations only during favorable weather conditions and on a dry base.

.3 Suspend all paving operations if the temperature drops below 20C.

.4 Spread subsequent paving courses within 12 hours after spreading and compaction of the previous course.

.5 Protect all adjacent areas and structures, particularly planted areas, from contamination by asphalt materials. Make good all damage.

1.5 Inspection

.1 Stake out paving locations and obtain approval from the Owner before proceeding.

.2 Obtain approval from the Owner of the finished sub-grade before proceeding.

.3 Obtain approval from the Owner of the paving base before proceeding.

2 Products

2.1 Materials

.1 **Granular A:** Granular material conforming in all respects with OPSS 1010. Removal includes granular base course material to existing sub-grade unless approved by the Owner for re-use on the site.

.2 **Granular B:** Granular material conforming in all respects with OPSS 1010. Remove other materials and surfaces as indicated on the drawings.

.3 **Coarse aggregates:** A crushed rock, slag or gravel or combination thereof, free of clay, silt and other deleterious materials.

.4 **Fine aggregates:** Composed of clean, hard, durable particles of natural sand, manufactured sand or screenings resulting from the crushing of rocks, stone or gravel and free of clay, slit or other deleterious materials. fine aggregate for HL3 and HL4 must contain a minimum of 10% passing the 10 mm screen and retained on the #4 sieve.

.5 **Mineral filler:** Finely ground particles of limestone, hydrated lime or other mineral dust approved by the owner, free of clay, silt and other deleterious material.

.6 **Asphalt cement:** Conforming in all respects with OPSS 310-1150.

.7 **Joint painting material:** Slow setting asphalt emulsion, type SS-1 conforming to OPSS 306.

.8 **Line marking paint:** As indicated in Section 32 17 23.

2.2 Mixes

.1 **Paving mixture:** A hot mix, hot laid asphaltic concrete, of the type specified, and installed to the minimum compacted thickness shown on the drawings and composed of coarse and find aggregates, mineral filler, and asphalt cement uniformly mixed.

3 Execution

3.1 Preparation

.1 Fine grade subgrade eliminating uneven areas and filling low spots. Remove all debris. Excavate all soft and unstable areas in sub grade and backfill with Granular A.

.2 Compact finished sub grade to 98% Standard Proctor Dry Density.

3.2 Installation

.1 Spread the specified granular materials in horizontal layers not exceeding 100 mm loose depth and compact to 95% Standard Proctor Dry Density. In areas where compaction by roller is not possible, compact with approved mechanical or hand tamping devices to the specified density.

.2 Ensure that granular does not become contaminated by deleterious material.

.3 Build up thickness of each material to the minimum compacted thickness as specified on the drawings.

.4 Correct all irregularities or depressions resulting from rolling and compact until the granular surface is smooth, uniform and true to line and grade.

.5 Paint all curbs, gutters walls, vertical faces of existing pavement, and all structures in actual contact with the new asphalt with a sealing coat of SS-1 emulsion. Provide a closely bonded, water tight joint.

.6 Lay and spread all paving courses by means of approved equipment. Base course of asphalt must be laid by hand to protect the snowmelt tubing (Hydronic Snow Melt System). Compact by machine.

.7 Immediately after spreading and screening, check the surface and correct all irregularities before compacting.

.8 Ensure all joints are straight, clean, vertical and free of broken or loose materials. Cut back existing asphalt to provide a clean vertical surface. Paint the vertical surfaces of all joints with a thin, continuous coating of type SS-1 emulsion.

.9 Compact each paving course, with approved rolling equipment, to 97% Standard Proctor Dry Density, or greater. Begin compaction operations as soon as possible after placement when asphalt will bare the weight without checking or undue displacement. Keep roller wheel moist so as not to pick up material. Keep all equipment clean and in good condition.

.10 Carry out compaction in 3 operations in close sequence:

.1 "Breakdown" rolling with two wheeled rollers as soon as possible after spreading.

.2 Rolling with pneumatic tired or tandem rollers immediately after the first rolling to achieve the minimum specified density.

.3 Final rolling with two or three axle tandem rollers to remove roller marks.

.11 Hand tamp with hot tampers in areas not accessible to rolling equipment.

.12 Hand tamp all edges adjacent to grass or planting beds to a 45 0 angle. Establish straight edge by the use of a string line. Where edge is not straight, lay in a smooth curve to the radii indicated. Where finished edge is not satisfactory, at the option of the Owner, the edge may be repaired by saw cutting to a 45 0 edge to the required line. Cut edge must be painted with liquid asphalt.

.13 After final rolling, surfaces shall be smooth and true to the specified grade and crown with the thickness of the courses varying no more than 6 mm

from that shown on the drawing. At the option of the Owner, unsatisfactory surface roughness on the asphalt may be corrected by the application of a coat of hot liquid sealer, at the contractor's expense.

.14 Ensure a minimum surface slope of 1.5% or as specified, away from edges and curbs and towards catch basins on all asphalt re-surfacing operations.

.15 Ensure the surface is free from depressions greater than 6 mm under a 3000 mm straight edge.

3.3 Line painting

.1 At the completion of asphalting operations, apply the traffic markings as indicated on the drawings. All markings are to be yellow.

.2 Avoid splashing or spattering paint on the surface.

3.4 Clean-up

.1 At the completion of asphalt operations and prior to final inspection, clean all curbs, catch basins, manhole covers, walls, and other structures to remove contamination by asphaltic or other materials resulting from the work.

End of section

1 General

1.1 Section includes

.1 Paint new parking lines, directional arrows, hatching, new concrete curbs, etc. on the parking as indicated on the Drawings

.2 Remove existing traffic paint on edges of all existing curbs and islands on all parking levels, prepare concrete surface and repaint with yellow traffic paint as directed by Consultant and indicated on Drawings.

1.2 Performance Requirements

1. The traffic line painting performed under this Contract shall satisfy the following requirements:

   .1 The paint shall not debond or peel off the substrate it is applied to.

   .2 The paint shall not crack, mark or wear unduly under normal use and maintenance.

   .3 General appearance and colour of the paint shall have satisfactory ratings (7 or higher according to ASTM D713) after one (1) year of service.

   .4 The final system must not reduce the skid resistance of the surface to which the coating is applied. Do not over apply.

2 Products

2.1 Compatibility

.1 Line paint is to be suitable for traffic applications and compatible with finished surfaces and selected surface waterproofing system.

2.2 Approved Products

1. General Paint Type 78020 (yellow) Set fast acrylic traffic marking paint as manufactured by Sherwin Williams Company.

2. Slab surface line painting shall be in accordance with Ontario Provincial Standard Specifications 1716 Material Specification for Water-Borne Traffic Paint or 1712 Material Specification for Organic Solvent Based Traffic Paint.

3. Slab surface traffic direction arrows should be painted in yellow or white paint as directed by the Owner

2.3 Paint Finish

.1 The parking stall lines shall be painted in yellow or white as directed by the Owner

3 Execution

3.1 Preparation

.1 Clean all surfaces prior to painting. Remove all surface contaminants such as oil, grease, dirt, foreign matter, rust, mould, mildew, mortar, efflorescence, and loose paint to ensure adequate bonding.

.2 Follow all other Manufacturer’s recommended cleaning and surface preparation procedures.

3.2 Installation

.1 Ensure surfaces to receive coating are sufficiently dry and fully cured.

.2 Provide adequate ventilation and sufficient heating facilities to maintain temperatures above 7°C for 24 hours before, during and 48 hours after application.

.3 Supply paint in two (2) coats of 10 mils (250 micrometer) dry film thickness per coat using mechanical applicator or line stencil. Additional coats may be required at Contractor’s expense to provide a uniform finish due to porosity of substrate.

.4 Contractor to follow Manufacturer’s recommended application procedures including drying time between subsequent coats.

.5 Finished line markings shall be 100 mm wide, straight, of uniform width and free of overspray. Overspray to be removed at no additional cost to Owner as directed by Consultant.

.6 Ensure wet paint is protected

End of section

1 General

1.1 Section includes

.1 This section specifies the installation of chain link fencing. This section shall compliment OPSD -972.130, Co-ordinate work with all other sections and trades.

1.2 Submittals

.1 Submit product data in the form of manufacturer's technical data, specifications, and installation instructions for fences. Shop drawings of fences and gates with all dimensions, details, and finishes. Drawings must include post foundations.

.2 Submit shop drawings showing location of fence and gates, including each post, details of post installation, hardware, and accessories. Show sizes and thicknesses of all members, types of materials, methods of connection and assembly, complete dimensions, clearances, anchorage, relationship to surrounding work, and other pertinent details of fabrication and installation.

.3 Furnish samples of each type, texture, and color of concrete wall panel for Region’s representative to provide approval prior to installation.

1.3 Product delivery, storage & handling

.1 Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism, and theft.

.2 Store materials only in locations designated by the Owner and/or the Region’s Project Manager.

2 Products

2.1 Fence fabric

.1 No. 9 gauge steel wire woven in a 50 mm mesh, hot dipped galvanized after weaving and knuckled finish top and bottom selvage edges. Galvanized fabric to have a minimum zinc application of 450 g per sq. meter of surface area.

2.2 Posts

.1 Standard butt-welded Schedule 40, ATM 120, galvanized pipe. Supply according to the following height schedule:

- .1 Line Posts:
  - .1 Under 1.8m fence height:
    - .1 48 mm O.D.
    - .2 3.7 mm wall thickness
    - .3 850 mm longer than fabric height.
  - .2 1.8m fence height:
    - .1 60 mm O.D.
    - .2 3.9 mm wall thickness
    - .3 1075 mm longer than fabric height.
- .2 End, Corner & Gate Posts
  - .1 Under 1.8m fence height:
    - .1 60 mm O.D.
    - .2 3.9 mm wall thickness
    - .3 1075 mm longer than fabric height.
  - .2 1.8m fence height:
    - .1 89 mm O.D.
    - .2 5.5 mm wall thickness
    - .3 1200 mm longer than fabric height.
- .3 No tubing, conduit or open seam material will be accepted.

2.3 Post tops

.1 Non-decorative aluminum caps or equivalent approved by the Region's Project Manager, securely attached to eliminate removal by hand and allowing for the insertion of 42 mm top rail in a horizontal position for fencing 1.8m heights and 33 mm top rail for fences under 1.8 m height.

2.4 Top Rails

.1 42 mm O.D., 3.5 mm wall thickness Standard butt-welded, galvanized pipe or high strength hollow structural steel, 2.5 mm (0.1") wall, pipe with mechanical properties similar to ASTM 120 for fencing 1.8 m height and

33 mm O.D. pipe, 3.4 mm wall thickness for fencing under 1.8 m height. No tubing, conduit or open seam material will be accepted.

2.5 Gates

.1 Greater than 1.0 m wide unless detailed otherwise with frames constructed of 48.3 mm O.D. Standard butt-welded, all joints electrically welded, and hot dipped galvanized after fabrication, complete with galvanized malleable iron hinges, and 3-piece drop latch. Gate lock hardware for standard 1 ½" size padlock (lift latch one side, eye bolt one side) Hinges to allow 180 0 gate swing. Gate braces to be 33 mm O.D., 3.2 mm wall thickness galvanized pipe, if required. Double swing gates to be complete with one foot bolt.

2.6 Tension Wire

.1 No. 9 gauge galvanized wire.

2.7 Concrete

.1 Ready mix or hand mixed on site with mechanical mixer 3:1 ratio, minimum 25 MPa strength, no air, 75 mm slump placed in Sono tubes, or approved equivalent.

3 Execution

3.1 Fence Installation

.1 Match existing fence height (8') and connect to existing posts.

.2 Provide all new material unless directed otherwise.

.3 Post spacing to be a maximum of 3.0 m on centre.

.4 Provide post footing according to the following schedule (minimum dimensions):

.1 End, Corner & Gate Posts

.1 Under 1.8m fence height:

.1 Diameter: 300mm

.2 Depth:1200mm

.2 1.8m fence height:

.1 Diameter: 350mm

.2 Depth:1500mm

.5 Set posts in concrete footings to the height required. Top of footings to be at finished grade. Footings to be installed below frost line in sono tubes, or approved equivalent..

.6 Join adjacent pieces of top rail with outside sleeve type coupling at least 175 mm long, to form a continuous top rail. Secure top rail at corner and gate posts using a receptacle coupier.

.7 Main posts to be in concrete footings; refer to OPSD 972.130 Post hole material to be removed from site; Do not spread on site.

.8 Line posts to be driven to a minimum depth of 1.83m (6 ft.).

.9 Install tension wire, stretch taut and secure to posts, top rail and tension wire with No. 16 gauge galvanized wire twists.

.10 Install fabric, stretch taut, and secure to posts and top rail with 9-gauge aluminum hog ties.

.11 Ensure space between bottom of fabric and ground is no greater than 50 mm in any location. Where required by abrupt changes in grade, bottom edge of fence may be buried up to 50 mm.

.12 Install fence on predetermined lines established with the site survey and consulting with the Owner or the Region’s representative.

End of section

1 General

1.1 Section includes

.1 The work covered by this section includes the furnishing of all labor, materials, equipment and incidentals for the design, inspection and construction of a modular concrete retaining walls including drainage system and reinforcement as shown on the Construction Drawings and as described by the Contract Specifications. The work included in this section consists of, but is not limited, to the following:

- .1 Design, inspection and certification by a registered professional engineer. The Design Engineer may be a different individual or firm from the Certifying Engineer.
- .2 Excavation and foundation soil preparation.
- .3 Furnishing and placement of the leveling base.
- .4 Furnishing and placement of the drainage system.
- .5 Furnishing and placement of geotextiles.
- .6 Furnishing and placement of segmental retaining wall facing units.
- .7 Furnishing and placement of geosynthetic reinforcement.
- .8 Furnishing and compaction of infill, drainage and retained soils.
- .9 Furnishing of final grading to ensure water is directed away from the wall.

1.2 References standards

.1 Engineering Design:

- .1 NCMA Design Manual for Segmental Retaining Walls, Second Edition.
- .2 NCMA TEK 2-4 - Specifications for Segmental Retaining Wall Units.
- .3 NCMA SRWU-1 - Determination of Connection Strength between Geosynthetics and Segmental Concrete Units.
- .4 NCMA SRWU-2 - Determination of Shear Strength between Segmental Concrete Units.

.2 Segmental Retaining Wall Units

.1 ASTM C 140 - Sampling and Testing Concrete Masonry Units

.2 ASTM C 1262 - Evaluating the Freeze - Thaw Durability of Manufactured Concrete Masonry Units and Related Concrete Units.

.3 ASTM C 33 - Specification for Concrete Aggregates

.4 ASTM C 90 - Standard Specification for Load-Bearing Concrete Masonry Units

.5 ASTM C 150- Specification for Portland Cement

.6 ASTM C 595 - Specification for Blended Hydraulic Cements

.3 Geotextile Filter

.1 ASTM D 4751 - Standard Test Method for Apparent Opening Size

.4 Geosynthetic Reinforcement (Applicable for structures designed with geogrid reinforcement)

.1 ASTM D 4595 - Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method. 2 May 2006

.2 ASTM D 5262 - Test Method for Evaluating the Unconfined Creep Behavior of Geosynthetics.

.3 GRI GG-1: Single Rib Geogrid Tensile Strength

.4 GRI GG-5: Geogrid Pullout

.5 GRI GT-6: Geotextile Pullout

.5 Soils

.1 ASTM D 698 - Moisture Density Relationship for Soils, Standard Method

.2 ASTM D 422 - Gradation of Soils

.3 ASTM D 424 - Atterberg Limits of Soils

.4 ASTM D G51 - Soil pH

.6 Drainage Pipe

.1 ASTM D 3034 - Specification for Polyvinyl Chloride (PVC) Plastic Pipe

.2 ASTM D 1248 - Specification for Corrugated Plastic Pipe

.7 Where specifications and reference documents conflict, the Owner or Owner's Representative shall make the final determination of applicable document.

1.3 Approved products

.1 Siena Smooth Segmental Retaining Wall System as supplied by the Risi Stone Systems, or reviewed equivalent.

.2 Color and finish shall be as directed by the Owner or as shown in the Drawings

1.4 The contractor

.1 The term Contractor shall refer to the individual or firm who will be installing the retaining wall.

.2 The Contractor must have the necessary experience for the project and have successfully completed projects of similar scope and size.

1.5 Delivery, material handling and storage

.1 The installing contractor shall check all materials delivered to the site to ensure that the correct materials have been received and are in good condition and meet the required dimensional tolerances.

.2 The Contractor shall store and handle all materials in accordance with manufacturer’s recommendations and in a manner to prevent deterioration or damage due to moisture, temperature changes, contaminants, breaking, chipping or other causes.

1.6 Engineering design and certification

.1 Design Engineer: The term Design Engineer shall refer to the individuals or firms who have been retained by the Contractor to provide design services for the retaining wall. The Design Engineer may be a different individual or firm from the Inspecting Engineer. The Design Engineer may be a different individual or firm from the Inspecting Engineer. The Design Engineer(s) must be qualified in the area of segmental retaining wall design and must be licensed to practice Engineering in the Province or State that the wall is to be constructed.

.2 Inspecting/Certifying Engineer: A qualified Third-Party Geotechnical Engineer must be retained by the contractor (as specified in the contract – must be verified prior to bidding) to provide full inspection and Certification of the wall. This is a requirement of the Risi Stone design. The Certifying Engineer(s) must be qualified in the area of segmental retaining wall design and construction and must be licensed to practice Engineering in the 3 May 2006 Province or State that the wall is to be constructed. It is the Contractor's responsibility to engage or ensure the Owner has engaged (as specified in the contract) the Certifying Engineer. This notification should be copied to both the Design Engineer and Certifying Engineer, and it should include a brief description of the scope of responsibilities of each party.

.3 The Engineer(s) will perform the following tasks:

.1 The Design Engineer will produce sealed construction drawings and detailed design calculations, completed in accordance with the design requirements outlined in Part 3 of these specifications.

.2 The Certifying Engineer will review the site soil, groundwater and geometric conditions to ensure the designed wall is compatible with the site prior to construction. The Design Engineer must be notified in writing by the Certifying Engineer of any material differences between the design and the actual site conditions.

.3 The Certifying Engineer will inspect the site conditions, materials incorporated into the retaining wall, and the construction practices used during the construction.

.4 The Certifying Engineer will provide the Contractor with a letter after completion, certifying the design meets the requirements of this specification, the design was compatible with the site and the wall was constructed according to design.

1.7 Submittals

.1 The Contractor shall submit the following information for approval within the time frame set out in the contract, prior to the construction of the segmental retaining wall.

.2 Design Submittal – Provide stamped construction drawings and detailed design calculations, completed and sealed by the Engineer in accordance

with the design requirements outlined in Part 3 of this specification. A detailed explanation of the design properties for the geosynthetic reinforcements shall be submitted with the design if requested by the Owner.

.3 Materials Submittal – Manufacturer's certifications, stating that the SRW units, the geosynthetic reinforcement if applicable and imported aggregates and soils meet the requirements of this specification and the Engineer's design.

.4 Installer Qualifications - The Contractor must be able to demonstrate that their field construction supervisor has the necessary experience for the project by providing documentation showing that they have successfully completed projects of similar scope and size.

1.8 Measurement for payment

.1 Payment for earthworks and retaining wall system will be in accordance with the contract documents or this specification if it has been included in the contract documents by the Project Administrator.

.2 Payment for earthworks to prepare the site for the retaining wall construction will be based on the contract unit price per cubic meter (or cubic yard) for site cut and fill earthwork as detailed in the Site Plan. Additional earthwork as directed and approved in writing by the Owner, or Owner's representative, shall be paid for under a separate pay item.

.3 Payment for the retaining wall system will be as specified in the contract documents. The contract unit price shall include the cost of all engineering, labor, materials, and equipment used to install the leveling base or spread footing, wall modules, drainage materials, infill soil, geosynthetic reinforcement, retained soil and site clean up. Additional vertical wall face area as directed and approved in writing by the Owner, or Owner's representative, shall be paid for under a separate pay item. 4 May 2006

2 Products

2.1 Definitions

.1 Modular concrete retaining wall units are dry-cast solid concrete units that form the external facia of a modular unit retaining wall system.

.2 Coping units are the last course of concrete units used to finish the top of the wall.

.3 Infill soil is specified material that is placed directly behind the drainage soil and within the reinforced zone, if applicable.

.4 Retained soil is an in-situ soil or a specified soil that is placed behind the wall infill soil.

.5 Foundation soil is the in-situ soil beneath the wall structure.

.6 Drainage aggregate is a free draining soil with natural soil filtering capabilities, or a free draining soil encapsulated in a suitable geotextile, or a combination of free draining soil and perforated pipe all wrapped in a geotextile, placed directly behind the modular concrete units.

.7 Drainage pipe is a perforated polyethylene pipe used to carry water, collected at the base of a soil retaining wall, to outlets in order to prevent pore water pressures from building up behind the wall facing modules.

.8 Non-woven geotextiles are permeable synthetic fabrics formed from a random arrangement of fibers in a planar structure. They allow the passage of water from one soil medium to another while preventing the migration of fine particles that might clog a drainage medium. These are not recommended for use adjacent to cohesive soils. Use of a mono-filament or other approved fabric designed for the application is required.

.9 Geogrid reinforcement is a polymer grid structure having tensile strength and durability properties that are suitable for soil reinforcement applications.

.10 All values stated in metric units shall be considered as accurate. Values in parenthesis stated in imperial units are the nominal equivalents.

2.2 Products

.1 Concrete Segmental Retaining Wall Units Sheet Aluminum: CSA. Type 5052 H32.

.1 The concrete wall modules shall be 305 x 1830 x 610 mm (12” x 72” x 24”) with a maximum tolerance of plus or minus 3 mm (1/8”) for each dimension

.2 The retaining wall modules shall be solid units and have a minimum weight of 790kg (1740 lbs.) per unit.

.3 The concrete wall modules shall have a integral shear key connection that shall be offset to permit a minimum wall batter of 1H : 8V. A vertical alignment is possible if specified in the design.

.4 The concrete wall modules shall have a minimum 28-day compressive strength of .1 35 MPa (5000 psi) as tested in accordance with ASTM C 140. The concrete shall have a maximum moisture absorption rate of 5 percent to ensure adequate freeze thaw protection.

.5 Basis of Design Materials: DuraHold Segmental Retaining Wall System as supplied by the Risi Stone Systems, or approved equivalent.

.6 Colour and finish shall be as directed by the Owner or as shown in the Drawings.

.2 Infill soil

.1 The infill soil shall consist of free draining sands or gravels with less than 8% passing the #200 sieve size or as specified in the Construction Drawings.

.2 In the case where the design has allowed the use of approved native material or material other than the free draining gravel described above, the following minimum criteria must be met.

.1 The fine content (passing the No.200 sieve) of the infill soil cannot exceed 35%

.2 A liquid limit <40 and a plasticity index <10 per ASTM D 4318

.3 PH in the range of 3 to 9 per ASTM G 51

.4 Compaction must be achieved to 95% SPD or as specified in the design with water content of +-2% of optimum.

.5 A drainage layer consisting of washed, gap graded crushed gravel (3/4” clear) stone or as specified in the design) that is free draining with no fines must be placed immediately behind the facing to a depth not less than 300mm (12”).

.6 The drainage layer must be separated from the backfill with an approved filter fabric or a specifically designed natural drainage system. If a filter fabric is used, it must be folded back at the vertical intersection with the geogrid reinforcement if applicable a minimum of 150mm (6”) to ensure the drainage layer is not contaminated. Other drainage systems installed as per the design requirements or recommendations of the Certifying Engineer (Chimney/blanket drains).

.7 During construction, the infill zone must be protected from water and freezing conditions at all times. The site must be properly managed to ensure water is directed away from the backfill zone through proper temporary grading.

.8 Following construction, final grading must be established immediately to ensure the backfill zone is protected from water infiltration.

.3 The Certifying Engineer shall review and determine the suitability of the wall infill soil at the time of construction to ensure it meets the requirements of the design and the assumed parameters can be reasonably achieved on site by the contractor given the weather conditions, equipment available, etc. Soils with high fine content can pose significant problems with respect to achieving the specified compaction and tolerances for optimum water content (+-2%).

.4 Retained soil

.1 The retained soil shall be on site soils unless specified otherwise in the Construction Specifications or as directed by the Owner or Owner’s Representative. If imported fill is required, it shall be examined and approved by the Engineer.

.5 Foundation soil

.1 The foundation soil shall be the native undisturbed on-site soils with an allowable bearing capacity as specified on the construction drawing. The foundation soil shall be examined and approval by the Engineer prior to the placement of the base material. The Foundation zone encompasses the area beneath the wall facia and the geogrid reinforced zone (entire footprint of wall).

.2 In the case where unsuitable founding soil exists, removal and replacement of the foundation soil must be conducted under the direction of Certifying Engineer.

.3 The foundation zone extends out in front and behind the wall footprint at a 1H:1V line to the required depth, or as determined by the Certifying Engineer.

.6 Levelling base material

.1 The footing material shall be non-frost susceptible, well graded compacted crushed stone (GW-Unified Soil Classification System), or a concrete leveling base, or as shown on the Construction Drawings.

.7 Drainage material

.1 The drainage material is a highly permeable aggregate that is used to ensure drainage of the wall. Refer to design.

.8 Drainage pipe

.1 The drainage pipe shall be perforated corrugated HDPE or PVC pipe, with a minimum diameter of 100 mm (4 inches) or as specified in the design, protected by a geotextile filter to prevent the migration of soil particles into the pipe, or as specified on the construction drawings.

.9 Geotextile filter

.1 The non-woven geotextile shall be installed as specified on the construction drawings. Although selection of the appropriate geotextile specifications is site soil specific, a commonly used geotextile for filtration will have an Apparent Opening Size ranging between 0.149 and 0.210 mm (U.S. Sieve Sizes 100 to 70) and a minimum unit weight of 135 grams per square meter (5.0 oz /square yard). The coefficient of permeability will typically range between 0.1 and 0.3 cm/second. Refer to design for type – no substitutes are acceptable unless allowed by Design Engineer.

.10 Geogrid reinforcement (applicable for structures designed with geogrid reinforcement)

.1 The Design Engineer shall determine the type, strength and placement location of the reinforcing geosynthetic. The design properties of the reinforcement shall be determined according to the procedures outlined in this specification. Detailed test data shall be submitted with the design calculations and shall include tensile strength (ASTM D 4595 or GGI GG-1), creep potential (ASTM D 5262), site damage and durability (GRI GG-4) and pullout resistance (GRI GG-5 or GRI-GT-6) and connection strength (NCMA SRWU-The geosynthetic must be a polyester geogrid approved by Risi Stone Systems for use with the intended product. No substitutes are acceptable unless allowed by Design Engineer.

.11 Concrete adhesive

.1 The adhesive is used to permanently secure the coping stone to the top course of the wall. The adhesive must provide sufficient strength and remain flexible.

3 Execution

3.1 Design standard

.1 The Design Engineer is responsible for providing a design that shall consider the external stability, internal stability, and local stability of the SRW System. It is the responsibility of the Certifying Engineer or Site

Geotechnical Engineer to determine if further design considerations must be implemented to ensure adequate global/overall slope stability, and/or, if the foundation soils will require special treatment to control total and differential settlement. The design life of the structure shall be 75 years unless otherwise specified in the construction drawings.

.2 Outside of the scope of the Design Engineer's work is the following:

.1 Assessment of anticipated surface water and dimensioning of swales or other surface water control systems. This function is part of the larger overall site drainage plan and must be considered by the Civil Engineer responsible for site grading and the site drainage plan. The Civil Engineer must be provided with a copy of the Retaining Wall Design to review and provide feedback as necessary on the dimensions of the swales, and other grading related issues to ensure surface water is properly managed. The Civil Engineer must understand that the wall is designed without hydrostatic pressures and cannot flow over top of or behind the wall under any circumstances

.2 Determination of connection locations or wall drainage outlet system. This function is part of the larger overall site drainage plan and must be considered by the Civil engineer responsible for site grading and the site drainage plan, refer to above. The location of the drain may be shown generically on the design drawing to indicate the requirement; however, the exact depth will be dependent on outlet locations. The Civil Engineer must be provided with a copy of the design for review and provide feedback to the Design Engineer in this regard. Connection locations are to be established on site under the direction of the Civil Engineer and under the supervision of the Certifying Engineer.

.3 The segmental retaining wall shall be designed in accordance with recommendations of the NCMA Design Manual for Segmental Retaining Walls, Second Edition. The following is a summary of the minimum factors of safety for the various modes of failure evaluated in the proposed design.

.1 External Stability

.2 Base Sliding 1.5

.3 Overturning 2.0

.4 Bearing Capacity 2.0

.5 Global Stability 1.3 (Others)

.6 Internal Stability

.7 Tensile Overstress 1.0

.8 Pullout 1.5

.9 Internal Sliding 1.5

.10 Local Stability

.11 Facing Shear 1.5

.12 Connection 1.5

3.2 Soil

.1 Design parameters: The soil parameters assumed in the design shall be stated on the design drawings. If sufficient site soil information is unavailable at time of design, and typical, assumed soil design parameters are used for design purposes, the assumed parameters must be verified by the Certifying Engineer upon further exploration or excavation of the site. If the design parameters are required to be modified, site specific design parameters shall be provided to the Design Engineer by the Certifying Engineer.

3.3 Design geometry

.1 The length, height, and overall elevations of the retaining wall must comply with the requirements of the proposed elevation detail, station information and site grading plan.

.2 The structures' design height, H, shall be measured from the top of the leveling pad to the top of the wall where ground surface intercepts the wall facing.

.3 Slopes above and below all sections of the segmental retaining wall are detailed in the site grading plan.

.4 The minimum wall embedment shall be the greater of 1) the height of a SRW unit or 2) the minimum embedment required because of the slope below the wall. Increased embedment may be required due to erosion

potential or global stability requirements. Slope Below Wall Minimum embedment

.1 Level H/10

.2 3: 1 (18.4 deg) H/10

.3 2: 1 (26.5 deg) H/7

.5 The following surcharges shall be applied to the top of each design cross section based on the following proposed uses above the wall.

.1 Use Above Wall Minimum Surcharge

.2 No Traffic 0 kPa (0 lb/sq. ft)

.3 Light Traffic 4.8 kPa (100 lb/sq. ft)

.4 Heavy Traffic 12.0 kPa (250 lb/sq. ft)

3.4 State of stress

.1 The lateral earth pressure to be resisted by the reinforcements at each reinforcement layer shall be calculated using the Coulomb coefficient of earth pressure, Ka, times the vertical stress at each reinforcement layer.

.2 The vertical soil stress at each reinforcement layer shall be taken equal to the unit weight of the soil times the depth to the reinforcement layer below the finished grade behind the facing units. A coefficient of active earth pressure, Ka, shall be used from the top to the bottom of the wall. The coefficient of active earth pressure, Ka, shall be assumed independent of all external loads except sloping fills. For sloping fills, the coefficient of active earth pressure, Ka, appropriate for the sloping condition, using Coulomb earth pressure shall be used in the analysis. The Design assumes no hydrostatic pressure within the soil unless otherwise noted.

3.5 Inclination of failure surface

.1 A Coulomb failure surface passing through the base of the wall at the back of the reinforced zone up to the ground surface at or above the top of wall shall be assumed in design of walls.

3.6 Geosynthetic reinforcement (applicable for structures designed with geogrid reinforcement)

.1 The allowable reinforcement tension, Ta, shall be determined in accordance with the method outlined in the NCMA Design Manual for Segmental Retaining Walls, Second Edition. This method calculates the Long-Term Design Strength (LTDS) of the geosynthetic reinforcement by considering the time-temperature creep characteristics of the reinforcement, environmental degradation, construction induced damage and an overall factor of safety.

3.7 Geogrid length (as required on the construction drawing)

.1 The minimum soil reinforcement length shall be as required to achieve a minimum width of structure, B, measured from the front face of the wall to the end of the soil reinforcements. B must be greater than or equal to 60 percent of the total height, H. The length of the reinforcements at the top of the wall may be increased beyond the minimum length required to increase pullout resistance.

3.8 Settlement control

.1 It is the responsibility of the Certifying Engineer or Site Geotechnical Engineer to determine if the foundation soils will require special treatment to control total and differential settlement.

3.9 Global stability

.1 It is the responsibility of the Certifying Engineer or Site Geotechnical Engineer to determine if further design considerations must be implemented to ensure adequate global/overall slope stability. The Design Engineer may require a global stability analysis be conducted by a qualified Geotechnical Engineer prior to construction.

3.10 Inspection and certification

.1 Contractor Responsible to Ensure Certification of Wall: The Contractor is responsible (or as specified in the Contract Documents) to retain a Certifying Engineer to inspect and certify the construction of the wall. If it is not explicitly within the Contractor's scope of work to engage a Certifying Engineer, the Contractor is still responsible to ensure that the owner has taken this on. Work on the wall must not commence until the Certifying Engineer has attended a preconstruction meeting, is known to all parties, and the scope of responsibilities is clear to all.

.2 Certifying Engineer Responsibilities: The Certifying Engineer is responsible for verifying that the contractor meets all the requirements of the design and specification and the design is applicable to the site. This includes the use of approved materials and their proper installation.

.3 Inspection and Materials Testing: The Certifying Engineer will provide field quality control services (compaction testing, bearing capacity testing, groundwater analysis, etc.) directly or will accept reports from a third-party inspection and testing service agency if the Certifying Engineer does not provide these services. The third-party inspection and testing service agency acts under the direction of the Certifying Engineer. The extent and scope of the testing program must be to the satisfaction of the Certifying Engineer such that they are confident that the materials testing aspects of the overall construction inspection have been properly conducted. The ultimate goal of the materials testing program will be to reasonably ensure the assumed geotechnical parameters, specified soil types, bearing capacity requirements, compaction requirements, and water/groundwater assumptions included in the design have been met throughout the wall(s). The extent of materials / compaction testing will be a function of the type of soil, weather conditions, consistency of results, Certifying Engineer judgment, etc. As a recommended minimum guideline, compaction tests should occur at the front of the reinforced zone (within 1.2m (4.0ft) of the face) and near the back of the reinforced zone (for geogrid reinforced zones with depth greater than 1.5m) at least every 10m-15m o/c horizontally along the length of the wall. Vertically, tests should be performed on at least every second lift (300mm – 450mm) as the backfill is placed and compacted.

.1 The type of material being used as backfill must be constantly checked against the specification. For imported fill materials, documentation from the aggregate supplier must be reviewed and kept by the Certifying Engineer. For using approved on-site soils, depending on the homogeneity of the soils, the physical properties of the soils (type, plasticity, internal angle of friction, unit weight, permeability, etc.), must be checked on a regular basis to ensure those parameters assumed in the design are being met or exceeded on site (either through testing, visual inspection or both). The allowable bearing capacity of the subgrade specified in the design must be verified under both the facing of the wall and the reinforced zone (entire wall footprint). The allowable bearing capacity of the subgrade must be verified at intervals not exceeding 3m along the length of the wall.

.4 The Owner may engage a testing and inspection agency for quality assurance, but this does not replace the official Certification function described above.

.5 Testing and inspection services shall be performed by trained and experienced technicians currently qualified for the work to be performed.

.6 The testing agency shall submit written reports of inspections to the Certifying Engineer and Contractor on a weekly basis. Such reports shall include description of the work performed, deficiencies noted in construction, and corrective action taken to resolve such deficiencies. The Owner shall be notified directly by the Contractor’s testing agency of deficiencies noted by testing agency and provided with a summary and schedule for corrective action. Written reports will also include location, type, and results of all tests taken on the Project.

.7 The Certifying Engineer shall inform the Design Engineer in writing if conditions on site differ in any way or at any time from the design. The Design Engineer is to be consulted with regard to discrepancies between design and construction. The appropriate revisions will be provided by the Design Engineer accordingly based on new information submitted by the Certifying Engineer in writing. Changes in conditions on site include but are not limited to; seepage from the excavation or higher than assumed groundwater elevations, soil conditions, both insitu and/or engineered soil conditions differ from those assumed in the design, surface drainage issues on the site require greater attention or measures to control than originally assumed, wall geometry differs from the design (maximum heights, etc.), other structures exist not shown on the grading plans and interfere with or are influenced by or influence the wall (catch basins, light standards, buildings, fences, etc.), loading conditions differ from those shown on the design (i.e. roadways or pathways closer to back of wall than originally assumed), slopes above or below the wall steeper than assumed in the design, etc.

.8 The Contractor's field construction supervisor shall have demonstrated experience and be qualified to direct all work related to the retaining wall construction.

.9 The Certifying Engineer shall provide a Certification to the Contractor and Owner that the completed SRW had been installed in accordance with the contract documents.

3.11 Construction tolerances

.1 Installation of SRW face location shall be within all the following tolerances:

.2 Vertical Control from plan: +/- 1.25 inches over a 10 ft distance

.3 Horizontal Control from plan:

.4 Straight lines: +/- 1.25 inches over a 10 ft distance

.5 Rotation of the wall face during construction:

.1 Maximum 2.0 degrees from established wall plan batter

.2 Maximum, +/-10.0% from total established horizontal setback.

.6 Bulging: +/- 1.25 inch over a 10 ft distance

3.12 Site preparation

.1 Comply with federal, state and local requirements for execution of the work, including local building codes and current OHSA excavation regulations. Provide excavation support as required to maintain stability of the area during excavation and wall construction and to protect existing structures, utilities, landscape features, or property or improvements. Inform all local utilities of work for verification of locations and depths. Inform any other party affected by the work prior to commencement

.2 Prior to grading or excavation of the site, confirm the location of the retaining walls and all underground features, including utility locations within the area of construction. Ensure surrounding structures are protected from effects of wall excavation.

.3 Coordinate installation of underground utilities with wall installation. Utilities must be located outside of the reinforced zone of walls for future access and/or potential for leakage in the case of water lines.

.4 Control surface water drainage and prevent inundation of the retaining wall area during construction. Temporary embankments and swales constructed of a low permeability soil must be prepared by the Contractor under the direction of the Certifying Engineer to ensure the wall area is free of water infiltration.

.5 The foundation soil shall be excavated or filled as required to the grades and dimensions shown on the Construction Drawings or as directed by the Owner or Owner’s Representative.

.6 The foundation soil shall be proof rolled and examined by the Certifying Engineer to ensure that it meets the minimum strength requirements according to the design. If unacceptable foundation soil is encountered, the contractor shall excavate the affected areas and replace with suitable quality material under the direction of the Engineer.

.7 In cut situations, the native soil shall be excavated to the lines and grades shown on the Construction Drawings and removed from the site or stockpiled for reuse as retained soil if the design has allowed the use of this material.

3.13 Installing drainage system

.1 Water/drainage management is extremely important and it is required both during construction of the wall(s) and after completion of construction.

.2 Geotextile is not suggested for use at the back of the reinforced zone where cohesive soils are being retained. The possibility of clogging of such geotextile creates unacceptable hydrostatic pressures in soil reinforced structures. When filtration is deemed necessary in cohesive soils, use an approved three-dimensional filtration system of clean sand or filtration aggregates.

.3 As the overall site drainage plan is outside of the Retaining Wall Design Engineer's scope of work, the Civil Engineer must be provided with a copy of the design to determine where the wall drains must outlet. The drainage collection pipe shall be placed according to the locations of the outlets as established by the Civil Engineer. The pipe shall be laid to maintain gravity flow of water from reinforced soil zone (min 2%). Daylight drainage collection pipe at storm sewer manhole or along slope at an elevation lower than lowest point of pipe within reinforced soil mass. If out letting through the face (as allowed by the Civil Engineer), the outlet locations must not exceed 12m (40 feet) o/c. The outlet pipe (the pipe connecting to the perforated pipe that exists behind the wall) must be non-perforated and capable of sustaining the soil loads, etc., anticipated on the site. Installation of this pipe(s) must be monitored by the Certifying Engineer.

.4 During construction, all collection pipes (perforated and non-perforated) must be checked on a daily basis to ensure they are positively drained and in working order.

.5 Main collection drain pipe just behind segmental units shall be minimum 4 inches in diameter. Secondary collection drain pipe shall gravity flow independently or tie into main collection drain pipe with laterals at maximum 40 feet spacing along wall face.

.6 Steps must be taken to ensure that drain pipes are properly installed and vented to daylight and a grading plan has been developed that routes water away from the retaining wall location.

.7 If other sources of water are discovered during excavation or anticipated, other drainage measures/systems such as chimney or blanket drains may be required. Certifying Engineer should contact Design Engineer for recommendations.

3.14 Levelling base or spread footing placement

.1 The leveling base material shall be crushed stone compacted to 98% Standard Proctor Density, or vibrated concrete along the grades and dimensions shown on the Construction Drawings or as directed by the Certifying Engineer. The minimum thickness of the leveling base shall be as noted on the design drawings. The base shall be protected as soon as reasonably possible from disturbance during construction by placing an additional layer of gravel on top of it, in front of the base course of blocks. Only place this embedment material once the base course of the wall has been properly backfilled and compacted (behind) to ensure the alignment of the blocks is not altered.

3.15 Installation of modular concrete retaining wall units

.1 The bottom row of retaining wall modules shall be placed on the prepared leveling base as shown on the Construction Drawings. Care shall be taken to ensure that the wall modules are aligned properly, leveled from side to side and front to back and are in complete contact with the base material.

.2 The wall modules above the bottom course shall be placed such that the tongue and grove arrangement provide the design batter (i.e., setback) of the wall face. Successive courses shall be placed to create a running bond pattern with the edge of all units being approximately aligned with the middle of the unit in the course below it.

.3 The wall modules shall be swept clean before placing additional levels to ensure that no dirt, concrete or other foreign materials become lodged between successive lifts of the wall modules.

.4 A maximum of 3 courses of wall units can be placed above the level of the infill soil at any time.

.5 The contractor shall check the level of wall modules with each lift to ensure that no gaps are formed between successive lifts that may affect the pullout resistance of geogrid reinforcement, if applicable. The wall

modules must be checked to ensure the allowable dimensional tolerances are not being exceeded. Units that exceed the allowable dimensional tolerances must not be used. If the unit is within the allowable tolerances, an approved shim may be utilized to level the block on machine placed systems.

.6 Care shall be taken to ensure that the wall modules and geosynthetic reinforcement where applicable are not broken or damaged during handling and placement.

3.16 Drainage soil (as required by design)

.1 The drainage soil will be placed behind the retaining wall modules with a minimum width of 300 mm (1 ft.) and separated from other soils using the approved non-woven geotextile as specified in the design.

.2 Drainage soil shall be placed behind the wall facing in maximum lifts of 6 inches and compacted to a minimum density of 95% Standard Proctor.

.3 No heavy compaction equipment or paving equipment shall be allowed within 1 meter (3 ft.) of the back of the wall facia.

3.17 Infill soil (as specified on the construction drawing)

.1 Wall infill soil shall be placed behind the first course of the wall facing units in maximum lifts of 150 mm (6 inches) and compacted to a minimum density of 95% Standard Proctor Maximum Dry Density (ASTM D 698) at a moisture content that is +- 2% optimum. The fill shall be placed and compacted level with the top of the wall modules at the specified geogrid elevations prior to placing the geogrid reinforcement where applicable.

.2 Wall infill soil shall be placed on top of the geogrid reinforcement layers if applicable in maximum lifts of 150 mm (6 inches) and compacted to a minimum of 95% Standard Proctor Density. Care shall be taken to ensure that the geogrid lays flat and taut during placement of the infill soil. This is best achieved by placing fill on top of the geogrid near the wall facia and spreading toward the back of the infill soil zone.

.3 No voids shall exist behind the back of the blocks, under the geogrid, as the geogrid extends into the reinforced zone. Ensure the backfill material is well compacted flush with the top of the adjacent block prior to setting the geogrid reinforcement in place.

.4 No tracked construction equipment shall be allowed to operate directly on top of the geogrid until a minimum thickness of 150 mm (6 inches) of fill has been placed. Rubber tired equipment may drive on top of the geogrid at slow speeds but should exercise care not to stop suddenly or make sharp turns. No heavy equipment shall be allowed within 1 meter (3 ft.) of the back of the wall.

.5 At the end of each day's operation, slope the last lift of reinforced backfill away from the wall facing to rapidly direct runoff away from the wall face. Do not allow surface runoff from adjacent areas to enter the wall construction site.

3.18 Geogrid soil reinforcement (applicable for structures designed with geogrid reinforcement)

.1 Verify type and orientation (Roll direction) of geosynthetic reinforcement.

.2 Geogrid sections, pre-cut to meet the length required in the design drawings, shall be placed horizontally at the specified elevations and with longitudinal axis perpendicular to the wall face (i.e., machine direction), at the elevations shown on the Construction Drawings, or as directed by the Engineer. The pre-cut sections of geogrid are to be placed immediately adjacent to one another, without overlapping and without gaps between them.

.3 The geogrid shall be placed over the compacted infill soil and the wall facing units with the outside edge extending over the tongue of the bottom unit and to within 25 mm (1 in.) of the front facing unit. The compacted infill soil must be level with the back of the block to ensure the geogrid is placed horizontally, and that no voids exist under the geogrid as it extends out over the infill zone. Care shall be taken to ensure that the wall modules are swept clean and that the geogrid is in complete contact with the top and bottom faces of the adjacent wall modules. The next course of wall modules shall be carefully placed on top of the lower modules to ensure that no pieces of concrete are chipped off and become lodged between unit layers.

.4 The geogrid shall be pulled taut away from the back the wall modules during placement of infill soil. Alternatively, suitable anchoring pins or staples can be used to ensure that there are no wrinkles or slackness prior to placement of the infill soil. The geogrid shall lay perfectly flat when pulled back perpendicular to the back of the wall facia. No voids shall exist under the geogrid reinforcement as it extends from the back of the block.

.5 Backfill material must be placed near the back of the blocks and spread away from the wall to help maintain tension in the geogrids

3.19 Retained soil

.1 Retained soils shall be placed and compacted behind the infill soil or drainage soil if applicable, in maximum lift thickness of 150 mm (6 inches). The retained soils shall be undisturbed native material or engineered fill compacted to a minimum density of 95% Standard Proctor.

.2 No heavy compaction equipment shall be allowed within 1 m (3 ft.) of the back of the wall modules

End of section

1 General

1.1 Section includes

.1 This section specifies requirements for sod and seeding and initial maintenance.

1.2 Reference standards

.1 Ontario Provincial Standard Specifications

.1 OPSS 802 (November 2010) – Construction Specification for Topsoil

.2 OPSS.MUNI 803 (November 2018) – Construction Specification for Sodding

1.3 Measurement and payment

.1 No measurement will be made for the work of this Section. The "Measurement for Payment" and "Basis of Payment" clauses of the referenced OPS Specifications shall not apply this this Contract.

.2 Lump sum price for this Section shall include all labour, equipment and materials to do the specified work and supply the specified materials.

1.4 Qualifications

.1 Firm performing work of this Section shall have at least 3 years' experience in performing work of similar scope.

1.5 Quality assurance

.1 Subsection 803.08.02 of OPSS.MUNI 803 is amended by the addition of the following:

"If surface soil should be visible between the rolls of sod the Contract Administrator may, at his sole discretion, request the Contractor to correct the open joints by providing topsoil and seed, in lieu of repositioning the displaced rolls of sod."

2 Products

2.1 Topsoil

.1 Fertile, friable, sandy natural loam material with a pH of 6.0 to 7.5, containing not less than 5% organic material.

.2 Free of roots, vegetation or other debris that prevents proper placement

.3 Free of stones and clods over 20 mm in any dimension.

.4 Imported topsoil shall be screened prior to delivery to the site.

.5 Native topsoil is acceptable provided it meets or is augmented to meet the quality standards specified in this Section.

2.2 Sod

.1 Subsection 803.05.01 of OPSS.MUNI 803 is amended by the deletion of the third sentence in paragraph 2, and replacing it with the following sentence:

> “There shall be no more than 5 broadleaf weeds per 40 square metres of sod.”

2.3 Source quality control

.1 Test proposed topsoil prior to shipment to the site and provide Consultant with a copy of test results confirming conformance with the requirements of this Section.

3 Execution

3.1 Preparation of areas to receive sod and seed

.1 Subsection 802.07.02 of OPSS 802 is deleted in its entirety and replaced with the following:

> “Areas where topsoil is to be placed shall be fine graded to a uniform surface according to OPSS 206. The subgrade shall be compacted to 95% Standard Proctor Density. The surface shall then be loosened to a depth of 25 mm. The prepared subgrade surface shall be at a depth to allow for placement of 150 mm of topsoil.”

3.2 Placement of topsoil

.1 Subsection 802.07.03 of OPSS 802 is deleted in its entirety and replaced with the following:

> "Topsoil shall be placed to a uniform depth of 150 mm on areas specified in the Contract Documents."

3.3 Placement of sod

.1 Subsection 803.07.04 of OPSS.MUNI 803 is amended by the addition of the following:

> "Sod shall be placed within 24 hours after delivery to the job site unless otherwise authorized by the Contract Administrator. Sod not placed within the permitted time shall be removed and disposed of off-site and replaced with new sod meeting specifications. Sod shall be rolled within 24 hours of being placed. Sod shall be saturated immediately after rolling. On all slopes 2:1 or steeper, every sod piece shall be pegged. Sod along ditch inverts and one row on both sides of the ditch invert shall be pegged. Minimum width of sod to be pegged in ditches shall be 1.2 m."

.2 Subsection 803.07.05 of OPSS.MUNI 803 is deleted in its entirety and replaced with the following:

> "Sod shall be maintained for a 30 consecutive calendar day maintenance period following completion of placement. For sod placed after September 30 in any calendar year, sod shall be maintained until May 30 of the following calendar year. All sod placed shall be kept healthy, actively growing and green in leaf colour. The Contractor shall provide maintenance watering as required during the maintenance period."

.3 For initial cutting, cut sod on a graduated cutting schedule as follows.

.4 Do 3 cuttings after sod has been placed.

.5 Do first cut 25 days after sod placement. Cut sod to 115 mm (4.5") height.

.6 Within a few days, do a second cut to a height of 100 mm (4")

.7 At end of maintenance period, do final cut to a height of 90 mm (3.5").

3.4 Sod maintenance

.1 Subsection 803.07.05 of OPSS.MUNI 803 is amended by the addition of the following:

> “If surface soil should be visible between the rolls of sod the Contractor Administrator may, at his sole discretion, request the Contractor to correct the open joints by providing topsoil and seed, in lieu of repositioning the displaced rolls of sod.”

End of section

Appendix D, D-2 Material Disclosures

1. Drawings

As issued with Tender and listed below:

Sheet No.	Drawing No.	Drawing name
1	G-001	LIST OF DRAWINGS
2	A-000	OBC MATRIX
3	A-001	EXISTING SITE PLAN
4	A-002	SITE PLAN
5	A-003	EXISTING BACK ENTRY
6	A-004	BACK ENTRY
7	A-005	EXISTING GROUND FLOOR PLAN
8	A-006	EXISTING EAST FACADE
9	A-007	GROUND FLOOR PLAN
10	A-008	SECOND FLOOR PLAN
11	A-009	SIDE ELEVATION
12	A-010	PARTIAL ELEVATIONS
13	A-011	SHAFT ELEVATOR SECTION
14	A-012	SHAFT SECTION
15	A-013	DETAIL
16	A-014	DETAIL
17	A-015	ELEVATOR SPEC DRAWING
18	A-016	ELEVATOR SPEC
19	A-017	DETAIL
20	A-018	DETAIL
21	ST-001	CONC. RAMP & SIDEWALK REMOVAL
22	ST-002	SIDEWALK AND ELEVATOR. SITE PLAN
23	ST-003	CONC. RAMP &SIDEWALK. SECTION & ELEV.
24	ST-004	NEW CONC. RAMP AND SIDEWALK
25	ST-005	NEW ELEV. SHAFT

2. Designated Substances

A Designated Substances Survey Report prepared by Golder Associates and dated March 28. 2011 and is posted as a separate document on the Region's bidding website under T-1013-2024.

In accordance with the Region of Durham Corporate Health and Safety Policy and Program a list of designated substances must be provided to all Contractors. Reference Appendix D-1, Section 01 35 29 – Health and Safety Procedures for the list of Designated Substances.

3. Investigation Report for Retaining Walls and Ramp

An Investigation Report for Retaining Walls and Ramp prepared by TAK Engineering Ltd. and dated April 19, 2021 and is posted as a separate document on the Region's bidding website under T-1013-2024.

4. Subcontracting

.1 As indicated in Section 01 11 00 Summary of work, division of the Work among Subcontractors, suppliers and vendors is solely the Contractor's responsibility, and is anticipated on this Project.