

**Bowmanville Health Centre
CT & Radiology Clinic
4 Storey Building Expansion
222 King Street East, Bowmanville, Ontario
Structural Pre-Tender (SPT)**

Project 26018

Date: August 31, 2026



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DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

00 01 11	Table of Contents	1
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DIVISION 01 – GENERAL REQUIREMENTS

01 00 60	List of Drawings	1
01 11 00	Summary of Work	3
01 25 00	Substitution Procedures	3
01 26 15	Requests for Information	2
01 31 00	Project Management and Coordination	2
01 32 00	Construction Progress Documentation	3
01 33 00	Submittal Procedures	4
01 35 43	Environmental Procedures	3
01 41 00	Regulatory Requirements	3
01 45 00	Quality Control	4
01 51 00	Temporary Utilities	3
01 52 00	Construction Facilities	3
01 56 00	Temporary Barriers and Enclosures	2
01 61 00	Common Product Requirements	5
01 70 03	Safety Requirements	5
01 71 00	Examination and Preparation	3
01 73 00	Execution Requirements	4
01 74 11	Cleaning	3
01 74 19	Construction Waste Management and Disposal	3
01 77 00	Closeout Procedures	2
01 78 00	Closeout Submittals	5

DIVISION 03 – CONCRETE

03 10 00	Concrete Forming and Accessories	5
03 20 00	Concrete Reinforcing	4
03 30 00	Cast-in-Place Concrete	10

DIVISION 05 – METALS

05 12 23	Structural Steel	8
05 21 00	Steel Joists	5
05 31 00	Steel Deck	3

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

07 13 26.16	Self-Adhering Sheet Waterproofing	4
07 21 13	Building Insulation	3
07 26 00	Vapour Retarders	3
07 81 23	Intumescent Fireproofing	6

DIVISION 31 – EARTHWORK

31 23 10	Excavating, Trenching and Backfilling	8
31 54 13	Erosion and Sedimentation Control	2
31 64 16	Excavated Caissons	5

DIVISION 33 – UTILITIES

33 46 13	Foundation Drainage	3
----------	---------------------	---

End of Section

LIST OF DRAWINGS

Dwg. No.	Title	Issue No.	Rev. No.	Issue Date
STRUCTURAL				
S101	General Notes	3	-	August 28, 2026
S102	Typical Details	3	-	August 28, 2026
S201	Foundation Plan	3	-	August 28, 2026
S202	1st Floor Framing Plan	3	-	August 28, 2026
S203	2nd Floor Framing Plan	3	-	August 28, 2026
S204	3rd Floor Framing Plan	3	-	August 28, 2026
S205	4th Floor Framing Plan	3	-	August 28, 2026
S206	Roof Framing Plan	3	-	August 28, 2026
S301	Framing Elevations	3	-	August 28, 2026
S302	Framing Elevations	3	-	August 28, 2026
S501	Foundation Sections	3	-	August 28, 2026
S502	Foundation Sections	3	-	August 28, 2026
S503	Framing Sections	3	-	August 28, 2026
S504	Framing Sections	3	-	August 28, 2026
S801	Schedules	3	-	August 28, 2026
S802	Isometric View	3	-	August 28, 2026

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Work covered by contract documents
- .2 Owner
- .3 Place of the Work
- .4 Site access
- .5 Work sequence
- .6 Contractor use of premises
- .7 Engineer design
- .8 Designated substances: ACM and others
- .9 Building smoking environment
- .10 Special conditions
- .11 Integrated systems testingSite security
- .12 "By Others"
- .13 Protection of Drawings

1.2 Work Covered by Contract Documents

- .1 Work of this Contract comprises the construction of the Bowmanville Health Centre CT & Radiology Clinic 4 Storey Building Expansion as indicated on the Contract Drawings and Specifications.

1.3 Place of the Work

- .1 The Work of this Contract is located at 222 King Street East, Bowmanville, Ontario.

1.4 Metric Project

- .1 This project is to be based on The International System of Units (SI). Measurements are expressed in metric (SI) units.
- .2 All dimensions are to be shown in meters and millimeters.

1.5 Site Access

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work
- .2 Provide secure construction fencing as specified and where indicated.

1.6 Work Sequence

- .1 Construct Work continuously.

1.7 Contractors Use of Premises

- .1 Contractor has restricted use of site until Substantial Performance.

1.8 Engineer Design

- .1 Where specifications require work to be designed by an engineer, engage an engineer licensed in the Province of Ontario to design such work. Refer to Section 01 78 00.

1.9 Designated Substances: ACM and Others

- .1 No asbestos-containing materials, as defined by O. Reg. 278/05, may be specified or used in any project.

1.10 Verification

- .1 All dimensions shall be verified on site, and all necessary modifications and adjustments shall be made as necessary to suit.

1.11 Building Smoking Environment

- .1 Smoking and vaping are prohibited in all work places within the Owner's buildings and on the Owner's property.

1.12 Special Conditions

- .1 The following general and special conditions apply:
 - .1 All exposed interior surfaces except prefinished surfaces shall be painted whether referred to in the specifications and drawings or not.

1.13 Site Security

- .1 Daily Inspection: Provide inspection of the work areas daily while the work is in progress and take whatever measures are necessary to secure the construction zones from theft, vandalism and unauthorized entry.

1.14 "By Others"

- .1 The term "by others" where it is used in the contract documents means that work shown or described in the contract documents and labeled with this designation is not included in the specific sub-trade's scope of work but will be required to be done within the General Contractor's contract.

1.15 Use of Drawings

- .1 Drawings are not to be scaled.
- .2 Copies of architectural and structural "issued for construction" drawings in digital format will be made available for the contractors use under the following conditions.
 - .1 Copyright remains with BBA.
 - .2 The drawings will only be used for shop drawings for this project and not be put to any other use.
 - .3 BBA assumes no liability for errors or omissions in the drawings. The Contractor assumes all risk and expenses associated with the use of drawings in the production of his work.
 - .4 References to BBA and other Consultants must be deleted from the title block.
 - .5 The Contractor signs a release available from BBA that addresses the above items in more detail.

- .3 Arrangements for use of Sub-Consultant drawings must be made with the Appropriate Sub-Consultant.

1.16 Protection of Drawings

- .1 Copyright of electronic document belongs to the Consultant. Electronic documents may not be forwarded to others, transmitted, downloaded or reproduced in any format, whether print or electronic, without the express, written permission of the copyright owner.
- .2 Drawings, specifications and other contract related documents which are posted on Contractor controlled websites for access by sub-trades and suppliers, shall be posted only on password protected platforms with access only to those parties with an expressed interest in the Project.
- .3 Provide Consultant and Owner with access to such websites as noted above.

PART 2 PRODUCTS

3.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.2 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Requests for Substitution (RFS) prior to execution of Contract.
- .2 Requests for Substitution (RFS) after execution of Contract.

1.2 Definitions

- .1 Products Not Available: When all listed manufacturer's products in the specification Section are no longer manufactured.
- .2 Proprietary Specification: A specification which includes one or more proprietary names of products or manufacturers, or both, and may also include descriptive, reference standard, or performance requirements, or any combination thereof.
- .3 Non-proprietary Specification: A specification which includes descriptive, reference standard or performance requirements, or any combination thereof, but does not include proprietary names of products or manufacturers.
- .4 Substitution: A product or manufacturer not specified by proprietary name, which may be acceptable in place of a product or manufacturer which, is specified by proprietary name.

1.3 Procedures

- .1 Product Options:
 - .1 For products specified by non-proprietary specification:
 - .1 Select any product by any manufacturer, which meets requirements of Contract Documents.
 - .2 For products specified by proprietary specification:
 - .1 Select any product or manufacturer named, or
 - .2 Substitute an unnamed product or manufacturer in accordance with Substitutions – Manufacturers article of this Section.
 - .3 For products specified by proprietary specification and accompanied by words indicating that substitutions will not be accepted:
 - .1 Select any product or manufacturer named; substitutions are not permitted.
- .2 Substitution Requests Prior to Execution of Contract: Submit substitutions requests to Consultant no later than the time stated in the Instructions to Bidders.

1.4 Substitutions – Products

- .1 Substitute Products: Where substitute products are permitted, unnamed products may be accepted by the Consultant, subject to the following:
 - .1 Substitute products shall be the same type as, be capable of performing the same functions as, and meet or exceed the standards of quality and performance of the specified products.
 - .2 Substitutions for Cause: Changes proposed by Subcontractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - .3 Substitutions for Convenience: Changes proposed by Subcontractor or Contractor that are not required in order to meet other Project requirements but may offer advantage to Contractor or Subcontractor.

1.5 Substitutions – Manufacturers

- .1 Substitute Manufacturers: Where substitute manufacturers are permitted, unnamed manufacturers may be accepted by the Consultant, subject to the following:
 - .1 Substitute manufacturers shall have capabilities comparable to those of the named manufacturers.
 - .2 In making a substitution Contractor and the Subcontractor represents that they have:
 - .1 Investigated substitute product or manufacturer, or both, and determined it meets or exceeds the criteria of the specified product, and;
 - .2 Will provide the same warranty for the Substitution as for the specified product.
 - .3 Will make any changes to the Work necessitated by substitution as required for Work to be complete in all respects, and;
 - .4 Waives claims for additional costs and time caused by substitution which may subsequently become apparent.
 - .5 Will reimburse Consultant's services for review or redesign, additional studies, investigations, review of submittals, and associated contract administration.
 - .6 Received necessary approvals of authorities having jurisdiction.
 - .7 Investigated the proposed substitute to determine if license fees and royalties are pending.
 - .8 If accepted, the substitution will not adversely affect the Construction Schedule.
 - .3 Do not install requested Substitutions without Consultant's acceptance.
 - .4 If, in the Consultant's opinion, a substitution does not meet requirements of Contract Documents, Contractor shall, at no extra cost to Owner, provide a product which, in the Consultant's opinion, does meet requirements of Contract Documents.

1.6 Proprietary Specifications

- .1 Notwithstanding specified proprietary names of either or both products or manufacturers, products provided shall meet other applicable requirements of Contract Documents. Modify products if necessary, to ensure compliance with all requirements of Contract Documents.

1.7 Changes to Accepted Products and Manufacturers

- .1 Products and manufacturers accepted by the Consultant for use in performance of Work of Contract shall not be changed without Consultant's written consent. .
- .2 Submit requests to change accepted products and manufacturers to Consultant in writing, including product data indicated in Product Data article.

1.8 Product Data

- .1 When requested by the Consultant, submit complete data substantiating compliance of a product with requirements of Contract Documents. Include the following:
 - .1 Product identification, including manufacturer's name and address.
 - .2 Manufacturer's literature providing product descriptions, applicable reference standards, performance and test data, in form consistent with the Contract Documents and readily comparable with product being substituted and can provide the specified and indicated requirements.
 - .3 Samples, as applicable.
 - .4 Name and address of projects on which product has been used and date of each installation.
 - .5 Itemized comparison of substitution with named product(s). List significant variations.
 - .6 Designation of availability of maintenance services and sources of replacement materials
 - .7 Completed Substitutions Request Form. Incomplete forms will be rejected.

1.9 Consultant Procedure

- .1 In reviewing the supporting data submitted for substitutions, Consultant will use, for purposes of comparison, all the characteristics of the specified material or equipment as they appear in the manufacturer's published data even though all the characteristics may not have been particularly mentioned in the Specifications.
- .2 Consultant will review supporting data and will determine that the substitution in the Consultant's opinion is or is not able to meet or exceed the standards of quality, appearance and performance to the material specified.
- .3 Consultant will sign, date and issue the RFS indicating acceptance or refusal, with applicable pre-contract or contract documentation, to affected participants.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Requests for Information
- .2 Submittal Procedures
- .3 Screening of RFI's
- .4 Response to RFI's
- .5 Response Timing

1.2 Request for Information (RFI)

- .1 A request for information (RFI) is a formal process used during the Work to obtain an interpretation of the Contract Documents or to obtain additional information.
- .2 An RFI shall not constitute notice of claim for a delay.

1.3 Submittal Procedures

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Number RFI's consecutively in one sequence in order submitted, in numbering system as established by the Contractor.
- .3 Submit one distinct subject per RFI form. Do not combine unrelated items on one form.
- .4 RFI Form:
 - .1 Submit a draft "Request for Information" form to be approved by the Owner and Consultant.
 - .2 Submit RFI's to the Consultant on approved "Request for Information" form. The Consultant shall not respond to an RFI except as submitted on this form.
 - .3 Where RFI form does not have sufficient space to provide complete information thereon, attach additional sheets as required.
 - .4 Submit with RFI form all necessary supporting documentation.
- .5 RFI Log:
 - .1 Maintain log of RFI's sent to and responses received from the Consultant, complete with corresponding dates.
 - .2 Submit updated log of RFI's at each construction meeting.
- .6 Submit RFI's 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 so will not be paid by the Owner.
- .7 Only the Contractor shall submit RFI's to the Consultant.
- .8 RFI's submitted by Subcontractors or Suppliers directly to the Consultant will not be accepted.

1.4 Screening of RFI's

- .1 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. 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.

1.5 Response to RFI's

- .1 Consultant shall review RFI's 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 RFI's. Responses to RFI's received from entities other than the Consultant shall not be considered.

1.6 Response Timing

- .1 Allow 5 Working Days for review of each RFI by the Consultant.
- .2 Consultant's review of RFI commences on date of receipt of RFI submission by the Consultant from Contractor and extends to date RFI returned by Consultant.
- .3 When the RFI submission 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.
- .4 If, at any time, the Contractor submits a large enough number of RFI's or the Consultant considers the RFI to be of such complexity that the Consultant cannot process these RFI's within 5 Working Days, the Consultant will confer with the Contractor within 3 Working Days of receipt of such RFI's, and the Consultant and the Contractor will jointly prepare an estimate of the time necessary for processing same as well as an order of priority among the RFI's submitted. The Contractor shall accommodate such necessary time at no increase in the Contract Time and at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Preconstruction Conference
- .2 Project Meetings
- .3 On Site Documents
- .4 Cost Breakdown

1.2 Preconstruction Conference

- .1 The Consultant will call for and administer a Preconstruction Conference at time and place to be announced.
- .2 Contractor, all major Subcontractors, and major suppliers shall attend the Preconstruction Conference.
- .3 Agenda will include, but not be limited to, the following items.
 - .1 Permits
 - .2 Lines of communication and contact information
 - .3 Submittal and RFI procedures
 - .4 Schedules
 - .5 Personnel and vehicle permit procedures
 - .6 Use of premises
 - .7 Location of any Contractor on-site facilities
 - .8 Security
 - .9 Housekeeping
 - .10 Inspection and testing procedures, on-Site and off-Site
 - .11 Control and reference point survey procedures
 - .12 Health and safety
 - .13 Contractor's Schedule of Values
 - .14 Contractor's Schedule of Submittals
- .4 The Consultant will distribute copies of minutes to attendees. Attendees shall have seven days to submit comments or additions to minutes. Minutes will constitute final documentation of results of Preconstruction Conference.

1.3 Project Meetings

- .1 The Contractor will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.
- .2 Meetings will be held minimum bi-weekly.

1.4 On-Site Documents

- .1 Maintain at job site, one copy each of the following:
 - .1 Contract drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed shop drawings, product data, and samples.
 - .5 Requests for Information (RFI's)
 - .6 Change Orders and other modifications to Contract.
 - .7 Field test reports.

- .8 Inspection certificates.
- .9 Manufacturer's certificates.
- .10 Geotechnical reports
- .11 DSS reports
- .12 Approved Work schedule.
- .13 Manufacturers' installation and application instructions.
- .14 Safety Data Sheets (SDS).
- .15 Health and Safety Plan and other safety related documents.
- .16 Other documents as specified.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Consultant.

1.5 Cost Breakdown

- .1 Submit a detailed cost breakdown to Consultant at least ten working days prior to the submission of the first progress claim. After approval by Consultant the cost breakdown will be used as basis for progress payment.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Submittals.
- .2 Schedules.
- .3 Format.
- .4 Submission.
- .5 Critical Path Scheduling.
- .6 Submittals Schedule.

1.2 Submittals

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

1.3 Schedules Required

- .1 Submit schedules as follows:
 - .1 Construction Progress Schedule.
 - .2 Submittal Schedule for Shop Drawings and Product Data.
 - .3 Submittal Schedule for Samples.
 - .4 Product Delivery Schedule.
 - .5 Cash Allowance Schedule for purchasing Products or Services.
 - .6 Shutdown or Closure Activity.

1.4 Format

- .1 Prepare schedule in form of a horizontal bar chart using Microsoft Project 2016 or later.
- .2 Provide a separate bar for each major item of work, trade or operation.
- .3 Split horizontally for projected and actual performance.
- .4 Provide horizontal time scale identifying first work day of each week.
- .5 Format for listings: chronological order of start of each item of work.
- .6 Identification of listings: By Systems description.

1.5 Submission

- .1 Submit initial format of schedules within 10 working days after award of Contract.
- .2 Submit schedules in electronic format, by email as PDF files.
- .3 Consultant will review schedule and return reviewed copy within 10 days after receipt.
- .4 Resubmit finalized schedule within 7 days after return of reviewed copy.
- .5 During progress of Work revise and resubmit schedule as directed by Consultant.
- .6 Submit revised progress schedule with each application for payment.

- .7 Distribute copies of revised schedule to:
 - .1 Job site office.
 - .2 Subcontractors.
 - .3 Other concerned parties.
 - .4 Instruct recipients to report to Contractor within 10 days, any problems anticipated by timetable shown in schedule.
- .8 Table current and up to date schedule at each regular site meeting.

1.6 Critical Path Scheduling

- .1 Include complete sequence of construction activities.
- .2 Schedules shall represent a practical plan to complete the work within the Contract period, and shall convey the plan to execute the work. Schedules as developed shall show the sequence and interdependencies of activities required for complete performance of the work.
- .3 The submittal of schedules shall be understood to be the Contractor's representation that the schedule meets the requirements of the Contract Documents and that the work will be executed in the sequence and duration indicated in the schedule.
- .4 Failure to include any element of work required for performance of the Contract or failure to properly sequence the work shall not excuse the Contractor from completing all work within the Contract Time.
- .5 All schedules shall be developed utilizing industry standard 'best practices' including, but not limited to:
 - .1 No open-ended activities.
 - .2 No use of constraints other than those defined in the Contract Documents without the prior approval of the Consultant.
 - .3 No negative leads or lags.
 - .4 No excessive leads or lags without prior justification and approval from the Consultant.
 - .5 For individual schedule construction activities, do not exceed 14 days in duration without prior approval of the Consultant. Subdivide activities exceeding 14 days in duration to an appropriate level.
 - .6 Sufficiently describe schedule activities to include what is to be accomplished in each work area. Express activity durations in whole days. Clearly define work that is to be performed by subcontract.
 - .7 Create the schedule in conformance with the work-hours and constraints set forth in these Contract Documents.
- .6 Include dates for commencement and completion of each major element of construction.
- .7 Show projected percentage of completion of each item as of first day of month.
- .8 Indicate progress of each activity to date of submission schedule.
- .9 Show changes occurring since previous submission of schedule:
 - .1 Major changes in scope.
 - .2 Activities modified since previous submission.
 - .3 Revised projections of progress and completion.
 - .4 Other identifiable changes.

- .10 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 prime contractors.

1.7 Submittals Schedule

- .1 Include schedule for submitting shop drawings, product data, and samples. Indicate manufacture and delivery lead times into the shop drawing submittal schedule.
- .2 Indicate dates for submitting, review time, resubmission time, and last date for meeting fabrication schedule.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Administrative
- .2 Requests for Information
- .3 Shop Drawings and Product Data
- .4 Interference Drawings
- .5 Progress Photographs
- .6 Samples
- .7 Mock-Ups
- .8 Certificates and Transcripts

1.2 Administrative

- .1 Submit to Consultant submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Work affected by submittal shall not proceed until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in metric units.
- .4 Where items or information is not produced in metric units converted values are acceptable.
- .5 Verify field measurements and affected adjacent work are coordinated.
- .6 Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review.
- .7 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant's review.
- .8 Keep one reviewed copy of each submission on site.

1.3 Requests for Information (RFI's)

- .1 Refer to Section 01 26 15 – Requests for Information

1.4 Shop Drawings and Product Data

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures, product data and other data which the Contractor provides to illustrate details of a portion of Work.
- .2 Coordinate each submission with requirements of Work and Contract Documents. Individual submissions will not be reviewed until all related information is available.
- .3 Submit shop drawings bearing stamp and signature of qualified professional Engineer registered or licensed in the Province of Ontario where required by the individual specification sections. Each submittal and each resubmittal must bear the stamp of the Engineer
- .4 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where

articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

- .5 Prior to submission to Consultant, review all submitted drawings. By this review, Contractor represents to have determined and verified field measurements, site conditions, materials, catalogue number and similar data and to have checked and coordinated each drawing with the requirements of Work and of Contract Documents. Contractor's review of each drawing shall be indicated by stamp, date and signature of a responsible person.
- .6 At time of submission, notify Consultant in writing of any deviations in drawings from the requirements of the Contract Documents.
- .7 Allow ten days for Consultant's review of each submission.
- .8 Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
- .9 Make any changes in submitted drawings which Consultant may require, consistent with Contract Documents and resubmit unless otherwise directed by Consultant. When resubmitting, notify Consultant in writing of any revisions other than those requested by Consultant.
- .10 Accompany submissions with transmittal letter containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .11 Submissions 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, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .12 After Consultant's review, distribute copies.

- .13 Submit one electronic copy in PDF format of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.
- .14 Submit electronic copy in PDF format of product data sheets or brochures for requirements requested in Specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.
- .15 Delete information not applicable to project.
- .16 Supplement standard information to provide details applicable to project.
- .17 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, copies will be returned, and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .18 The review of shop drawings by the Consultant is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that the Consultant approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.5 Interference Drawings

- .1 Prepare interference drawings to coordinate the installation of the work of all sections, within available space. Conflicts between trades which could be determined beforehand, by the careful coordination and preparation of interference drawings, shall be corrected at no expense to the Owner.
- .2 Prepare interference drawings of all buried services as necessary to avoid conflicts with new or existing structures, foundations or services.
- .3 Submit interference and equipment placing drawings as specified in Section 01 71 00, when requested by the Consultant.

1.6 Progress Photographs

- .1 Progress photograph to be electronically formatted and labelled as to location and view.

1.7 Samples

- .1 Submit for review samples as requested in respective specification Sections. Label samples with origin, manufacturer, product information, applicable specification section, and intended use.
- .2 Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .3 Where colour, pattern or texture is criterion, submit full range of manufacturer's samples.

- .4 Adjustments made on samples by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
- .5 Make changes in samples which Consultant may require, consistent with Contract Documents.
- .6 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.8 Mock-Ups

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

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Administrative
- .2 Fires
- .3 Disposal of Wastes
- .4 Drainage
- .5 Site Clearing and Plant Protection
- .6 Pollution Control
- .7 Unanticipated Soil Contamination

1.2 References

- .1 Statutes of Canada 1999 Chapter 33.
 - .1 Canadian Environmental Protection Act 1999.
 - .2 SOR/2003-289. Federal Halocarbon Regulations, 2003.
 - .3 Transportation of Dangerous Goods Act, 1992 (1992, c. 34)
- .2 OPSS 805 Construction Specification for Temporary Erosion and Sediment Control Measures
- .3 Province of Ontario Environmental Protection Act, R.S.O. 1990, c. E.19
- .4 Ontario Regulation O Reg 406/19 On-Site and Excess Soil Management

1.3 Administrative

- .1 Comply with all federal, provincial, and municipal regulatory requirements and guidelines for environmental protection and natural resource conservation, including those referenced above.
- .2 Failure to comply with environmental requirements may result in a stop work order or assessment of damages commensurate with repair of damage.
- .3 It is the Contractor's responsibility to be aware of environmental requirements and the best management practices and pollution control measures necessary to meet them.
- .4 It is the Contractor's responsibility to obtain and abide by permits, licenses and compliance certificates at appropriate times and frequencies as required by the authorities having jurisdiction.
- .5 All hazardous materials are to be stored with secondary containment

1.4 Fires

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

1.5 Disposal of Wastes

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.6 Drainage

- .1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
- .2 Do not pump water containing deleterious substances into waterways, sewer or drainage systems.
- .3 Protect storm drains against entry by sediment, debris, oil, or chemicals.

- .4 Control disposal or runoff of water containing deleterious substances or other harmful substances in accordance with local authority requirements.

1.7 Site Clearing and Plant Protection

- .1 Protect trees and plants on site and adjacent properties.
- .2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
- .4 Restrict tree removal to areas indicated.
- .5 Prevent unnecessary disturbance of topsoil and underlying soil from vehicles and heavy equipment.
- .6 Minimize stripping of topsoil and vegetation.
- .7 Comply with the requirements of Ontario Regulation O. REG 406/19, "On-Site and Excess Soil Management", for the importation of new soils and fill materials and the exportation, removal and disposal off-site, of excavated materials. Complete testing of imported and exported materials as required. Unless noted elsewhere, costs for such testing is the responsibility of the contractor and is not included in any allowances. Maintain and submit to authorities having jurisdiction all required test reports, certificates and documentation.

1.8 Pollution Control

- .1 Maintain, inspect, and repair temporary erosion and pollution control features installed under this contract on a weekly basis. Submit inspection logs to the Owner when requested.
- .2 Control emissions from equipment and plant to conform to federal, provincial, and municipal requirements.
- .3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- .4 Take all measures necessary to prevent material and mud tracking on adjacent roads and streets.
- .5 Use mechanical sweepers as often as necessary to keep adjacent roads and streets clean of material and mud that is deposited from this project.
- .6 On site disposal or clean out of concrete trucks is not permitted. Any spillage of concrete onto asphalt or other surfaces must be cleaned up before spillage sets.

1.9 Unanticipated Soil Contamination

- .1 Should unanticipated soil contamination be discovered:
 - .1 Stop work and assess the situation for safety.
 - .2 If situation does not appear to be safe, evacuate workers from area.
 - .3 If safe to do so, take immediate steps to control any spread of contamination, in accordance with Contractor's spill prevention and response plan.
 - .4 Immediately contact the Consultant.

- .2 Removal and disposal off site of contaminated materials shall comply with the requirements of Ontario Regulation O Reg 406/19 On-Site and Excess Soil Management.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 References
- .2 Owner's Regulations
- .3 Standards and Definitions
- .4 Hazardous Materials
- .5 Spills Reporting
- .6 Protection of Water Quality
- .7 Potable Water Systems
- .8 Soils Management
- .9 Access for Inspection and Testing
- .10 Other Regulatory Requirements

1.2 References

- .1 Perform Work in accordance with Ontario Building Code (OBC), National Fire Code of Canada (NFC), the Canadian Electrical Code CSA C22.1:21, including all Supplements and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Where a material is designated in the Contract Documents for a certain application, unless otherwise specified, that material shall conform to standards designated in the Code. Similarly, unless otherwise specified, installation methods and standards of workmanship shall also conform to standards invoked by the aforementioned Code.
- .3 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.
 - .3 Manufacturer's instructions.
- .4 Where requirements of Contract Documents exceed Code requirements provide such additional requirements.
- .5 Where the Contract Documents or the Building Code do not provide all information necessary for complete installation of an item, then the manufacturer's instructions for first quality workmanship shall be strictly complied with.

1.3 Owner's Regulations

- .1 Conform to requirements, regulations and procedures of the Owner.

1.4 Standards and Definitions

- .1 Where a reference is made to specification standards produced by various organizations and agencies, conform to latest edition of standards, as amended and revised to date of Contract.
- .2 Have a copy of each specified standard which relates to the work available on the site to be produced immediately on Consultant's request.

1.5 Hazardous Materials

- .1 Definition: "Hazardous Material" is material, in any form, which by its nature, may be flammable,

explosive, irritating, corrosive, poisonous, or may react violently with other materials, if used, handled or stored improperly. Included are substances prohibited, restricted, designated or otherwise controlled by law.

- .2 Provide SDS for all materials brought to the Place of Work.
- .3 Hazardous Materials will not be introduced for experimental or any other use prior to being evaluated for hazards.
- .4 Make known to the Consultant those hazardous materials or designated substances intended to be used in the workplace and receive permission to use before introducing to the Owner's property.
- .5 Many common construction materials such as asbestos pipe and various insulations are designated substances and shall not be used under any circumstances.

1.6 Spills Reporting

- .1 Spills or discharges of pollutants or contaminants under the control of the Contractor, and spills or discharges of pollutants or contaminants that are a result of the Contractor's operations that cause or are likely to cause adverse effects shall forthwith be reported to the Consultant. Such spills or discharges and their adverse effects shall be as defined in the Environmental Protection Act R.S.O. 1999.
- .2 All spills or discharges of liquid, other than accumulated rain water, from luminaries, internally illuminated signs, lamps, and liquid type transformers under the control of the Contractor, and all spills or discharges from this equipment that are a result of the Contractor's operations shall, unless otherwise indicated in the Contract, be assumed to contain PCB's and shall forthwith be reported to the Consultant.
- .3 This reporting will not relieve the Contractor of his legislated responsibilities regarding such spills or discharges.

1.7 Protection of Water Quality

- .1 No waste or surplus organic material including topsoil is to be stored or disposed of within 30 metres of any watercourses. Run-off from excavation piles will not be permitted to drain directly into watercourses. Where this measure is not sufficient or feasible to control sediment entering the watercourses, sedimentation traps or geo-textile coverage will be required.
- .2 If de-watering is required, the water shall be pumped into a sedimentation pond or diffused onto vegetated areas a minimum of 30 metres from any watercourses and not pumped directly into the watercourses.
- .3 Provide all de-watering and sedimentation control required to properly complete the work of this contract.
- .4 Supply, install and maintain silt/sediment control fencing along the edge of the site or where indicated to intercept construction runoff silt, to the satisfaction of the Owner.

1.8 Potable Water Systems

- .1 Potable water systems in completed buildings must meet criteria and guidelines established by Provincial and Municipal authorities, prior to occupancy by the Owner.

- .2 Upon completion, submit testing certificates verifying water quality and water systems meets all applicable Provincial and Legislated Standards

1.9 Soils Management

- .1 Comply with the requirements of Ontario Regulation O. REG 406/19, "On-Site and Excess Soil Management", for the importation of new soils and fill materials and the exportation, removal and disposal off-site, of excavated materials. Complete testing of imported and exported materials as required. Unless noted elsewhere, costs for such testing is the responsibility of the contractor and is not included in any allowances. Maintain and submit to authorities having jurisdiction all required test reports, certificates and documentation.

1.10 Access for Inspection and Testing

- .1 Cooperate fully with and provide assistance to, all outside authorities including Building Inspectors, utilities, testing agencies and consultants, with the inspection of the Work.

1.11 Other Regulatory Requirements

- .1 Conform to the requirements of the Ontario Ministry of Transportation, Regional and Local authorities regarding transportation of materials.
- .2 Obtain required road occupancy permits.
- .3 Pay any required roadway damage deposits required by the local municipality.
- .4 Conform to the requirements of the Ontario Ministry of the Environment.
- .5 Conform to the requirements of the Ontario Ministry of Labour.
- .6 Conform to the requirements of the local Conservation Authority.
- .7 Conform to all applicable local by-laws, regulations and ordinances.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Inspection
- .2 Independent Inspection Agencies.
- .3 Access to Work
- .4 Procedures
- .5 Rejected Work
- .6 Reports
- .7 Contractors Responsibilities
- .8 Tests and Mix Designs
- .9 Mock-Ups
- .10 Equipment and Systems.

1.2 Inspection

- .1 Contractor is responsible for Quality Control (QC).
- .2 Allow Owner and Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .3 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Consultant instructions, or law of Place of Work.
- .4 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .5 Consultant will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Owner shall pay cost of examination and replacement.

1.3 Independent Inspection Agencies

- .1 Independent Inspection and Testing Agencies will be engaged by Contractor for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the Contractor and paid from the cash allowances specified in Section 01 21 13. Refer to Section 01 29 83 - Payment Procedures for Testing Laboratory Services.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Consultant at no cost to Owner. Pay costs for retesting and re-inspection.

1.4 Access to Work

- .1 Allow inspection and testing agencies access to Work, off site manufacturing and fabrication plants.

- .2 Co-operate to provide reasonable facilities for such access.

1.5 Procedures

- .1 Notify Owner and Consultant 48 hours in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples

1.6 Rejected Work

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

1.7 Reports

- .1 Submit electronic .pdf format inspection and test reports to Consultant.
- .2 Provide copies to Subcontractor of work being inspected or tested or manufacturer or fabricator of material being inspected or tested.

1.8 Contractors Responsibilities

- .1 Be responsible for the execution of the Construction Quality Plan and is to pay all costs for the execution of the Construction Quality Plan. Designate an experienced site representative for carrying out the Construction Quality Plan.
- .2 Provide the Owner with a completed quality product for the Work. Contractor shall be responsible for any costs associated with re-testing and reperforming the Work as a result of the Contractor's poor performance or workmanship or other failure to comply with the Contract Documents.
- .3 All Work shall be done by persons qualified in their respective trades, and the workmanship shall be first-class in every respect. Contractor is responsible for ensuring employees are appropriately trained. All materials and equipment furnished shall be the best of their respective kinds for the intended use and unless otherwise specified, same shall be new and of the latest design.
- .4 The Consultant will have the authority to reject Work that does not conform to the Contract Documents or may require special inspection or testing, whether or not such Work is to be then fabricated, installed or completed.

- .5 Failure by a Contractor to conduct its operations, means and methods and coordinate proper sequencing of the Work may cause the Owner to withhold payment or any other means deemed necessary to correct non-conforming Work.
- .6 The Owner shall engage a testing firm to perform such engineering laboratory services and on-site inspection as deemed necessary by the Owner. The testing firm will determine compliance with the requirements of the Contract Documents. This Work will not be a service to the Contractors for the performing of tests and checking of materials required of the Contractors.
- .7 Copies of test and inspection reports will be furnished to the Contractor. The laboratory and its representatives will be instructed to promptly call to the attention of the Contractor, any instance of non-compliance with the requirements of the Contract Documents. Failure to so notify the Contractor shall not relieve the Contractor of any of its responsibilities for compliance or making good workmanship or materials which are not in compliance with the requirements of the Contract Documents. The agency shall notify the Consultant and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services
- .8 Contractor's construction materials, procedures and work shall be subject to specified testing procedures and shall be in conformance with the Contract Documents as verified by Testing Agency.
- .9 Cooperate with the testing firm and provide labor to assist with sample preparations where applicable.
- .10 Except where specifically indicated to be provided by another entity as identified, inspections, tests, and similar quality control services including those specified to be performed by independent agency are the Contractor's responsibility, and costs thereof are not to be included in contract sum.
- .11 Cooperate with independent agencies performing required inspections, tests, and similar services. Provide auxiliary services as reasonably requested, including access to Work, the taking of samples or assistance with the taking of samples, delivery of samples to test laboratories, and security and protection for samples and test equipment at Project site.
- .12 Coordination: Contractor and each engaged independent agency performing inspections, tests, and similar services for project are required to coordinate and sequence activities so as to accommodate required services with minimum delay of Work and without the need of removal/replacement of work to accommodate inspections and tests. Scheduling of times for inspections, tests, taking of samples, and similar activities is Contractor's responsibility.
- .13 Where sampling and testing is required for Sections of Work listed in the Contract Documents, the tests shall be performed by an independent testing lab and paid for by the Contractor.
- .14 Test procedures to be used shall be submitted for approval of the Consultant where other than those specified are recommended by the testing agency.
- .15 Testing Agency Duties: The independent Testing Agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the Owner, the Consultant and Contractors in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.
- .16 Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.9 Tests and Mix Designs

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

1.10 Mockups

- .1 Prepare mockups for Work specifically requested in specifications.
- .2 Construct in locations acceptable to Consultant.
- .3 Prepare mockups for Consultant's review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mockups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 Mock-ups may remain as part of Work unless indicated otherwise.

1.11 Equipment and Systems

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

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Temporary utilities

1.2 Installation and Removal

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

1.3 Dewatering

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

1.4 Water Supply

- .1 Provide continuous supply of potable water for construction use.
- .2 Arrange for connection with local utility company and pay all costs for installation, maintenance and removal.
- .3 Pay all utility charges.
- .4 Conveniently locate water supply for use by all Sections of the Work. Protect water lines from freezing.
- .5 Water shall be potable and shall meet the requirements of the technical sections of the specifications.

1.5 Temporary Heating and Ventilation

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Construction heaters used inside building must be vented to outside or be flameless type. Solid fuel salamanders are not permitted, unless prior approval is given by the Consultant.
- .3 Provide temporary heat and ventilation in enclosed areas as required to:
 - .1 Facilitate progress of Work.
 - .2 Protect Work and products against dampness and cold.
 - .3 Prevent moisture condensation on surfaces.
 - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
 - .5 Provide adequate ventilation to meet health regulations for safe working environment.
- .4 Maintain temperatures of minimum 10° C in areas where construction is in progress.
- .5 Ventilating:
 - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
 - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances

- into atmosphere of occupied areas.
 - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
 - .4 Ventilate storage spaces containing hazardous or volatile materials.
 - .5 Ventilate temporary sanitary facilities.
 - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
 - .6 Permanent heating system of building may not be used when available, unless there are savings to the Contract Price and Consultant's written permission is obtained stating conditions of use, provisions relating to guarantees on equipment and operation and maintenance of system. Be responsible for damage to heating system if use is permitted.
 - .7 On completion of Work for which permanent heating system is used, replace filters.
 - .8 Ensure Date of Substantial Performance and warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Consultant.
 - .9 Pay costs for maintaining temporary heat, when using permanent heating system. Owner will pay utility charges when temporary heat source is existing building equipment.
 - .10 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .1 Conform to applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.
 - .5 Vent direct fired combustion units to outside.
 - .11 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.
- 1.6 Temporary Power and Light
- .1 Provide and pay for all temporary power during construction.
 - .2 Arrange for connection with utility company. Pay all costs for installation, maintenance and removal.
 - .3 Provide and maintain temporary lighting throughout project. Lighting levels shall be sufficient to complete work including inspections. Provide minimum lighting levels of 400 lux at work areas. Lighting levels at floors and stairs not within work areas shall be not less than 160 lux at all times during construction activity.
 - .4 All equipment used shall be CSA approved.
 - .5 Wiring and method of installation shall conform to local power requirements and shall be reviewed by a licensed inspector prior to use.
- 1.7 Temporary Communication Facilities
- .1 Provide and pay for temporary telephone, fax, cellular data, lines and all equipment necessary for Contractor's own use.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Construction aids
- .2 Site storage
- .3 Construction parking
- .4 Offices
- .5 Equipment, tool and material storage
- .6 Sanitary facilities
- .7 Signage
- .8 Shoring

1.2 References

- .1 CSA Group (CSA)
 - .1 CAN/CSA Z321-96 (R2006) Signs and Symbols for the Workplace
 - .2 CSA Z797:18 (R2023) Code of Practice for Access Scaffold

1.3 Installation and Removal

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

1.4 Scaffolding

- .1 Scaffolding in accordance with CSA Z797.
- .2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms and temporary stairs.
- .3 Enclose and heat scaffolding during cold weather.

1.5 Hoisting

- .1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment.
- .2 Hoists and cranes shall be operated by qualified operator.

1.6 Site Storage/Loading

- .1 Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.7 Construction Parking

- .1 Parking will be permitted on site at areas designated by the Owner provided it does not disrupt performance of Work or ongoing Owners operations.
- .2 Provide and maintain adequate access to project site.
- .3 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.

1.8 Offices

- .1 General Contractor and Subcontractors may provide their own offices as necessary and subject to site constraints. Direct location of these offices.

1.9 Equipment, Tool and Material Storage

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

1.10 Sanitary Facilities

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

1.11 Construction Signage

- .1 Direct requests for approval to erect a Contractor signboard to Consultant.
- .2 Signs and notices for safety and instruction shall be in English. Graphic symbols shall conform to CAN/CSA Z321.
- .3 Post "Construction Zone" signage outside barrier and entrance to all work areas.
- .4 Maintain approved signs and notices in good condition for duration of project and dispose of off-site on completion of project.
- .5 Install signage to direct site traffic and deliveries to the Construction work areas.

1.12 Shoring

- .1 Examine the site to determine the conditions under which work will be performed.
- .2 Contractor shall formulate his own conclusions as to the extent of the existing conditions and shoring required.
- .3 The method of shoring shall be according to the Contractor's and his Engineer's directions.
- .4 All existing loads must be shored prior to commencement of demolition and removal of load bearing elements.
- .5 All shoring and frame braces must be supplied with a safe load rating which must not be exceeded. Install in accordance with manufacturer's recommended procedures and safety guidelines. Ensure that the safe load conditions of the shoring are not exceeded by dead, live or construction loads.
- .6 All shoring shall be subject to the Consultant's review and approval prior to commencing demolition

work.

- .7 Completely remove all shoring after new structure is installed and all concrete is set.
- .8 Submit shoring drawings and a proposed installation procedure stamped by a professional engineer registered in the Province of Ontario. Procedures shall follow the information provided on these drawings. The shoring design engineer shall be retained and paid for by the Contractor. The shoring engineer shall review all existing conditions on site prior to completing shoring design.
- .9 Removal of existing materials without proper engineered shoring is a safety hazard and will not be permitted.
- .10 Make good all damage to the existing structure and adjoining structures and bear full responsibility for failure to provide adequate shoring.
- .11 The failure or refusal of the Consultant to suggest the use of shoring, shall not in any way or to any extent relieve the Contractor of any responsibility concerning the condition of the work or of any of their obligations under the Contract, nor impose any liability on the Owner or their agents; nor shall any delay, whether caused by any action or want of action on the part of the Contractor, or by any act of the Owner, or their agents, or employees, relieve the Contractor from necessity of properly and adequately protecting the existing structure from collapse or damage, nor from and of his obligations under the Contract relating to injury to persons or property, nor entitle him to any claims for extra compensation or an extension in schedule.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Barriers.
- .2 Environmental Controls.
- .3 Traffic Controls.
- .4 Fire Routes.

1.2 Installation and Removal

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

1.1 Site Fencing

- .1 Contractor's lay-down area designated by the Owner must be secure and there must be no access by unauthorized persons. Provide temporary fencing around whole work site. Use modular free-standing fencing: galvanized, minimum 1.8m high, chain link or welded steel mesh, pipe rail. Provide one lockable truck entrance gate and at least one pedestrian door as directed. Equip all gates with locks and keys. Maintain fence in good repair.

1.2 Guard Rails and Barricades

- .1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs and wherever else necessary to prevent accidental falls.
- .2 Provide as required by governing authorities.

1.3 Weather Enclosures

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

1.4 Dust Tight Screens

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

1.5 Protection for Off Site and Public Property

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

1.6 Protection of Building Finishes

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with Consultant locations and installation schedule 3 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

1.7 Protection of Surrounding Work

- .1 Provide protection for finished and partially finished Work from damage.
- .2 Provide necessary cover and protection.
- .3 Be responsible for damage incurred due to lack of or improper or inappropriate protection.

1.8 Public Traffic Flow

- .1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect the public.

1.9 Fire Routes

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

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Product quality, availability, storage, handling, protection, and transportation.
- .2 Manufacturer's instructions.
- .3 Quality of Work, coordination and fastenings.
- .4 Tolerances for Execution of Work.
- .5 Protection of Work in progress.
- .6 Existing Utilities

1.2 Definition – Basis of Design

- .1 Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
 - .1 Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.
- .2 Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
 - .1 Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
- .3 Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 01 33 00 -Submittal Procedures.

1.3 Quality

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

1.4 Availability

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

1.5 Storage, Handling and Protection

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

1.6 Transportation

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by Owner. Contractor shall be responsible for the unloading, handling and storage of such products.

1.7 Manufacturer's Instructions

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

Contract Time.

1.8 Quality of Work

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

1.9 Coordination

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

1.10 Concealment

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

1.11 Remedial Work

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

1.12 Location of Fixtures

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

1.13 Fastenings

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

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

1.14 Fastenings – Equipment

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

1.15 Dielectric Separation

- .1 Ensure that a dielectric separator is provided in a permanent manner over entire contact surfaces to prevent electrolytic action (galvanic corrosion) between dissimilar materials. Similarly, prevent corrosion to aluminum in contact with alkaline materials such as contained in cementitious materials.

1.16 Tolerances for Execution of Work

- .1 Unless specifically indicated otherwise, Work shall be installed plumb, level, square and straight.
- .2 Unless acceptable tolerances are otherwise specified in specification sections, or are otherwise required for proper functioning of equipment, site services and mechanical and electrical systems:
 - .1 "Plumb and level" shall mean plumb or level within 1 mm in 1m.
 - .2 "Square" shall mean not in excess of 10 seconds lesser or greater than 90 degrees.
 - .3 "Straight" shall mean within 1 mm under a 1 m long straight edge.
 - .4 "Flush" shall mean within:
 - .1 6 mm for exterior concrete, masonry and paving materials.
 - .2 1 mm for interior concrete, masonry, tile and similar surfaces.
 - .3 0.5 mm for other interior surfaces.
- .3 Allowable tolerances shall not be cumulative

1.17 Protection of Work in Progress

- .1 Adequately protect Work completed or in progress. Work damaged or defaced due to failure in providing such protection is to be removed and replaced, or repaired, as directed by Consultant, at no increase in Contract Price or Contract Time.
- .2 Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of the Consultant.

1.18 Existing Utilities

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

1.19 Hazardous Materials

- .1 Report any found or suspected hazardous materials to the Owner.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Safety Requirements
- .2 Fire Protection
- .3 Accident Reporting
- .4 Records on Site

1.2 References

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Fire Commissioners of Canada, FC 301, Standard for Construction Operations
- .3 National Fire Protection Agency (NFPA)
 - .1 NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations
- .4 Occupational Health and Safety Act
 - .1 R.R.O. 1990, Reg. 860: Workplace Hazardous Materials Information System (WHMIS)
 - .2 O. Reg. 632/05: Confined Spaces
- .5 Ontario Building Code

1.3 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit to Owner and Consultant copies of the following documents, including updates issued:
 - .1 Notice of Project filed with Ontario Ministry of Labour, Immigration, Training and Skills Development.
 - .2 Site-specific Health and Safety Plan prior to commencement of work on the work site. Plan shall include but not be limited to the following:
 - .1 Name and contact info of Contractor's Health and Safety Representative for Work Site; including twenty-four (24) hour emergency contact phone numbers.
 - .2 Phone numbers of local fire, police, and ambulance outside of 911 services.
 - .3 Location of nearest medical facility and level of injury that each can service.
 - .3 Submit to the Owner, Consultant and Municipal Fire Department, for review, a "Fire Safety Plan" conforming to Section 2.14 of the National Fire Code of Canada. Maintain a copy of the "Fire Safety Plan" on site.
 - .4 Copies of certification for all employees on site of applicable safety training including, but not limited to:
 - .1 WHMIS.
 - .2 Fall arrest and protection.
 - .3 Suspended Access Equipment.
 - .4 Erection of Scaffolding.
 - .5 License for powder actuated devices.
 - .5 On-site Contingency and Emergency Response Plan addressing:
 - .1 Standard procedures to be implemented during emergency situations.
 - .2 Preventative planning and protocols to address possible emergency situations.
- .3 Guidelines for handling, storing, and disposing of hazardous materials that maybe encountered on site, including measures to prevent damage or injury in case of an accidental spill.
- .4 Incident and accident reports, promptly if and upon occurrence
 - .1 Reports or directions issued by authorities having jurisdiction, immediately upon issuance from that authority.

.2 Accident or Incident Reports, within 24 hours of occurrence.

.5 Submit other data, information and documentation upon request by the Consultant as stipulated elsewhere in this section.

1.4 Compliance Requirements

.1 Comply with the latest edition of the Ontario Occupational Health and Safety Act, and the Regulations made pursuant to the Act.

1.5 Constructor

.1 Notify all regulatory bodies required for construction activities, (i.e., Notice of Project, employer notification, etc.). 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. For the purpose of this contract the Contractor shall be the "Constructor".

.2 The "Constructor" will be solely responsible for the safety of all persons on the Site.

1.6 Safety Requirements

.1 Observe and enforce all construction safety measures and comply with the latest edition and amending regulations of the following documents and in the event of any differences among those provisions, the most stringent shall apply:

- .1 Occupational Health and Safety Act (OHSa) and Regulation for Construction Projects, R213/91; April 2025
- .2 Hazardous Products Act (HPA) and the Canada Labour Code (CLC) Part II
- .3 The Workplace Safety and Insurance Act
- .4 Ontario Building Code Act, Ontario Regulation 73/24 including amendments.
- .5 National Building Code of Canada, Part 8: Safety Measures on Construction and Demolition Sites.
- .6 National Fire Code of Canada.
- .7 NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations, 2027 Edition.
- .8 Environmental Protection Act.
- .9 The Power Commission Act.
- .10 The Boiler and Pressure Vessels Act.
- .11 The Elevators and Lifts Act.
- .12 The Operating Engineer's Act.
- .13 Municipal statutes.

.2 Obey all Federal, Provincial and Municipal Laws, Acts, Statutes, Regulations, Ordinances and By-laws which could in any way, pertain to the work outlined in the Contract, or to any employees of the Contractor. Satisfy all statutory requirements imposed by the Occupational Health and Safety Act and Regulations made thereunder, on a Contractor, and Constructor and/or Employer with respect to or arising out of the performance of the Contractors obligations under this Contract.

.3 Working at Heights: The supervisor of the project, will be responsible to ensure that his employees and subcontractors/suppliers have current Working at Heights and Fall Protection certification.

.4 The supervisor of the project will be responsible for his employees and subcontractors/suppliers maintaining standard safety practices, as well as the specific safety rules listed below, while working on the Owner's property.

- .5 The Owner reserves the right to order individuals to leave the site if the individual is in violation of any safety requirement or any Act. Any expense incurred will be the responsibility of the Contractor.
- .6 Notify the Owner should any hazardous condition become apparent.
- .7 Enforce the use of CSA approved hard hats, reflective vests and safety boots for all persons entering or working at the construction site. Refuse admission to those refusing to conform to this requirement.
- .8 Provide safeguard and protection against accident, injury or damage to any person on the site, adjacent work areas and adjacent property.

1.7 Confined Space

- .1 Confined Space: Where applicable, provide the Consultant and all Regulatory Authorities with a copy of the Contractors' Confined Space Entry Procedure. In the event that defined procedures are not available, abide by the applicable requirements of the Occupational Health and Safety Act and all regulations made thereunder.
- .2 Persons intended to work in confined spaces, as defined by the Owner, must have formal training in performing work in confined spaces.
- .3 Provide proof of valid certificates of such training for all workers prior to entry of such workers into confined spaces.
- .4 Provide all necessary safety equipment for entry into confined spaces.
- .5 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.
 - .6 Supply the necessary tools and equipment to perform the confined space entry. These items include, but are not limited to, required documentation, gas detectors, breathing equipment, fall protection and rescue equipment.

1.8 Safety Meetings

- .1 Site toolbox safety meetings will be held weekly for all Contractor employees and all sub trade contractors.
- .2 Where a Joint Health and Safety Committee is required on a project, workers and supervisors, selected, as members of the committee must attend.

1.9 Workplace Hazardous Materials Information System (WHMIS)

- .1 Be familiar with WHMIS regulations and be responsible for compliance.

- .2 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.
- .3 Be responsible for all other requirements of regulations as applicable to Employers.
- .4 All controlled products to be properly labelled and stored.
- .5 Immediately inform Owner and Consultant if any unforeseen or peculiar safety-related factor, hazard, or condition becomes evident during performance of Work.

1.10 Fire Protection

- .1 Provide and maintain safeguard and protection against fire in accordance with current fire codes and regulations.
- .2 Provide temporary fire protection throughout the course of construction. Particular attention shall be paid to the elimination of fire hazards.
- .3 Comply with the requirements of FCC No. 301 Standards for Construction Operations issued by the Fire Commissioner of Canada and the National Building Code.
- .4 Provide and maintain portable fire extinguishers during construction, in accordance with Part 6 of the National Fire Code of Canada 2015 and NFPA 241.
- .5 Maintain unobstructed access for firefighting at all areas in accordance with the National Building Code of Canada.

1.11 First Aid

- .1 Provide such equipment and medical facility as required by WSI Act to supply first aid services to anyone who may be injured at the place of Work. Report all accidents or injuries to the proper authorities and to the Owner and Consultant.

1.12 Accident Reporting

- .1 Investigate and report incidents and accidents as required by Occupational Safety and Health Act, and the Regulations made pursuant to the Act.

1.13 Records on Site

- .1 Maintain on site a copy of the safety documentation as specified in this Section and any other safety related reports and documents issued to or received from the authorities having jurisdiction.
- .2 Upon request, make copies available to the Consultant.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Field Engineering survey services.
- .2 Survey services to establish and confirm inverts for Work.
- .3 Recording of subsurface conditions found.

1.2 References

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

1.3 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit name and address of Surveyor to Consultant.
- .3 On request of Consultant, submit documentation to verify accuracy of field engineering work.
- .4 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform to Contract Documents.

1.4 Examination of Work and Site

- .1 Examine the site to be fully informed of their particulars as related to the Work.
- .2 Verify dimensions of completed Work in place before fabrication of Work to be incorporated with it. Ensure that all necessary job dimensions are taken for the proper execution of the work. Assume complete responsibility for the accuracy and completeness of such dimensions.
- .3 No claims for extra payment will be paid for extra work made necessary or for difficulties encountered due to conditions of the site which were visible or reasonably inferable from an examination of the site at the time prior to tender closing date and furthermore, failure of the Contractor to visit and examine the site shall be deemed a waiver of all claims for extra payment due to any condition of the site existing prior to tender closing date.
- .4 As-found damage: Record by photography and submit evidence to Consultant before commencing work, any found damaged surfaces or materials adjacent to new work, and not included under scope of this new work. Remedial work to any damage, not so recorded, shall be the responsibility of the Contractor.

1.5 Qualifications of Surveyor

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

1.6 Survey Reference Points

- .1 Existing control points are designated on drawings.
- .2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .3 Make no changes or relocations without prior written notice to Consultant.

- .4 Report to Consultant when reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations.
- .5 Require surveyor to replace control points in accordance with original survey control.

1.7 Survey Requirements

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

1.8 Existing Services

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Consultant of findings. The Contractor is responsible for coordination of all utility locates.
- .2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut off points as directed by Consultant.
- .3 Where Work involves breaking into or connecting to existing services, carry out work at times directed by authorities having jurisdiction, with minimum of disturbance to building occupants, pedestrian and vehicular traffic.
- .4 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.
- .5 Install temporary drain plugs to prevent construction debris from blocking pipes downstream of the work.

1.9 Location of Services, Equipment and Fixtures

- .1 Location of services, equipment, fixtures and outlets indicated on drawings or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance. Include existing equipment which affects or will be affected by the work.
- .3 Inform Consultant of impending installation and obtain approval for actual location.
- .4 Location of site services where required, is approximate and is based on information provided by

the Owner. Undertake all locates to determine exact locations of existing services and lay out new services to avoid any conflicts with new building elements, including site improvements, building foundations and other new or existing services.

- .5 Submit field drawings and interference drawings to indicate relative position of various services and equipment. Refer to requirements for interference drawings specified elsewhere.
- .6 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the spaces provided.
- .7 Prepare drawings to indicate coordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus and connections are coordinated.
- .8 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance and access are indicated and maintained.
- .9 Submit interference drawings to Owner and Consultant in accordance with Section 01 33 00.
- .10 Unless specifically indicated by the Consultant, interference drawings will be received for information only and will not be reviewed.

1.10 Records

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 Record locations of maintained, re-routed and abandoned service lines.

1.11 Subsurface Conditions

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

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Requirements and limitations for cutting and patching the Work.

1.2 Submittals

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

1.3 Materials

- .1 As specified and required for original installation.
- .2 Change in Materials: Submit request for substitution in accordance with Section 01 25 00 - Substitution Procedures.
- .3 Requests for change in materials shall include documentation indicating conformance to project requirements and intent.

1.4 Definitions

- .1 Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- .2 Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

PART 2 PRODUCTS

2.1 Materials

- .1 General: Comply with requirements specified in other Sections.
- .2 In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

- .3 If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Consultant for the visual and functional performance of in-place materials.

PART 3 EXECUTION

3.1 Preparation

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

3.2 General

- .1 Carry out all cutting, fitting and patching required for the work of the Contract.
- .2 Repair all wall and floor surfaces where items have been removed.
- .3 Make good all finishes as required.
- .4 Repaint damaged wall surfaces.
- .5 Fit several parts together, to integrate with other Work.
- .6 Uncover Work to install ill-timed Work.
- .7 Remove and replace defective and non-conforming Work.
- .8 Provide cutting and patching of all openings in non-structural elements of Work as necessary to complete installation of mechanical and electrical Work. Include complete removal and replacement of such elements as necessary to provide construction access.
- .9 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .10 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .11 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools are not allowed on masonry work without prior approval.
- .12 Restore work with new products in accordance with requirements of Contract Documents.
- .13 Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

- .14 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with "ULC approved firestopping material, full thickness of the construction element. Include any openings in existing building elements created by removal of existing services or equipment.
- .15 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

3.3 Cutting and Patching

- .1 General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
- .2 Cut in-place 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.
- .3 Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- .4 Temporary Support: Provide temporary support of work to be cut.
- .5 Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- .6 Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 - Summary of Work.
- .7 Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- .8 Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - .1 In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - .2 Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - .3 Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - .4 Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - .5 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.
 - .6 Proceed with patching after construction operations requiring cutting are complete.
- .9 Patching: 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 practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

- .1 Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - .2 Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - .1 Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - .2 Restore damaged pipe covering to its original condition.
 - .3 Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, colour, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform colour and appearance.
 - .1 Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 - .4 Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 - .5 Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- .10 Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.4 Subfloor Levelling

- .1 Where new flooring is to be installed on new concrete slab or on framed floors, subfloor shall be levelled in accordance with flooring manufacturer's specifications and tolerances and with ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

3.5 Fire Barrier Seals

- .1 Ensure fire separations are maintained as indicated on the drawings. Patch and firestop all penetrations accordingly.

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Progressive Cleaning
- .2 Final Cleaning

1.2 References

- .1 National Fire Protection Association (NFPA)
 - .1 NFPA 241-27 Standard for Safeguarding Construction, Alteration, and Demolition Operations

1.3 Project Cleanliness

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

PART 2 PRODUCTS

2.1 Products

- .1 All cleaning materials and products shall be low VOC type. Submit list of cleaning products including SDS for approval prior to commencement of cleaning operations.
- .2 Use only cleaning materials recommended by manufacturer of surface to be cleaned and recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.1 Final Cleaning

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .5 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, floors and ceilings.
- .6 Clean lighting reflectors, lenses, and other lighting surfaces. Clean and/or replace lamps, light fixtures, grilles and lenses.
- .7 HEPA vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .8 Thoroughly vacuum clean interior of electrical equipment.
- .9 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- .10 Clean and seal concrete floor surfaces with non-skid matte sealer.
- .11 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .12 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.
- .13 Broom clean and wash exterior paved areas, walks, steps and surfaces; rake clean other surfaces of grounds.
- .14 Remove dirt and other disfiguration from exterior surfaces.
- .15 Clean and sweep roofs. Clear all drains, scuppers, gutters and downspouts.
- .16 Remove debris and surplus materials from crawl spaces and other accessible concealed spaces.
- .17 Remove snow and ice from access to building.
- .18 Under direction of Consultant, aim adjustable luminaires.

3.2 Waste Management and Disposal

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Construction Waste Management and Disposal.

Project: 26018
Description: Bowmanville Health Centre CT & Radiology Clinic
4 Storey Building Expansion

CLEANING
Section 01 74 11

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 References
- .2 Submittals
- .3 Definitions
- .4 Waste Management Goals for the Project
- .5 Documents
- .6 Waste Management Plan
- .7 Materials Source Separation Program
- .8 Disposal of Wastes
- .9 Scheduling
- .10 Storage, Handling and Protection
- .11 Application
- .12 Diversion of Materials

1.2 References

- .1 O. Reg. 102/94 Waste Audits and Waste Reduction Work Plans.
- .2 O. Reg. 278/05 Occupational Health and Safety Act

1.3 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit a completed Waste Management Plan (WMP) prior to project start-up.

1.4 Definitions

- .1 Waste Management Plan (WMP): Contractor's approved overall strategy for waste management including waste reduction workplan and materials source separation program.
- .2 Materials Source Separation Program (MSSP): Consists of a series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.
- .3 Separate Condition: Refers to waste sorted into individual types.

1.5 Waste Management Goals for the Project

- .1 The Owner has established that this Project shall generate the least amount of waste possible and that processes shall be employed that ensure the generation of as little waste as possible including prevention of damage due to mishandling, improper storage, contamination, inadequate protection or other factors as well as minimizing over packaging and poor quantity estimating.
- .2 Of the waste that is generated, the waste materials designated in this specification shall be salvaged for reuse and or recycling. Waste disposal in landfills or incinerators shall be minimized.

1.6 Waste Management Plan

- .1 Waste Management Plan: Submit a Waste Management Plan within 10 calendar days after receipt of Notice of Award of Contract, or prior to any waste removal, whichever occurs sooner. The Plan shall contain the following:
 - .1 Analysis of the proposed job site waste to be generated, including the types of recyclable and waste materials generated (by volume or weight). In the case of demolition, a list of each item proposed to be salvaged during the course of the project should also be prepared
 - .2 Alternatives to Land Filling: Contractor shall designate responsibility for preparing a list of each material proposed to be salvaged, reused, or recycled during the course of the Project.
- .2 Post WMP or summary where workers at site are able to review its content.

1.7 Materials Source Separation Program

- .1 The Waste Management Plan shall include a Source Separation Program for recyclable waste and shall be in accordance with the established policies currently in place at the local Municipality, and the requirements of O. Reg. 102/94.
- .2 Prepare MSSP and have ready for use prior to project start-up.
- .3 Implement MSSP for waste generated on project in compliance with approved methods and as approved by Consultant.
- .4 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and/or recyclable materials.
- .5 Provide containers to deposit reusable and/or recyclable materials.
- .6 Locate containers to facilitate deposit of materials without hindering daily operations.
- .7 Locate separated materials in areas which minimize material damage.
- .8 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.

1.8 Disposal of Wastes

- .1 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .2 Provide appropriate on-site containers for collection of waste materials and debris. Containers for volatile wastes shall be closed containers and shall be removed from site daily.
- .3 Provide and use clearly marked separate bins for recycling.
- .4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.
- .5 Remove waste material and debris from site and deposit in waste container at end of each working day.
- .6 Do not permit waste to accumulate onsite.

- .7 Burying of rubbish and waste materials is prohibited.
- .8 Disposal of waste into waterways, storm or sanitary sewers is prohibited.

1.9 Scheduling

- .1 Coordinate work with other activities at site to ensure timely and orderly progress of the Work.

1.10 Storage, Handling and Protection

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Owner.
- .2 Materials from building demolition to be salvaged or re-used are to be removed and salvaged.
- .3 Unless specified otherwise, materials for removal become Contractor's property.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Application

- .1 Do work in compliance with Waste Management Plan.
- .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.
- .3 Source separate materials to be reused/recycled into specified sort areas.

3.2 Diversion of Materials

- .1 Separate materials from general waste stream and stockpile in separate piles or containers, to approval of Owner, and consistent with applicable fire regulations. Mark containers or stockpile areas.
- .2 On-site sale of materials is not permitted.

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Administrative procedures preceding preliminary and final inspections of Work.

1.2 References

- .1 Canadian Construction Documents Committee
 - .1 CCDC 2-2020 Stipulated Price Contract including Supplementary Conditions.
- .2 OAA/OGCA Document 100 - Recommended Procedures Regarding Substantial Performance of Construction Contracts and Completion Takeover of Projects.
- .3 The Construction Act.

1.3 Review and Takeover Procedures

- .1 In accordance with OAA/OGCA Document 100, latest edition, except where specified otherwise.
- .2 In OAA/OGCA Document 100, where the term "Architect" is used, substitute the term "Consultant", and where the term "inspection" is used in relation to the Consultant's assessment of the Work, substitute the term "review".
- .3 Arrange and pay for review by local authorities to obtain permission to occupy/occupancy permit (where applicable) prior to applying for Ready-for-Takeover.

1.4 Inspection and Declaration

- .1 Contractor's Inspection: The Contractor shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents. Submit duplicate copies of the deficiency list to the Owner and Consultant.
 - .1 Notify Consultant in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
 - .2 Request Consultant's review.
- .2 Consultant's Review: Consultant and Contractor will perform review of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.
- .3 Completion: submit written certificate that following have been performed:
 - .1 Work has been completed and inspected for compliance with Contract Documents.
 - .2 Defects have been corrected and deficiencies have been completed.
 - .3 Equipment and systems have been tested, adjusted and balanced and are fully operational.
 - .4 Certificates required by Boiler Inspection Branch, Fire Commissioner, Utility companies, TSSA, ESA and other regulatory agencies have been submitted.
 - .5 Operation of systems have been demonstrated to Owner's personnel.
 - .6 Work is complete and ready for Final Review by the Consultant.
- .4 Final Inspection: when items noted above are completed, request final review of Work by Consultant, and Contractor. If Work is deemed incomplete by the Consultant, complete outstanding items and request re-review.
- .5 Declaration of Substantial Performance: when Consultant consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance. Refer to CCDC 2, General Conditions

Article GC 5.4 - Substantial Performance of Work and Payment of Holdback for specifics to application.

- .6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
- .7 Final Payment: When Consultant considers final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. Refer to CCDC 2, General Conditions Article GC 5.5 – Final Payment for specifics to application.
- .8 Payment of Holdback: After issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount in accordance with CCDC 2, General Conditions Article 5.4 - Substantial Performance of Work and Payment of Holdback.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Submittals

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

1.2 Operating and Maintenance Manuals

- .1 Collect reviewed submittals and assemble documents executed by Subcontractors, suppliers, and manufacturers including red-lined as-builts.
- .2 Minimum two weeks prior to commencement of scheduled commissioning activities, submit 2 copies of the draft Operating and Maintenance Manuals, for Consultants review and use during the commissioning activities. After the completion of the commissioning activities, the Consultant will return to the Contractor 1 draft copy, with review comments, for revision. Submit 1 copy of the revised Operating and Maintenance for approval prior to the production of final copies. Prior to the Issuance of the Final Certificate of Completion, and within 10 working days after Substantial Performance, submit 2 copies of the final Operating and Maintenance Manuals.
- .3 Bind contents in a three ring, hard covered, black plastic jacketed binder, with labelling pocket on spine and with 'D' type rings. Size for 8-1/2" x 11" size paper, enclose title sheet labelled "Operating and Maintenance Data Manual", project name, date and list of contents. Organize contents into applicable sections of work to parallel project specification breakdown. Mark each section by labelled tabs protected with celluloid covers fastened to hard paper dividing sheets.
- .4 Include following information as applicable, plus data specified elsewhere:
 - .1 operational information on equipment, cleaning and lubrication schedules, filters, overhaul and adjustment schedules and similar maintenance information; copy of building permit.
 - .2 copy of final inspection certificate by Electrical Safety Authority.
 - .3 Copy of fire alarm verification certificate.
 - .4 Copy of sprinkler test verification certificate.
 - .5 Copy of certificates issued by other utilities.
 - .6 Copies of field tests.
 - .7 Copies of all inspection and testing reports.
 - .8 Maintenance instructions for finished surface and materials.
 - .9 Copy of hardware and paint schedules.
 - .10 Description, operation and maintenance instructions for equipment and systems, including complete list of equipment and parts list.
 - .11 Indicate nameplate information such as make, size, capacity, serial number.
 - .12 Names, addresses and phone numbers of Contractor, Subcontractors and Suppliers, including local source of supplies and replacement parts.
 - .13 Manufacturer's product guarantees and warranties, executed in the name of the Owner, showing name and address of project and guaranty/warranty commencement date and duration of guaranty/warranty, and clear indication of what is being guaranteed and what remedial action will be taken under guaranty/warranty.
 - .1 Separate each warranty or guarantee with index keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer with name, address, and telephone number of responsible principal.
 - .3 Co-execute submittals when required.
 - .14 Additional material used in project listed under various sections showing name of manufacturer and source of supply.
 - .15 A letter on company letterhead clearly stating and verifying that no materials or products containing more than 0.1 per cent asbestos by dry weight has been applied or installed on the project.

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- .5 For Mechanical and Electrical include:
 - .1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with Engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
 - .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
 - .3 Include installed colour coded wiring diagrams.
 - .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
 - .5 Maintenance Requirements: include routine procedures and guide for troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
 - .6 Provide servicing and lubrication schedule, and list of lubricants required.
 - .7 Include manufacturer's printed operation and maintenance instructions.
 - .8 Include sequence of operation by controls manufacturer.
 - .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
 - .10 Provide installed control diagrams by controls manufacturer. Include maintenance and testing schedule.
 - .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
 - .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
 - .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
 - .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control.
 - .15 Additional requirements: as specified in individual specification Sections.
 - .6 Neatly type lists and notes. Use clear drawings, diagrams or manufacturers' literature.
 - .7 Manuals shall include complete set of reviewed shop drawings and product data sheets, indicating corrections and changes made during fabrication and installation.
 - .8 Create electronic copies of manuals, in their entirety in a searchable PDF file format saved to USB flash-drive.
 - .9 Building will not be deemed ready for use unless the draft copies of the Operating and Maintenance Manuals and the "As-built" Record Documents have been submitted and reviewed by the Consultant.
 - .10 Building will not be deemed ready for use unless the completed and submitted Operating and Maintenance Manuals and "As-built" Record Documents have been accepted by the Consultant.
- 1.3 Project Record Documents
- .1 After award of Contract, the Contractor will be provided with electronic copies of the Contract Documents. Contractor will use these to maintain current as-built drawings and specifications by recording deviations caused by site conditions and changes ordered by the Consultant and/or the Owner.
 - .2 Record locations of:
 - .1 Measured depths of elements of foundation in relation to finish first floor datum.

- .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features or structure.
 - .4 Concealed components of mechanical and electrical services;
 - .5 Field changes of dimension and detail.
 - .6 Changes made by Change Order, Change Directive or Site Instruction.
 - .7 Details not on original Contract Drawings.
 - .8 References to related shop drawings and modifications.
- .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .4 Record information on set of drawings, provided by Consultant. Record changes using a different colour of felt tip pen markers for each major system.
- .5 Specifications: legibly mark each item to record actual construction, including:
- .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda, Change Order, Change Directive or Site Instruction.
- .6 Photos of concealed components must be taken and tagged to their locations labelled on the record drawings. Save photos to a USB flash-drive and submit with Contract close-out package.
- .7 Identify all copies of the drawings and specifications as "Project As-built Copy". Maintain in new condition and make available for review on site by Consultant/Owner. At construction completion, neatly and accurately transfer notations to a second set of hard-copy drawings and specifications. Once completed, create electronic copies of both. As-built drawings to be generated in AutoCAD and PDF file formats. As-built specifications to be generated in PDF file format.
- .8 Submit following drawings:
- .1 Record changes in red. Mark on one set of prints and at completion of project prior to final inspection, produce electronic "as-built" records on disk using latest version of AutoCad. Annotate "AS-BUILT RECORD" in each drawing title block.
 - .2 All changes shall be shown on a separate drawing layer named "as-built".
 - .3 Minimum two weeks prior to commencement of scheduled commissioning activities, submit 2 copies of the draft Operating and Maintenance Manuals, for Consultants review and use during the commissioning activities. After the completion of the commissioning activities, the Consultant will return to the Contractor 1 draft copy, with review comments, for revision. Submit 1 copy of the revised Operating and Maintenance for approval prior to the production of final copies. Prior to the Issuance of the Final Certificate of Completion, and within 10 working days after Substantial Performance, submit 2 copies of the final Operating and Maintenance Manuals.
- .9 Minimum 2 weeks prior to application for final payment, submit one (1) electronic copy of the Project Record Documents to Owner via the Consultant.

1.4 Materials and Finishes

- .1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and

methods, and recommended schedule for cleaning and maintenance.

- .3 Moisture-Protection and Weather-Exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional Requirements: as specified in individual specifications Sections.

1.5 Maintenance Materials and Spare Parts

- .1 Where supply of maintenance materials and spare parts are specified, deliver to Owner as follows:
 - .1 Use unbroken cartons, or if not supplied in cartons, they shall be strongly packaged. Supply maintenance materials and spare parts in quantities specified in individual specification sections.
 - .2 Provide only new materials as maintenance materials and spare parts, of the same manufacture, type and quality as incorporated into the Work.
 - .3 If applicable, give colour, room number, or area where material used.
 - .4 Ensure maintenance materials and spare parts provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work

1.6 Special Tools

- .1 Where supply of special tools is specified, deliver to Owner in quantities specified as follows:
 - .1 Provide items with tags identifying their associated function and equipment.
 - .2 Special tools are to be delivered to the Owner prior to the application for Substantial Performance.
 - .3 Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.
 - .4 Ensure spare parts provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

1.7 Storage, Handling and Protection

- .1 Store spare parts, maintenance materials and special tools in manner to prevent damage or deterioration and as follows:
 - .1 Store in original and undamaged condition with manufacturer's seal and labels intact.
 - .2 Store components subject to damage from weather in weatherproof enclosures.
 - .3 Store paints and freezable materials in a heated and ventilated room.
 - .4 Remove and replace damaged products at own expense and to satisfaction of Consultant.
 - .5 Clearly mark containers as to content.
 - .6 Obtain receipt from Owner upon delivery of materials.

1.8 Final Site Survey Certificate

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

1.9 Independent Specialty Engineers Sign-Off

- .1 Provide paper and electronic copies of signed and stamped engineers review and sign-off letters stating that the work has been built in accordance with their drawings and designs. Conditional or vague letters of sign-off will not be accepted. All specialty design engineers for all sub-contractors and suppliers will be required to review the work in progress at appropriate intervals to ensure

compliance with their designs and drawings and shall provide final sign-off letters. Provide copies of all field reports issued by specialty engineers.

1.10 Electronic Documents

- .1 Any electronic documentation submitted must be in the formats described above.
- .2 Any electronic documentation submitted must be compatible with Consultant's computers or the documentation will be returned for re-submission.
- .3 To ensure that the documents are able to be read on a computer different than the Contractor's, enable the "close the disc upon completion" option in the disc authorizing application.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 20 00 Concrete Reinforcing
- .2 Section 03 30 00 Cast-in-Place Concrete
- .3 Section 05 50 00 Metal Fabrications
- .4 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

- .1 American Concrete Institute (ACI)
 - .1 ACI 117-10 Specifications for Tolerances for Concrete Construction and Materials.
 - .2 ACI 347R-14 Guide to Formwork for Concrete
 - .3 ACI SP-4-14 Formwork for Concrete
- .2 CSA Group (CSA)
 - .1 CSA A23.1:19/A23.2:19 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete
 - .2 CSA B111-1974 (R2003) Wire Nails, Spikes and Staples
 - .3 CSA O86:19 Engineering Design in Wood
 - .4 CSA O121-2017 (R2022) Douglas Fir Plywood
 - .5 CSA O141:23 Canadian Standard Lumber
 - .6 CSA S269.1-16 (R2021) Falsework and Formwork
- .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 41-GP-35M Polyvinyl Chloride Waterstop
- .4 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 1204 Material Specification for Polyvinyl Chloride Waterstops

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit shop drawings showing type, extent and locations of items to be built into concrete.
 - .2 Sleeving Drawings: Submit drawings showing sleeves required through floors, roof and other structural members.
 - .3 Submit drawings showing size and spacing of conduits and piping.
 - .4 Coordinate with other Divisions prior to submittal.
 - .5 Do not commence placing sleeves, conduits, or piping before drawings have been reviewed and Consultant's comments incorporated on drawings issued to site.
 - .6 Assume responsibility for accuracy of Work. Review of submitted shop drawings does not relieve Contractor from compliance with requirements of Contract Documents.
- .3 Required by Regulatory Agencies: Submit shop drawings bearing signature and seal of Professional Engineer responsible for formwork design, as may be required by regulatory Agencies. Proceed with construction of formwork only with their approval.

1.5 Quality Assurance

- .1 Obtain a copy of CSA A23.1/A23.2 and maintain on site
- .2 Design of Formwork: Assume full responsibility for complete structural design and construction of formwork in accordance with CSA S269.1 and CSA O86, as applicable.
 - .1 The design and engineering of the formwork, as well as its' construction, shall be the responsibility of the Contractor.
- .3 Formwork shall be designed for the loads and lateral pressures outlined in the ACI publication "SP-4 Formwork for Concrete" and wind pressures and allowable stresses as set down in the National Building Code and in accordance with CSA A23.1 and A23.2. Formwork shall be of sufficient strength and rigidity to support all concrete and construction loads, taking into account proposed rate and method of pouring concrete so that the resultant finished concrete shall conform to the shapes, lines and dimensions of the members shown on the drawings.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Protect formwork to prevent functional damage and damage to faces affecting appearance of concrete surfaces exposed to view.

1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 All materials shall be new, in accordance with referenced standards.
- .2 Plywood: Douglas Fir, conforming to CSA O121. Sound undamaged sheets finished one side, fabricated especially for use as concrete form panels, with sealed edges. Minimum 17mm thickness.
- .3 Lumber: Conforming to CSA O141, with grade stamp clearly visible.
- .4 Chamfers: Cut from 19mm x 19mm wood, smooth with no open defects.
- .5 Form Ties: snap ties, with spreader washer and 25mm break back.
- .6 Void Form: Honeycomb cellular core structure manufactured from kraft fibre. Top and sides protected with wax coated corrugated board, and bottom unprotected.
- .7 Round Column Fibre Forms: Sonotube "W" Coated, by Sonoco Limited.
- .8 Joint Tape: non-staining, water impermeable, self-release.
- .9 Nails, Spikes and Staples: Galvanized, conforming to CSA B111.

- .10 Waterstops: PVC Waterstop to CGSB 41-GP-35M, types 2 and 3 and OPSS 1204:
 - .1 Construction Joints, Internal Waterstop. 150 mm wide, ribbed, centre bulb style tapered thickness varying from 9.5 mm minimum near centre to 6.4 mm minimum near edge.
 - .1 Wirestop PVC Waterstop type CR-6380, with steel wire fastening loops, by Paul Murphy Plastics Company.
 - .2 Vinylex PVC Waterstop type RB6-38 ribbed with centre bulb, by Gamco Inc.
 - .3 Durajoint PVC Waterstop type 5, by Durajoint Concrete Accessories.
 - .4 PVC Waterstop Type 6380, by W. R. Meadows of Canada Ltd.
- .11 Form Release Agent: Colourless mineral oil which will not stain concrete.
- .12 For concrete surfaces exposed to view, provide panels smooth and free of defects which would be reproduced as concrete blemishes.

PART 3 EXECUTION

3.1 Examination

- .1 Before starting this work, examine work done by others which affects this work.
- .2 Notify the Consultant of any conditions which would prevent proper completion of this work.
- .3 Commencement of work implies acceptance of existing conditions.

3.2 Erection

- .1 Verify lines, levels and centres before proceeding with formwork. Ensure dimensions agree with drawings.
- .2 Align joints and make watertight, to prevent leakage of cement paste and disfiguration of concrete.
- .3 Construct formwork to produce concrete with dimensions, lines and levels within tolerances specified in ACI 347R-14.
- .4 Provide formed openings where required for pipes, conduits, sleeves and other work to be embedded in and passing through concrete members.
- .5 Install chamfers at all external corners exposed to view.
- .6 Waterstops:
 - .1 Install waterstops to provide continuous water seal.
 - .2 Do not distort or pierce waterstop in way as to hamper performance.
 - .3 Do not displace reinforcement when installing waterstops.
 - .4 Use equipment to manufacturer's requirements to field splice waterstops.
 - .5 Tie waterstops rigidly in place.
 - .6 Use only straight heat sealed butt joints in field.
 - .7 Use factory welded corners and intersections unless otherwise approved by Consultant.
- .7 Voidform: Install voidform and place 7.5 mm thick plywood over voidform, to provide firm surface for supporting reinforcement.
- .8 Round Fibre Forms:
 - .1 At concealed locations, provide uncoated fibre form.

- .2 Provide round fibre form where indicated for piers, equipment bases, light pole bases, fence foundation and wherever indicated or required.
- .9 Adequately brace and shore formwork to sustain loads (both concrete and working loads) applied during construction.
- .10 Be responsible for safety of the structure both before and after the removal of forms, until the concrete has reached its specified 28 day strength.

3.3 Built-In Work

- .1 Form openings and build in anchors, inserts, sub-frames, key-ways, sleeves, miscellaneous metal items, reglets and similar items furnished under Work of other Sections, which are indicated on Drawings and on shop drawings of other trades, and as required for proper completion of Work.
- .2 Do not embed wood in concrete.
- .3 Anchor Bolts: Tie anchor bolts securely in position to prevent movement during concrete placing. Use template to locate bolts. Verify that bolts have specified projection above concrete.
- .4 Openings or Sleeves Not Shown on Structural Drawings:
 - .1 Obtain Consultant's written approval before forming openings of sleeves through columns and beams, or through slabs within 1800 mm of their supports.
 - .2 Obtain Consultant's written approval before forming openings or sleeves larger than 200 mm square in any location.
- .5 Embedded Pipe or Conduit Not Shown or Detailed on Structural Drawings:
 - .1 Obtain Consultant's written approval before placing conduit or pipe which would be embedded in finished structure.
- .6 Confirm that built-in items that penetrate surface waterproofing are installed to meet requirements of waterproofing trade.

3.4 Construction Joints

- .1 Form construction and expansion joints with bulkheads to ensure straight lines. Immediately before subsequent pour at construction joint, remove bulkhead and tighten forms so that concrete surfaces will be on same plane with no overlapping of concrete.
- .2 Review with Consultant proposed location and details of construction joints in walls, columns, beams and slabs.
 - .1 Construction joints shall present appearance of normal form panel joint.
 - .2 Install continuous shear key in construction joints in walls and framed floors which are 152mm or more thick.
 - .3 Provide vertical construction joints in walls at not more than 20 metres centre to centre.
 - .4 Provide waterstops in accordance with manufacturer's instructions at construction joints in walls which retain earth. Waterstops shall be continuous.

3.5 Treatment of Formwork Surfaces

- .1 Form Release Agent:
 - .1 Coat formwork with form release agent before reinforcement, anchors, accessories, and other built in items are installed.

- .2 Do not coat plywood forms pre-treated with release agent.
- .3 On surfaces to receive finish materials, adhesives, sealers, paint or other coatings or materials, use a compatible release agent.

3.6 Stripping of Formwork

- .1 Strip formwork on vertical surfaces when concrete has hardened sufficiently that no damage will result from stripping operations.
- .2 Do not remove plywood formwork by jerking loose or by metal pinch bars. Use wood wedges and gradually force panels loose. Leave plywood forms in place as long as possible to permit maximum shrinkage away from concrete.
- .3 Take particular care not to damage external corners when stripping formwork.
- .4 When forms are stripped during curing period, cure and protect exposed concrete in accordance with Section 03 30 00 - Cast-in-Place Concrete.

3.7 Defective Work

- .1 Movement and displacement of formwork during construction, variations in excess of specified tolerances, marked and disfigured surfaces, and failure of materials or workmanship to meet requirements of this specification, and which cannot be repaired by approved methods, will be considered defective work.
- .2 Replace defective work, as directed by Consultant.
- .3 Pay for additional inspection and testing, redesign, corrective measures, and related expenses, if work has proven to be deficient.
- .4 Reconstruct defective formwork and replace concrete and reinforcement placed in defective formwork at no additional cost.

3.8 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

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

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM A143/A143M-07(2020) Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
 - .2 ASTM A1064/A1064M-22 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- .2 American Concrete Institute (ACI)
 - .1 ACI SP-66 (04) ACI Detailing Manual
- .3 CSA Group (CSA)
 - .1 CSA A23.1:19/A23.2:19 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete
 - .2 CSA A23.3:19 Design of Concrete Structures
 - .3 CSA G30.18:21 Carbon Steel Bars for Concrete Reinforcement
 - .4 CSA G40.20-13/G40.21-13 (R2018) General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .5 CSA W186:21 Welding of Reinforcing Bars in Reinforced Concrete Construction
- .4 Reinforcing Steel Institute of Canada (RSIC)
 - .1 RSIC Reinforcing Steel Manual of Standard Practice

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit shop drawings, including placing drawings and bar lists.
 - .2 Prepare placing drawings and bar lists in accordance with the American Concrete Institute (ACI) Detailing Manual, and the Reinforcing Steel Institute of Canada (RSIC) Reinforcing Steel Manual of Standard Practice and the typical details included with Contract Documents.
 - .3 Prepare placing drawings to minimum scale of 1:50.
 - .4 Submit placing drawings and bar lists sufficiently detailed and dimensioned to permit correct placement of reinforcement and accessories without reference to architectural or structural Drawings.
 - .5 Show reinforcement, including dowels, in elevation on placing drawings for wall reinforcement.
 - .6 Show concrete cover to reinforcement.
 - .7 Show location of construction joints.
- .3 Inspection Reports: Inspection and Testing Company shall:
 - .1 Submit written reports of inspection and tests.
 - .2 Distribute reports as follows:
 - .1 Consultant.
 - .2 Contractor.

- .4 Quality Assurance Submittals:
 - .1 Mill Test Report: provide Consultant with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.
 - .2 Submit in writing proposed source of reinforcement material to be supplied.

1.5 Quality Assurance

- .1 Obtain a copy of CSA A23.1/A23.2 and maintain on site.
- .2 Qualifications: Welding: Undertake welding of reinforcement only by a fabricator or Subcontractor approved by Canadian Welding Bureau to requirements of CSA W186.
- .3 Source Quality Control: Source Quality Control may be performed by an Inspection and Testing Company appointed by Consultant.
- .4 Review provided by Inspection and Testing Company does not relieve Contractor of his sole responsibility for quality control over Work. Performance or non-performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of the Specification.
- .5 Identify and correlate reinforcing steel from Canadian mills with test reports for compliance with requirements specified.
- .6 Test unidentified reinforcing steel at expense of Contractor. Perform testing for each 1 tonne or part thereof supplied for incorporation in Work.

1.6 Shipping, Handling and Storage

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

1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 In accordance with reference standards.
- .2 Substitute different size bars only if permitted in writing by Consultant.
- .3 Bar Reinforcing Steel:
 - .1 Bars which are to be welded by arc-welding process: to CSA G30.18, Grade 400W.
 - .2 Other bars: to CSA G30.18, Grade 400R.
- .4 Plain round bars: to CSA G40.20-04/G40.21.
- .5 Welded Wire Fabric: to ASTM A1064/A1064M and in flat sheets, not rolls.
- .6 Cold-drawn annealed steel wire ties: to ASTM A497.
- .7 Chairs, bolsters, bar supports, spacers: to CSA A23.1.

- .8 Mechanical splices: subject to approval of Consultant.

2.2 Fabrication

- .1 Fabricate reinforcing steel only in permanent fabricating shop.
- .2 Fabricate reinforcing steel in accordance with shop drawings.
- .3 Tag reinforcing bars to indicate placement as designated on shop drawings.
- .4 Splices:
 - .1 Provide splices only where specifically indicated on Drawings.
 - .2 Stagger alternate mechanical splices 750 mm apart.
 - .3 Stagger alternate end bearing splices 750 mm apart.
 - .4 Install on threaded splices, plastic internal coupler thread protector and plastic bar end thread protector.

PART 3 EXECUTION

3.1 Examination

- .1 Before starting this work, examine work done by others which affects this work.
- .2 Examine formwork to verify that it has been completed, and adequately braced in place.
- .3 Notify the Consultant of any conditions which would prejudice proper completion of this work.
- .4 Commencement of work implies acceptance of existing conditions.

3.2 Installation

- .1 Place reinforcing steel in accordance with reviewed placing drawings, typical details, and CSA A23.3.
- .2 Adequately support reinforcing and secure against displacement within tolerances permitted.
- .3 Place reinforcing steel to provide minimum spacing and proper concrete cover as noted on drawings.
- .4 Do not cut reinforcement to incorporate other Work.
- .5 Relocate or rebend bars only on written instructions of Consultant.
- .6 Tie reinforcement in place. Do not weld.

3.3 Adjusting

- .1 Adjust and secure reinforcement in correct position immediately before concrete is placed.
- .2 Remove contaminants which lessen bond between concrete and reinforcement.

3.4 Field Quality Control

- .1 Provide competent supervisor, with at least three years of experience in reinforcement placement, to direct placement of reinforcement.
- .2 Inspect placement of reinforcement for conformance with Drawings and Specifications, before each concrete placement, and correct as necessary.
- .3 Consultant's periodic review of selected areas of reinforcement are for verification of conformity to design concept and general arrangement only and shall not relieve Contractor of responsibility for quality control, errors, or omissions, or conformance with requirements of Contract Documents.

3.5 Defective Work

- .1 Incorrectly fabricated, misplaced or omitted reinforcement will be considered defective Work.
- .2 Replace or adjust defective reinforcement before concrete is placed as directed by Consultant.
- .3 Replace or strengthen concrete work which is deficient as a result of incorrectly fabricated, misplaced, or omitted reinforcement, which was not corrected before concrete was placed.
- .4 Pay for additional inspection and testing, redesign, corrective measures, and related expenses, if Work has proven to be deficient.

3.6 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 10 00 Concrete Forming and Accessories
- .2 Section 03 20 00 Concrete Reinforcing
- .3 Section 05 31 00 Steel Deck
- .4 Section 07 92 00 Joint Sealants
- .5 Section 31 64 16 Excavated Caissons

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C260/C260M-24 Standard Specification for Air-Entraining Admixtures for Concrete
 - .2 ASTM C295/C295M-19 Standard Guide for Petrographic Examination of Aggregates for Concrete
 - .3 ASTM C309-25 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 - .4 ASTM C330/C330M-23 Standard Specification for Lightweight Aggregates for Structural Concrete
 - .5 ASTM C494/C494M-24 Standard Specification for Chemical Admixtures for Concrete
 - .6 ASTM C881/C881M-20a Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
 - .7 ASTM C1017/C1017M-13e1 Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - .8 ASTM C1107/C1107M-20 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
 - .9 ASTM D412-16(2021) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
 - .10 ASTM D570-22 Standard Test Method for Water Absorption of Plastics
 - .11 ASTM D624-00(2020) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 - .12 ASTM D638-22 Standard Test Method for Tensile Properties of Plastics
 - .13 ASTM D1259-06(2025) Standard Test Methods for Nonvolatile Content of Resin Solutions
 - .14 ASTM D1751-23 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types)
 - .15 ASTM D2240-15(2021) Standard Test Method for Rubber Property—Durometer Hardness
 - .16 ASTM D5329-20 Standard Test Methods for Sealants and Fillers, Hot-Applied, for Joints and Cracks in Asphalt Pavements and Portland Cement Concrete Pavements
- .2 American Concrete Institute (ACI)
 - .1 ACI 117-10 Specifications for Tolerances for Concrete Construction and Materials.
 - .2 ACI 232.1R-12 Report on the Use of Raw or Processed Natural Pozzolans in Concrete
- .3 CSA Group (CSA)
 - .1 CSA A23.1:19/A23.2:19 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete.
 - .2 CSA A283:19 Qualification Code for Concrete Testing Laboratories.
 - .3 CSA A3000-18 Cementitious Materials Compendium
- .4 Ontario Provincial Standard Specifications (OPSS)

- .1 OPSS 1010 Material Specification for Aggregates - Granular A, B, M and Select Subgrade Material.
- .2 OPSS 1212 Material Specification for Hot-Poured Rubberized Asphalt Joint Sealing Compound.
- .5 Government of Canada Treasury Board Secretariat (TBS)
 - .1 Standard on Embodied Carbon in Construction

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Samples: Submit for inspection, material samples of specified mix designs.
- .3 Concrete Mix Designs:
 - .1 Submit concrete mix designs for review. Specify intended use for each mix design.
 - .2 Review of mix design does not relieve Contractor from responsibility for compliance with Contract Documents.
 - .3 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CSA A23.1. Mix design shall be adjusted to prevent alkali aggregate reactivity problems.
 - .4 Provide certification that plant, equipment, and all materials to be used in concrete comply with the requirements of CSA A23.1.
 - .5 Submit written requests for use of admixtures not specified, for site mixing of concrete, and for use of bonding agents.
 - .6 Submit in writing, proposed method of in-situ strength testing.
- .4 Inspection Reports: Inspection and Testing Company shall:
 - .1 Submit written reports of inspection and tests.
 - .2 Distribute reports as follows:
 - .1 Consultant;
 - .2 Contractor.
 - .3 On concrete cylinder test reports, include:
 - .1 Specific location of concrete represented by sample
 - .2 Design strength.
 - .3 Unit weight of sample
 - .4 Class of exposure
 - .5 Aggregate size and mixtures incorporated
 - .6 Date, hour and temperature at time sample taken
 - .7 Percentage air content
 - .8 Test strength of cylinder
 - .9 Type of failure if test fails to meet specification.

1.5 Quality Assurance

- .1 Obtain a copy of CSA A23.1/A23.2 and maintain on site.
- .2 Pre-Construction Conference:
 - .1 At least 35 days prior to the start of concrete construction schedule, conduct a meeting to review proposed mix designs and to discuss detailed requirements of the proposed concrete operations. Review requirements for submittals, coordination, and availability of materials. Establish work progress and sequencing schedules and procedures for material testing, inspection and certifications.

- .3 Source Quality Control:
 - .1 Both source quality control, and field quality control specified in Article 1.5.4, may be performed by an Inspection and Testing Company appointed by Consultant.
 - .2 Review provided by Inspection and Testing Company does not relieve the Contractor of his sole responsibility for quality control over Work. Performance or non- performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of the Specification.
 - .3 Inspection and Testing Company shall be certified under CSA A283, Qualification Code for Concrete Testing Laboratories, for Category 1 Certification.
 - .4 Payment for specified Work performed by Inspection and Testing Company will be made from Cash Allowance.
 - .5 Payment for additional tests (including testing of structure and its performance and load testing) required by changes of materials or mix design requested by Contractor, and failure of completed Work to meet specified requirements, shall be made at Contractor's expense.
 - .6 Perform Work of source quality control in accordance with CSA A23.2 and to include:
 - .1 Verification that ready-mix supplier is qualified to supply concrete in accordance with Specification.
 - .2 Review of proposed concrete mix designs.
 - .3 Sampling, inspection, and testing of materials as may be required.
- .4 Field Quality Control:
 - .1 Inspection and Testing Company, when appointed as specified for Source Quality Control, shall perform sampling, inspection and testing of concrete work at site.
 - .2 Perform sampling, inspection and testing in accordance with CSA A23.2, and to include:
 - .1 Making of standard slump tests.
 - .2 Obtaining of three standard specimens for strength tests from each 100 m of concrete, or fraction thereof, of each mix design of concrete placed in any one day. In addition, for slabs-on-grade, obtain beam specimens for determination of modulus of rupture.
 - .3 Verification that test specimens are stored within an enclosure, maintained at specified temperatures.
 - .4 Making compression tests of each set of three specimens, one at 7 days and two at 28 days; modulus of rupture tests at 90 days.
 - .5 Verification of air content of air-entrained concrete.
 - .1 For Class of exposure F-1, and C-2, test at frequency in accordance with CSA A23.1.
 - .2 Make first test before placing any concrete.
 - .3 After stable air content has been established, frequency of tests will be determined by Consultant.
 - .4 For other Classes of exposure, test at time of obtaining strength test specimens.
 - .3 Inspection for Tolerances:
 - .1 Confirm that concrete work meets specified tolerance requirements.
 - .2 Use the elevation survey records of elevations of finished concrete surfaces specified in Section 03 10 00 and this section as basis for judging compliance.
 - .3 Use approved aluminum straightedge to judge compliance with specified slab tolerances, except use dipstick equipment where F-number tolerance is specified.
 - .4 Slabs-on-Grade:
 - .1 Observe application of curing compound to sample slab, recording rate of application.
 - .2 Monitor on a random basis acceptable to the Consultant, that slab is being saw cut before slab temperature starts to fall.
 - .3 Qualifications: Floor finishing shall be undertaken only by contractors with at least 10 years of experience.
 - .4 Sample of Finish Flooring:

- .1 Finish an area of floor slab where directed by Consultant to provide sample of finish for approval.
- .2 Protect new sample area until finish is approved.
- .3 If liquid membrane curing compound is to be used on Project, determine and apply correct quantity required to meet rate of coverage recommended by manufacturer for measured test area.
- .4 Approved sample will provide standard by which subsequent finishing will be judged and will be incorporated into Work.

1.6 Tolerances

- .1 In accordance with ACI 117 and CSA A23.1.
- .2 Concrete tolerance to CSA A23.1
 - .1 Office Area Thick Finishes:
 - .1 FF = 20/FL = 18
 - .2 Office Area Thin Finishes:
 - .1 FF = 25/FL = 18
 - .3 Elevated Slabs:
 - .1 FF20/FLna
- .3 Floor tolerances must be measured within 72 hours following construction.

1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.

1.8 Job Conditions

- .1 Protect floor slabs, and concrete surfaces exposed to view or on which finishes are to be applied, from grease, oil, and other soil which will affect the appearance of the concrete, or impair the bond of finish material.
- .2 Environmental Conditions: In addition to Cold Weather and Hot Weather Requirements of CSA A23.1, the following shall apply to Work of this Section:
 - .1 Provide protection or heat, or both, so that temperature of concrete at surfaces is maintained at not less than 21 ° C for three days after placing, not less than 10 ° C for the next two days and above freezing for the next two days.
 - .2 Do not permit alternate freezing and thawing for fourteen days after placing.
 - .3 Vent exhaust gases from combustion type heaters to atmosphere outside protection enclosures.
 - .4 Provide protection to maintain concrete continuously moist during curing period.
 - .5 For field cured cylinders representing strength development of in-situ concrete, provide same specified hot and cold weather protection for storage of each concrete compression specimen as for concrete from which it was taken, until it is sent to testing laboratory.
 - .6 Do not place concrete during rain. Should rain commence during placing, cover freshly placed concrete.
 - .7 Do not place bonded toppings on rough slabs that are less than 15 °C.
 - .8 Do not grout at ambient air temperatures or concrete surface temperatures less than 5 ° C, or when temperature is forecast to fall to less than 5 ° C within 24 hours of grouting.
 - .9 Do not apply sealants at ambient air temperatures or concrete surface temperatures less than 5 ° C.

1.9 Project Records

- .1 Maintain record of all concrete pour related to time, date, delivery slip serial number and location of each concrete pour and identify related test cylinders. Keep records on site until project is completed.
- .2 Delivery Records: File duplicate copies of concrete delivery slips on which shall be recorded: supplier, serial number of slip, date, truck number, contractor, Project, Class of exposure, cementing materials content, air content, volume in load, and time of first mixing of aggregate, cementing materials and water.
- .3 Record Drawings:
 - .1 Record on a set of Drawings:
 - .1 founding elevations of all footings
 - .2 variations of foundation Work from that indicated on Drawings.
 - .2 Make record drawings available for Consultant's inspection at all times.

1.10 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 To meet specified requirements of referenced Standards.
- .2 Cement:
 - .1 Portland Cement: to CSA A3000.
 - .2 Cementitious Hydraulic Slag: to ACI 232.1R
- .3 Fine Aggregate: For slabs-on-grade, fineness modulus of fine aggregate to be between 2.7 and 3.1.
- .4 Coarse Aggregates:
 - .1 20 mm to 5 mm (No. 4 sieve) except as specified below.
 - .2 For slabs-on-grade 125 mm and thicker: 40 mm to 5 mm (No. 4 sieve); combine at least two of the single sizes specified in Table 5 Group II of CSA A23.1, one of which is to be 40 mm, to obtain maximum bulk density (unit weight) and optimum grading, in accordance with an approved procedure.
 - .3 For slabs-on-grade: Abrasion loss not to exceed 35%. Petrographic number of aggregate not to exceed 125 when tested in accordance with ASTM C295.
 - .4 For toppings 50 mm thick and less and for slabs over open web steel joists: 12 mm to 5 mm (No. 4 sieve).
- .5 Bonding Agent: To ASTM C881, 100% reactive, 2 component, low viscosity, high modulus bonding adhesive.
- .6 Saw Cut Filler: Semi-rigid epoxy or polyurea in accordance with ACI 302.1R for joint fillers used in control and construction joints.
 - .1 Basis of Design Euco 700 or Euco QWIKjoint UVR by Euclid Chemical.
- .7 Premoulded Joint Fillers: Bituminous impregnated fiber board: to ASTM D1751.

- .8 Sealant: Refer to Section 07 92 00 – Joint Sealants
- .9 Mechanical Anchors: 'Kwik' Bolts, 'Cinch' Anchors or Parabolts.

2.2 Concrete Mixes

- .1 Ready Mix, with 28 day compressive strength as indicated on Drawings.
- .2 Design concrete mix in conformance with CSA A23.1, Tables 1, 2, 5 (Alternative 1) and 17, and as follows. Provide concrete meeting water/cementing materials ratio and air content of Table 14 in accordance with Class of exposure specified in following sub-paragraphs, and minimum strength specified on Drawings. Note that concrete designed in accordance with water/cementing materials ratio of Table 14 may yield strength exceeding minimum strength specified on Drawings.
 - .1 Class of Exposure F2 for exterior footings, foundation walls and piers
 - .2 Class of Exposure N for interior footings, foundation walls and piers
 - .3 Class of Exposure N* for slab on grade.
 - .4 Class of Exposure F-2 for grade beams
 - .5 Class of Exposure C-1 for caissons.
 - .6 Class of Exposure N for all other concrete
 - .7 Class of Exposure C-2 for exterior unreinforced concrete (curbs, gutters and concrete walkways).
 - .8 Slabs-on-Grade:
 - .1 Use type 20 Portland cement, or replace 35 percent Portland cement with cementitious hydraulic slag.
 - .2 When mean daily temperature exceeds 25 ° C at time of placement, replace 25 percent of type 20 cement, or 50 percent of type 10 cement, with cementitious hydraulic slag.
 - .3 Use water/cementing materials ratio 0.45 maximum.
 - .4 Use aggregates specified in paragraphs 2.1.3.
 - .5 Cementing materials content 325 kg/m.
 - .6 Modulus of rupture 3.5 MPa average, 3.0 MPa minimum.
 - .7 Slump at delivery, before addition of superplasticizer, 50 mm; add superplasticizer, not water, to bring slump to level acceptable to floor finisher for placement.
 - .9 Interior Concrete, other than specified above, and not exposed to freezing and thawing or the application of deicing chemicals: select water/cementing materials ratio and cementing materials content on basis of strength, workability, and finishing requirements.
- .3 Submit evidence, and material samples, if requested, acceptable to the Inspection and Testing Company, to verify that the proposed concrete mix design will produce specified quality of concrete.
- .4 List all proposed admixtures in mix design submission. Do not change or add admixtures to approved design mixes without Consultants approval.
- .5 Concrete Weight: Air dry unit weight: minimum 2,300 kg/m; adjusted proportionally for maximum air content listed in CSA A23.1, Clause 15, Table 10.
- .6 Concrete supplier to provide documentation indicating the requirements of TBS Standard on Embodied Carbon in Construction have been met.

2.3 Admixtures

- .1 Chemical Admixture: To ASTM C494. Incorporate water-reducing admixture, type WN, in all concrete.
- .2 Air Entraining Agent: To ASTM C260. Incorporate air-entraining agent in addition to chemical admixture in concrete of relevant Class of exposure, in accordance with CSA A23.1, Clause 15, Table 10.
- .3 Chloride: Do not use calcium chloride or admixtures containing chloride in concrete.

2.4 Concrete Toppings

- .1 Provide topping with minimum 28 day compressive strength of 25 MPa.

2.5 Premixed Grout

- .1 Non-Shrink Metallic: Non-catalyzed metallic grout to ASTM C1107, Compressive strength at 28 days: 48 MPa.
- .2 Non-Shrink, Non Stain, Non-Metallic: to ASTM C1107. Compressive strength at 28 days: 59 MPa.
- .3 Flowable Grout: High-tolerance Non-shrink, Non-metallic shrinkage compensating grout to ASTM C1107. Compressive strength at 28 days: 59 MPa.

PART 3 EXECUTION

3.1 Examination

- .1 Before starting this work, examine work done by others which effects this work.
- .2 Notify Consultant of any condition which would prejudice proper completion of this work.
- .3 Confirm that surfaces on which concrete is to be placed are free of frost and water before placing.
- .4 Confirm that reinforcement, dowels, control joints, inserts and all other built in work are in place and secured.
- .5 Commencement of work implies acceptance of existing conditions.

3.2 Treatment of Formed Surfaces

- .1 Conform to the requirements of CSA A23.1, and as additionally specified herein.
- .2 Treat concrete surfaces which will be exposed or painted in the completed building to provide a "Smooth Rubbed Finish" in accordance with CSA A23.1, uniform in colour and texture.
- .3 Plugs at Recessed Ties:
 - .1 Clean tie holes to remove all foreign matter.
 - .2 Coat plugs by dipping in adhesive and insert in hole.
 - .3 Remove excess adhesive immediately with thinner which will not stain concrete, as recommended by manufacturer.

- .4 Obtain Consultant's approval of finished exposed concrete and grind or otherwise correct to the satisfaction of the Consultant.

3.3 Placing Concrete

- .1 Place concrete in accordance with requirements CSA A23.1/A23.2.
- .2 Notify Consultant and inspection and testing firm at least 24 hours prior to commencement of concrete placing operation and 24 hours before wall forms are closed in.
- .3 Obtain Geotechnical Engineer's confirmation that thickness, elevation and compaction of sub-grade meets specifications before placing concrete.
- .4 Do not place concrete in water or open frozen surfaces.
- .5 Remove contaminants which lessen concrete bond to reinforcement before concrete is placed.
- .6 Maintain accurate records of cast in place concrete items. Record date, location of pour, quantity, air temperature and test samples taken.
- .7 Ensure that reinforcement, inserts, embedded items, formed expansion joints and the like, are not disturbed during concrete placement.
- .8 Joint fillers:
 - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Consultant.
 - .2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
 - .3 Locate and form isolation, construction and expansion joints as indicated.
 - .4 Install joint filler.
 - .5 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.
- .9 Provide construction joint as indicated on the drawings. Ensure dowels are adequately anchored and placed at right angles to the joint before placing concrete.
- .10 Place floor slabs to depth indicated on the drawings with 25 MPa minimum concrete unless otherwise noted on drawings but consistent with minimum cement content specified for exposed floors in this specification.
- .11 Sloping Surfaces and Slabs: commence concrete placement at bottom of sloping surfaces.

3.4 Finishing Concrete

- .1 Perform finishing operations on plastic concrete surfaces in accordance with CSA A23.1, and as specified herein.
- .2 Refer to the drawings for floor finishes and coverings.
- .3 Screed the top of rough floor slabs to an even level or sloping surface at the proper elevation to receive the finish or topping specified on the drawings and in finish schedule.

- .4 Provide a smooth steel trowel finish on all areas scheduled to receive a covering, or painted finish.
- .5 Exposed Floor Surfaces: Provide hard, smooth, dense, steel troweled surface, free from blemishes, and of uniform appearance.
- .6 Non-slip Surfaces: Provide swirl trowel or broom finish of texture acceptable to Consultant.
- .7 Curb Edging: Finish external corners of curbs rounded and smooth.
- .8 Drains:
 - .1 In areas where floor drains are installed, grade the entire floor surface (or as indicated) toward the drains.
 - .2 Floors to be level around walls and have a minimum 5mm/m uniform pitch to drains unless indicated otherwise.
 - .3 The slope shall be such that water on all areas of the floor will drain by gravity without leaving pools or puddles on the floor surface.

3.5 Curing

- .1 Cure concrete in accordance with CSA A23.1 and as specified herein.
- .2 Cure finished concrete surface with an approved curing and sealing compound which will leave the surface with a uniform appearance and with a minimum of discolouration after drying. Ensure that the curing compound will be compatible with the architectural finishes or adhesives for finishes to be applied later. Apply the compound in strict accordance with the manufacturer's instructions.
- .3 Protect surface which will be exposed to direct sunlight during the curing period, with a light coloured, laminated waterproof paper immediately after the curing and sealing compound has hardened sufficiently for the paper to be placed without damage to the sealed surface. Lap the paper a minimum of 100 mm and seal the laps. Leave the paper in place for at least seven days.

3.6 Grouting

- .1 Mix prepackaged grout with water in accordance with manufacturer's printed instructions.
- .2 Dampen concrete surfaces immediately before installing grout.
- .3 Use non-shrink and shrinkage-compensating grouts only when grout will be contained against expansion and self-disintegration.
- .4 Slope grout beyond edge of plate at 45 degrees.
- .5 Provide same environmental protection and curing as specified for concrete.

3.7 Joint Sealant

- .1 Apply sealant specified in Section 07 92 00 to thoroughly dry surfaces only, at ambient air temperatures above 5 ° C.
- .2 Provide sealant on top of joint filler with a polyethylene bond breaker between joint filler and joint sealant applied in accordance with manufacturer's direction.

- .3 Confirm that preformed joint filler and backer rod are compatible with sealant.
- .4 Caulk joints in accordance with the following:
 - .1 Do not commence joint preparation until concrete is at least 28 days old.
 - .2 Thoroughly clean sides of joints with mason's router, or power saw, equipped with double blade where necessary to suit joint width.
 - .3 Blow clean with compressed air with oil trap on line, or vacuum clean.
 - .4 Install backer rod of diameter 25 percent greater than joint width, and type recommended by sealant manufacturer to be compatible with sealant. Locate backer rod to provide for sealant depth of one-half joint width, but not less than 12 mm.
 - .5 Prime joint if required, as recommended by sealant manufacturer.

3.8 Defective Work

- .1 Variations in excess of specified tolerances and marked and disfigured surfaces that cannot be repaired by approved methods will be considered defective work.
- .2 Replace or modify concrete that is out of place or does not conform to lines, detail or grade as directed by the Consultant.
- .3 Replace or repair defectively placed or finished concrete as directed by the Consultant.
- .4 Testing and Replacement of Deficient Concrete in Place:
 - .1 Pay for additional testing and related expenses if concrete has proven to be deficient.
 - .2 Replace or strengthen deficient concrete work as directed by the Consultant, and pay for all testing and related expenses for replaced work until approved by the Consultant.

3.9 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clear away from the building site excess and waste materials and debris resulting from Work of this Section.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 05 21 00 Steel Joists
- .3 Section 05 31 00 Steel Deck
- .4 Section 07 81 16 Cementitious Fireproofing
- .5 Section 07 81 23 Intumescent Fireproofing

1.3 References

- .1 ASTM International, (ASTM)
 - .1 ASTM A108-24 Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
 - .2 ASTM A123/A123M-24 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - .3 ASTM A153/A153M-23 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - .4 ASTM A307-21 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
 - .5 ASTM A653/A653M-25a Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .6 ASTM A1011/A1011M-25 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High-Strength
 - .7 ASTM F3125/F3125M-25a Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi, 144 ksi, and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength
- .2 CSA Group (CSA)
 - .1 CSA G40.20/G40.21-13 (R2018) General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .2 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA S16:19 Design of Steel Structures.
 - .4 CSA S136-16 North American Specification for the Design of Cold Formed Steel Structural Members
 - .5 CSA W47.1:19 Certification of Companies for Fusion Welding of Steel Structures.
 - .6 CSA-W48.1-M1991 (R1998) Carbon Steel Covered Electrodes for Shielded Metal Arc Welding
 - .7 CSA-W55.3-08 (R2013) Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .8 CSA W59-18 Welded Steel Construction (Metal Arc Welding).
 - .9 CSA W178.1-18 Certification of Welding Inspection Organizations.
 - .10 CSA W178.2-18 Certification of Welding Inspectors.
- .3 American Welding Society (AWS)
 - .1 AWS A2.4:2020 Standard Symbols for Welding, Brazing, and Nondestructive Examination
- .4 Structural Steel Painting Council
 - .1 SSPC-SP 6-91 Commercial Blast Cleaning.

- .5 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA)
 - .1 CISC/CPMA 1-73a Quick-Drying, One-Coat Paint for Use on Structural Steel.
- .6 American Institute of Steel Construction (AISC)
 - .1 Code of Standard Practice for Steel Buildings and Bridges, Section 10, Architectural Exposed Structural Steel, latest edition.
- .7 The National Building Code of Canada.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit shop and erection drawings. Submit typical details of connections and any special connections for review before preparation of shop drawings. Assume responsibility for the accuracy of Work. Review of submitted shop drawings is to ensure only that the Contract Documents are being correctly interpreted.
- .3 Professional Engineer responsible for connection design shall sign and seal each shop drawing.
- .4 Show on shop drawings the size, spacing, and the location of structural steel members; connections; attachments; reinforcing; anchorage and required inserts; and all necessary plans, elevations and details.
- .5 Show splice locations and details.
- .6 Welded connections shall be designated by welding symbols in compliance with AWS A2.4 and indicate clearly net weld lengths.
- .7 Submit design calculations if requested by the Consultant.
- .8 Submit diagrams showing methods of erection.
- .9 Field Work Drawings shall be submitted as shop drawings.
- .10 Notify Consultant in writing of any deviations in shop drawings from the requirements of the Contract Documents.
- .11 Submit a schedule of fabrication to the Consultant and the Testing Agency, prior to commencement of fabrication.

1.5 Qualifications

- .1 Undertake welding and/or welding inspection by welders fully approved to one or more of the reference codes and standards where applicable.
- .2 Applicator Qualifications (Intumescent Coatings):
 - .1 Approved, certified and supervised by manufacturer of fire resistive coating materials.
 - .2 Company shall have minimum five years documented experience.

1.6 Quality Assurance

- .1 Connections:

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- .1 Connections designed by Engineer: Submission of shop drawings for connection which have been detailed on Drawings shall represent acceptance by Contractor that connection can be executed successfully.
 - .2 Design of other connections which cannot be selected from standard designs tabulated in CISC Handbook of Steel Construction shall be by a Professional Engineer, licensed in the Province of Ontario, experienced in structural steel connection design.
 - .3 Consultant will review connection arrangement to verify general conformance with overall design concept of structure.
 - .4 Connection design engineer shall be insured for professional liability in accordance with section 74 subsection (1) of Regulation 941 of the Ontario Professional Engineers Act. The alternative of compliance with subsection (2) is not acceptable.
 - .5 Provide connections adequate to resist reaction of beam, when beam is loaded to maximum flexural capacity under uniformly distributed load, unless reaction or connection detail is shown on Drawings.
 - .1 Provide flexible beam connections for unrestrained members in accordance with CSA S16.1, unless shown otherwise on Drawings.
 - .2 Select connections, wherever possible, from standard designs tabulated in current edition of CISC Handbook of Steel Construction, except that length of beam web angles shall not be less than half the depth of beam, and single angles shall not be used.
 - .3 Provide direct connections to flanges of spandrel beams (exterior perimeter beams) to restrain twisting.
 - .2 Design:
 - .1 Connections:
 - .1 Provide bolted or welded connections, unless shown otherwise on Drawings.
 - .2 Use high strength bolts to ASTM F3125 for all connections.
 - .3 Use slip resistant (friction-type) connections for bolted joints designed to resist reversible forces.
 - .4 Provide tension adjustment hardware at rod type bracing and at flat bar type bracing.
 - .5 Do not permit connections to encroach on clearance lines required for installation of Work of other Sections.
 - .3 Random Splicing: Obtain in writing from Consultant, prior to commencement of shop drawings, special requirements that will be imposed as a necessary condition of acceptance of members with randomly located butt welded splices.
 - .4 All edge perimeter angles and bent plates installed at roof framing level shall be joined by butt weld splices designed for full tension capacity of members being joined.
 - .5 Meet with applicator of applied intumescent coatings to review requirements for preparation and application of shop-applied fire resistive coatings.
 - 1.7 Tolerances
 - .1 In addition to tolerances specified in CSA S16, erect shelf angles and sash angles attached to steel frame within a tolerance of 3 mm plus or minus, with abutting ends of members at the same level.
 - 1.8 Inspection and Testing
 - .1 Inspection and testing of materials and shop fabrication of Work of this Section, and field quality control, will be performed by an independent Inspection and Testing Company.

- .2 The Inspection and Testing Company shall meet qualification requirements of CSA W178.1 and shall be certified by the Canadian Welding Bureau in Category 1 Buildings.
- .3 Welding Inspectors and supervisors shall be certified by Canadian Welding Bureau to CSA W178.2, to minimum level 2 certification.
- .4 Provide free access for inspectors to all places work is being performed, whether on site or off.
- .5 Mill inspection shall ensure that materials conform to specified requirements. Mill test reports, properly correlated to the materials, will be accepted in lieu of physical tests.
- .6 Shop inspection shall ensure that structural steel is fabricated in accordance with the shop drawings, and the specified fabrication and welding procedures.
- .7 The cost of inspection and testing of splices introduced by the fabricator and not required on the Contract Documents will be paid by the Contractor.
- .8 Inspection and Testing Company when appointed shall carry out shop inspection to verify:
 - .1 Structural materials and paint conform to Specifications. Mill test reports, properly correlated to the materials, will be accepted in lieu of physical tests of structural materials.
 - .2 Fabrication and welding conforms to Specifications and dimensioned shop drawings.
 - .3 Shop cleaning and preparation and prime painting to conform to specified requirements.
 - .4 Surfaces inaccessible for cleaning and painting after assembly are treated before assembly.
 - .5 For surfaces painted with zinc rich paint or zinc primer, specified surface preparation is followed and specified paint thickness is applied.
 - .6 For testing of shop-applied fire resistive Intumescent Coatings, refer to Section 07 81 23.
- .9 Non-destructive Testing of Welded Connections: Carry out non-destructive testing of welded connections chosen at random as follows:
 - .1 Check and record steel member sizes for 20% of beams.
 - .2 Check 5% of all welds by magnetic particle inspection.
 - .3 Check 25% of moment connections and all connections subject to direct tension involving use of full penetration groove welds by ultrasonic testing.
 - .4 Check 10% (minimum 2 per connection) in accordance with Section 23 of CSA S16 of pretensioned connections including main building bracing connections.
- .10 More frequent testing and inspection shall be completed if random tests described above are not satisfactory. These costs are to be paid by the Contractor.

1.9 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver products that are only supplied under work of this Section to those who are responsible for their installation, to the work site as directed and to meet construction schedule.
- .3 Handle and store structural steel in such a manner that no damage, including corrosion, is caused to the stored or erected work, or to other property.
- .4 Protect all steel members with shop applied intumescent coatings during delivery, handling and erection as directed by coating manufacturer. Store in a manner to avoid damage.
- .5 Store structural steel off of ground on timber supports.

1.10 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Rolled shapes, hollow structural sections, plates and rods: new steel, in compliance with CSA and/or ASTM Standards indicated on Structural Drawings.
- .2 Welding Electrodes: to meet the requirements set forth in the applicable standard of the CSA W48 Series on welding electrodes. (Any process which produces deposited weld metal meeting the requirements of the applicable W48 Series Standard for any grade of arc welding electrodes shall be accepted as equivalent to the use of such electrodes.)
- .3 High Strength Bolts: to meet specified requirements of ASTM F3125
- .4 Machine Bolts: to meet specified requirements of ASTM A307.
- .5 Anchor Bolts: To CSA-G40.20/G40.21, Grade 300W.
- .6 Shop Coat Paint:
 - .1 Interior Structural Steel: To meet specified requirements of CISC/CPMA 1-73a and compatible with Master Painters Institute INT 5.1S or 5.1X Institutional low odour/low VOC semi-gloss finish. Colour to be grey.
 - .2 Exposed Bracing and Connections: Intumescent Fireproofing basecoat and topcoat as specified in Section 07 81 23.
- .7 Galvanizing: hot dipped with zinc coating to CSA G164, ASTM A123 or ASTM A153.

PART 3 EXECUTION

3.1 Fabrication

- .1 Fabricate work of this Section in compliance with CSA S16, and as specified following.
- .2 Connections:
 - .1 Make bolted or welded connections.
 - .2 Use high strength bolts unless otherwise noted on Drawings.
 - .3 Use friction type high strength bolts for the connections of bracing members (diagonal kickers) resisting the effects of applied lateral loads. Provide tension adjustment at flat bar and rod type lateral bracing.
 - .4 Do not permit connections to encroach on the clearance lines required for the installation of work of this Section.
- .3 Beam Connections:
 - .1 Provide beam connections adequate to resist the reactions produced by the framing or load conditions.
 - .2 Provide beam to column connections that apply vertical reaction with negligible eccentricity at the connecting face of the column, such as single or double beam web connections, end plate connections or un-stiffened seats, unless otherwise shown on Drawings. Submit for

- review, in advance of the preparation of shop drawings, connections which do not meet these requirements.
- .3 Provide connections complying with the requirements of the CISC Handbook of Steel Construction, except that the length of beam web angles shall not be less than half the depth of the beam and single angles shall not be used.
 - .4 Provide direct connections to flanges of spandrel beams to restrain twisting.
- .4 Holes in Structural Members:
- .1 Punch holes 11 mm to 27 mm in diameter as required for attaching the work of other Sections to structural steel members. Locate holes so that no appreciable reduction of the strength of members is caused.
 - .2 Provide holes for pipes and ducts, and reinforce openings as indicated on drawings. Cutting of holes in structural members in the field will not be permitted except with written approval of the Consultant.
 - .3 Provide effective drainage holes to prevent the accumulation of water in tubular members.
- .5 Member Separators: Provide separators at approximate spacing of 1200 mm o.c. for double beams and channels as follows:
- .1 For beams and channels 225 mm or less in depth: one or two rows of pipe separators.
 - .2 For beams and channels over 225 mm in depth: channel separators, unless otherwise detailed on Drawings.
- .6 Built up Compression Members General Requirements: Comply with the requirements of CSA-S16, for all built up compression members.
- .7 Column Bearing Plates: Mill column bearing plates under column bearing unless plate is sufficiently flat to give adequate contact bearing between column and plate.
- .8 Structural Steel Painting: All prime painting shall be shop applied and the responsibility of the steel fabricator. Refer to specific priming requirements specified in Section 09 91 23 - Interior Painting.
- .1 Paint in accordance with manufacturer's published directions. Paint steel in the shop under cover. Keep painted members under cover until the paint has dried.
 - .2 Clean and prepare surfaces, as appropriate for paint specified, in accordance with Commercial Blast Cleaning is only required where zinc rich paint is to be applied. All other steel to be or clean steel in compliance with SSPC SP6 where zinc rich paint is shop applied.
 - .3 Where paint is applied adjacent to welded joints, remove it to bare metal for a distance of at least 50 mm beyond sides of joints.
 - .4 Do not paint surfaces and edges to be field welded, contact surfaces of friction type connections assembled by high strength bolts, surfaces encased in or in contact with concrete.
 - .5 Intumescent fireproofing primer and finish coats on exposed interior bracing members and connections shall be shop applied in accordance with manufacturer's recommendations and approved submittals. Refer to Section 07 81 23.
 - .6 Do not paint surfaces to receive Cementitious Fireproofing.
- .9 Galvanizing: Galvanize members as indicated and in accordance with reference standards, after shop welding is complete.
- .1 Steel members, fabrications, and assemblies shall be galvanized after fabrication by the hot dip process in accordance with CSA G164 or ASTM A123.

- .2 Bolts, nuts, washers, iron, and steel hardware components shall be galvanized in accordance with CSA G164 or ASTM A153.
- .3 Coating Requirements:
 - .1 Weight: the weight of the galvanized coating shall conform with Table 1 of CSA G164 or paragraph 6.1 of ASTM A123 and Table 1 of ASTM A153 (as appropriate).
 - .2 Surface Finish: The galvanized coating shall be continuous, adherent, as smooth and evenly distributed as possible and free from any defect that is detrimental to the stated end use of the coated article.
- .4 The integrity of the coating shall be determined by visual inspection and coating thickness measurements.
- .5 Adhesion: the galvanized coating shall be sufficiently adherent to withstand normal handling.

3.2 Examination

- .1 Verify, before delivery of structural steel, that work of other Sections on which work of this Section is dependent is correctly installed and located.

3.3 Preparation

- .1 Supply anchor bolts, base and bearing plates and other members to be built in under work of other Sections as the work progresses. Cooperate with installers of this work and provide instructions for setting items to be built in.

3.4 Erection

- .1 Comply with CSA S16 and work site safety plans in erection of work of this Section.
- .2 Make adequate provision for horizontal and vertical erection loads and for sufficient temporary bracing to keep structural frame plumb and in true alignment until the completion of erection, and the installation of masonry, concrete work, and floor and roof decks which provide the necessary permanent bracing.
- .3 Provide temporary steel members as may be required for erection purposes and remove them when no longer required.
- .4 Installation of Bearing and Column Base Plates: Install bearing plates and standard wall anchors for beams bearing on masonry or concrete.
 - .1 Set loose beam bearing plates and column base plates, at proper elevation, true and level, with steel shims, ready for grouting as specified under work of other Sections.
 - .2 Set loose bearing plates and/or levelling plates to be cast into concrete.

3.5 Coating Touch-Up

- .1 Clean welds with wire brushes and wash down with clean water to ensure no residue from electrodes is present.
- .2 After erection, give one coat of prime coat or zinc rich paint as applicable and specified for shop coat to field bolts, field connections, burnt areas, and abrasions or damage to shop coats.
- .3 Touch up all areas with a specified paint film thickness.

- .4 Give areas of bare metal on galvanized members two coats of zinc-rich paint. Repair coating on architecturally exposed galvanized metals in accordance with reference standards and as directed by the Consultant. Replace any materials where damage cannot be repaired to the satisfaction of the Consultant.

.5 Intumescent Coatings:

- .1 Touch up any damaged areas of fire protective intumescent coatings in accordance with manufacturer's instructions and to the entire satisfaction of the Consultant. Refer to Section 07 81 23.

.6

3.6 Field Quality Control

- .1 Inspection and Testing Company, when appointed as specified in Source Quality Control elsewhere in this Section, shall perform:

- .1 Inspection of erection and fit-up, including placing, plumbing, levelling and temporary bracing and conformance with specified tolerances.
- .2 Inspection of bolted connections, including verification that ASTM A307, ASTM F3125 snug tight only bolts, and ASTM F3125 pre-tensioned bolts have been installed and used appropriately, and that threads are excluded from shear plane where required.
- .3 Inspection of welded joints, including slag removal.
- .4 General inspection of field cutting and alterations; report immediately to Consultant, any alterations or cutting not shown on reviewed shop drawings.
- .5 General inspection of shop coating touch-up.
- .6 Inspection of zinc primer and zinc-rich paint, including surface preparation and coating thickness.

3.7 Defective Work

- .1 Variations in excess of specified tolerances, and failure of materials or workmanship to meet requirements of this specification, and which cannot be repaired by approved methods, will be considered defective Work performed by this Section.
- .2 Replace defective Work, as directed by Consultant.
- .3 Pay for additional inspection and testing, redesign, corrective measures, and related expenses if Work has proven to be deficient.

3.8 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- | | | |
|----|------------------|---------------------------|
| .1 | Section 03 20 00 | Concrete Reinforcing |
| .2 | Section 03 30 00 | Cast-in-Place Concrete |
| .3 | Section 05 12 23 | Structural Steel |
| .4 | Section 05 31 00 | Steel Deck |
| .5 | Section 07 81 16 | Cementitious Fireproofing |

1.3 References

- .1 ASTM International, (ASTM)
- .1 ASTM A108-24 Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
 - .2 ASTM A1011/A1011M-25 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High-Strength
- .2 CSA Group (CSA)
- .1 CSA S16:19 Design of Steel Structures
 - .2 CSA S136-16 North American Specification for the Design of Cold Formed Steel Structural Members
 - .3 CSA W47.1:19 Certification of Companies for Fusion Welding of Steel
 - .4 CSA-W48.1-M1991 (R1998) Carbon Steel Covered Electrodes for Shielded Metal Arc Welding
 - .5 CSA W59-18 Welded Steel Construction (Metal Arc Welding)
 - .6 CSA W55.3-08 (R2018) Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings
 - .7 CSA W178.1-18 Certification of Welding Inspection Organizations
 - .8 CSA W178.2-18 Certification of Welding Inspectors
- .3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA)
- .1 CISC/CPMA 2-75 Quick-Drying, Primer for Use on Structural Steel
 - .2 CISC/CPMA 1-73a Quick-Drying, One-Coat Paint for Use on Structural Steel
- .4 The National Building Code of Canada.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
- .1 Submit steel joist shop drawings as defined in reference standards. Shop drawings shall be stamped by a Professional Engineer registered in the Province of Ontario. Each submission of the shop drawings shall bear the seal of the Engineer.
 - .2 Indicate, in addition, dimensioned intersections of members, critical bending moments due to eccentricities, joist spacing, framing for openings, and slopes.
 - .3 Detail welded connections using standard symbols for welding joints as published in the current CISC Handbook of Steel Construction.

- .4 Indicate on erection drawings, for each type of joist and bearing condition, the centre of bearing assumed in design and the maximum allowable distance from this point to the intersection of the axes of the chord and the end diagonal.
- .5 Review all shop drawings prior to submission. By this review, the Contractor represents that he has determined and verified all field measurements, field construction criteria, materials, catalogue number and similar data or will do so and that he has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The Contractor's review of each shop drawing shall be indicated by stamp, date and signature of a responsible person.
- .6 At time of submission, notify the Consultant in writing of any deviations in the shop drawings from the requirements of the Contract Documents.
- .7 The Consultant will review and return shop drawings in accordance with any schedule agreed on, or otherwise with reasonable promptness. The Consultant's review will be for conformity to the design concept and for general arrangement only and such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the Contract Documents unless a deviation on the shop drawings has been approved in writing by the Consultant.
- .8 Make any changes in shop drawings which the Consultant may require and resubmit unless otherwise directed by Consultant. When resubmitting the Contractor shall notify the Consultant in writing of any revisions other than those requested by the Consultant.

1.5 Quality Assurance

.1 Design Criteria

- .1 Design joists to carry loads indicated on structural drawings.
- .2 Design joist to ensure that total load deflection does not exceed $1/240$ of the span and live load deflection does not exceed $1/360$ of the span.
- .3 Analyze joists composed wholly or in part of cold formed structural members as rigidly connected linear elastic frame works, including all joint eccentricities. Design cold formed members for combined axial loads and bending moments predicted by analysis. Design hot rolled members for combined axial load and bending moment if eccentricity at one or both ends exceeds limits of reference standards above.
- .4 Tie Joists: Where tie joists are used, design tie joist, columns and connections to resist the member forces predicted by a linear elastic analysis.
- .5 Design special joist components to allow the passage of mechanical and electrical services through webs of joists, where so indicated on the structural drawings.
- .6 Design of joists shall be by a Professional Engineer licensed in the Province of Ontario and experienced in steel joist design.
- .7 Design framing members to meet minimum requirements of ULC for listed assemblies

.2 Source Quality Control

- .1 Inspection and testing of materials and shop fabrication of work of this Section, and field quality control specified elsewhere in this Section, will be performed by an Inspection and Testing Company appointed by the Consultant.
- .2 The Inspection and Testing Company, and welding inspectors and supervisors shall meet qualification requirements of CSA W178, and shall be certified by the Canadian Welding Bureau in Category (1), Buildings.
- .3 Provide free access for inspectors to all places work is being performed.
- .4 Shop Inspection shall ensure that materials conform to specified requirements. Mill test reports, properly correlated to the materials, will be accepted in lieu of physical tests. Inspection shall ensure that fit up, fabrication, and shop painting conform to specified requirements and dimensioned shop drawings.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver products that are supplied only under work of this Section to those who are responsible for their installation, to the place they direct and to meet construction schedule.
- .3 Handle and store joists in such a manner that no damage, including corrosion, is caused to the stored or erected work, or to other property.
- .4 Store all steel joists off of the ground on timber supports.

1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Steel Joists: Formed of hot rolled or cold formed shapes, hollow structural sections, plates and rods: new steel, in compliance with CSA and/or ASTM Standards indicated on Structural Drawings.
- .2 Shop Coat Paint: To meet specified requirements of CISC/CPMA Standard 1-73a and compatible with Master Painters Institute INT 5.1S Institutional low odour/low VOC semi-gloss finish.

2.2 Fabrication

- .1 Fabricate joists with their attachments and accessories in accordance with the reference standards.
- .2 Provide top chords of sufficient width and material thickness to permit 20 mm diameter arc spot welds of deck to joist to be formed, in accordance with CSA S136.
- .3 Prepare joists for attachment of other work as indicated on drawings and required for construction.
- .4 Fabricate bridging not less than 3 mm in thickness.
- .5 Extend bottom chords of joists where required to support ceiling or walls as shown on drawings.
- .6 Fabricate joists and shoes to accommodate roof slopes shown on drawings.
- .7 Fabricate web systems to allow clearances for transverse mechanical and electrical services to pass through where so indicated on structural drawings.
- .8 Provide shoe depths to suit elevations of bearings in each location.
- .9 Fabricate joists of uniform appearance for erection in areas where they are exposed to view.

2.3 Cleaning and Painting

- .1 Coordinate with Section 07 81 16 and apply prime paint to steel joists scheduled to be covered with cementitious fireproofing only if such application does not affect or alter the design criteria for fireproof assemblies.
- .2 Painting: All prime painting shall be shop applied and the responsibility of the fabricator.
 - .1 Paint in accordance with manufacturer's published directions. Paint steel in the shop under cover. Keep painted members under cover until the paint has dried.
 - .2 Clean and prepare surfaces, as appropriate for paint specified, in accordance with CISC/CPMA 2-75 or clean steel in compliance with SSPC SP6 where zinc rich paint is shop applied.
 - .3 Where paint is applied adjacent to welded joints, remove it to bare metal for a distance of at least 50 mm beyond sides of joints.
 - .4 Do not paint surfaces and edges to be field welded, surfaces encased in or in contact with concrete or masonry.
- .3 Mark joists to indicate erection orientation when they are fabricated to special design or loading requirements.
- .4 Identify each joist with mark corresponding to shop drawing designation.

PART 3 EXECUTION

3.1 Examination

- .1 Verify, before delivery of joists, that work to receive joists is located correctly and at proper levels.

3.2 Preparation

- .1 Provide necessary instructions to other trades for installation of bearings and anchors installed under work of other Sections. Assist in installation if requested.
- .2 If steel surfaces are painted where connections are made by welding at the site, remove paint to bare metal for a distance of at least 50 mm beyond sides of joints.

3.3 Erection

- .1 Comply with CSA S16 and work site safety plans in erection of work of this Section.
- .2 Refer to drawings for the work of other Sections and locate joists to avoid interference with ceiling construction, recessed lights, mechanical and electrical services, and similar work.
- .3 Install shims, packing or special shoes to support joists at proper elevation.
- .4 Carry joists to centre line of beams, with a tolerance of +0 mm and 25 mm for beams with joists bearing from both sides, and +25 mm and 0 mm for beams with joists bearing from one side only.
- .5 Weld each joist at bearings on structural steel members and bearing plates, or as indicated on drawings.
- .6 Install framing for openings between joists as indicated on drawings.

- .7 Bridging:
 - .1 Install steel bridging, transverse to joist spans to meet specified requirements of reference standards.
 - .2 Locate bridging at panel points wherever possible.
 - .3 Locate bridging to ensure no interference with recessed lights, and mechanical and electrical services.
 - .4 Top chord load distributing bridging may be used in lieu of normal top chord bridging specified above.

3.4 Field Quality Control

- .1 Perform field inspection by Inspection and Testing Company to meet requirements specified under Source Quality Control of this Section, and to include:
 - .1 Inspection of erection and fit up, including placing joist beaming, plumbing, levelling and temporary and permanent bracing.
 - .2 Verification for each end of each joist that the distance from the centre of bearing to the end tension web member does not exceed the maximum dimension given on the drawings.
 - .3 Inspection of welded and bolted connections.
 - .4 General inspection of shop coating touch up.
- .2 Inspection & Testing Company shall:
 - .1 Submit reports at least weekly when shop and site work is in progress.
 - .2 Distribute inspection reports as follows:
 - .1 2 copies to Consultant;
 - .2 1 copy to Contractor;
 - .3 2 copies to Fabricator.
 - .4 Sign report by inspector who performs inspection, and describe progress of Work, deficiencies found and corrective actions taken.
 - .5 Include deficiency list of outstanding items from previous reports, and comment on status.

3.5 Coating Touch Up

- .1 After erection, give one coat of paint specified for shop coat to field bolts, field connections, burnt areas, and abrasions or damage to shop coats.

3.6 Defective Work

- .1 Variations in excess of specified tolerances, and failure of materials or workmanship to meet requirements of this specification, and which cannot be repaired by approved methods, will be considered defective Work performed by this Section.
- .2 Replace defective Work, as directed by Consultant.
- .3 Pay for additional inspection and testing, redesign, corrective measures, and related expenses if Work has proven to be deficient.

3.7 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- | | | |
|----|------------------|----------------------------|
| .1 | Section 03 30 00 | Cast-in-Place Concrete |
| .2 | Section 05 12 23 | Structural Steel |
| .3 | Section 05 21 00 | Steel Joists |
| .4 | Section 05 50 00 | Metal Fabrications |
| .5 | Section 06 10 00 | Rough Carpentry |
| .6 | Section 07 81 16 | Cementitious Fireproofing. |

1.3 References

- .1 ASTM International, (ASTM)
- .1 ASTM A653/A653M-25a Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- .2 CSA Group (CSA)
- .1 CSA S16:19 Design of Steel Structures
- .2 CSA S136-16 North American Specification for the Design of Cold Formed Steel Structural Members
- .3 CSA W47.1:19 Certification of Companies for Fusion Welding of Steel Structures.
- .4 CSA W48:23 Filler Metals and Allied Materials for Metal Arc Welding
- .5 CSA W55.3-08 Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .6 CSA W59-18 Welded Steel Construction (Metal Arc Welding)
- .3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB 1.181-99 Ready-Mixed Organic Zinc-Rich Coating
- .4 Canadian Sheet Steel Building Institute (CSSBI)
- .1 CSSBI 10M Standard for Steel Roof Deck
- .2 CSSBI 12M Standard for Composite Steel Deck

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit drawings stamped and signed by qualified professional engineer registered or licensed in Province of Ontario, Canada. Each submission of the shop drawings shall bear the seal of the Engineer.
- .1 Indicate deck plan, profile, dimensions, base steel thickness, metallic coating designation, connections to supports and spacings, projections, openings, reinforcement details and accessories.
- .2 Indicate details of temporary shoring of steel deck.
- .3 Submit design calculations if requested by Consultant.

1.5 Design Requirements

- .1 Design steel deck using limit states design in accordance with CSA S136 and CSSBI 10M.

- .2 Steel deck and connections to steel framing to carry dead, live and other loads including lateral loads, diaphragm action, and uplift as indicated.
- .3 Deflection under specified live load not to exceed 1/240 of span, except that when gypsum board ceilings are hung directly from deck, live load deflection not to exceed 1/360 of span.
- .4 Design composite deck sections in accordance with the National Building Code of Canada for concrete strength indicated on drawings.
- .5 Where vibration effects are to be controlled as indicated, dynamic characteristics of decking system to be designed to be in accordance with CSA S16.

1.6 Shipping, Handling and Storage

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

1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Sheet Steel: ASTM A653 minimum Grade 230 with a base steel design thickness or 0.76 mm or greater and a minimum zinc-iron alloy coating designation of ZF75.
- .2 Closures: in accordance with manufacturer's recommendations.
- .3 Cover plates, cell closures and flashings: steel sheet with minimum base steel thickness of 0.76 mm. Metallic coating same as deck material.
- .4 Primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.2 Types of Decking

- .1 Deck shall conform to the depths noted on the drawings.
- .2 Steel roof deck: to CSSBI 10M non-cellular, interlocking side laps. Base steel thickness, depth & profile as shown on the drawings.
- .3 Composite steel floor deck: to CSSBI 12M non-cellular, upright embossed fluted profile, interlocking side lap, base steel thickness, depth & profile as shown on the drawings. Flat sheet for cellular deck, 0.76 mm minimum base steel thickness or as noted on drawings.

PART 3 EXECUTION

3.1 General

- .1 Structural steel work: in accordance with CSA S136 and CSSBI 10M.

- .2 Welding: in accordance with CSA W59, except where specified otherwise.
- .3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel and/or CSA W55.3 for resistance welding.

3.2 Erection

- .1 Erect steel deck as indicated and in accordance with CSA S136, CSSBI 10M, CSSBI 12M and with reviewed erection drawings.
- .2 Lap ends: to 50 mm minimum.
- .3 Place and support reinforcing steel as indicated.
- .4 Immediately after deck is permanently secured in place, touch up metallic coated top surface with compatible primer where burned by welding.
- .5 Prior to concrete placement, steel deck to be free of soil, debris, standing water, loose mil scale and other foreign matter.
- .6 Temporary shoring, if required, to be designed to support construction loads, wet concrete and other construction equipment. Do not remove temporary shoring until concrete attains 75% of its specified 28 day compression strength.

3.3 Closures

- .1 Install closures in accordance with approved details.

3.4 Openings and Areas of Concentrated Loads

- .1 No reinforcement required for openings cut in deck which are smaller than 150 mm square.
- .2 Frame deck openings with any one dimension between 150 to 300 mm as recommended by manufacturer, except as otherwise indicated.
- .3 For deck openings with any one dimension greater than 300 mm and for areas of concentrated load, reinforce in accordance with structural framing details, except as otherwise indicated.

3.5 Connections

- .1 Install connections in accordance with CSSBI recommendations as indicated.

3.6 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 07 21 13 Building Insulation

1.3 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's technical data sheets. These documents shall describe the physical properties of the material, installation techniques, restrictions, limitations and other manufacturer recommendations.

1.4 Quality Assurance

- .1 The manufacturer of elastomeric bitumen products will provide proof of ISO 9001 and ISO 14001 certifications.
- .2 Waterproofing work shall be performed only by skilled applicators, employed by an installation contractor operating all adequate and necessary equipment to execute such work in accordance with the manufacturer's recommendations and recognized standards.
- .3 The waterproofing materials manufacturer may delegate a representative to visit the work site at commencement of work.
 - .1 Permit and facilitate access to the site by the manufacturer's representative cited above.

1.5 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Rolls of materials shall be handled with care and proper equipment.
- .3 Rolls of materials shall be carefully stored and adequately protected in accordance with the manufacturer's recommendations.

1.6 Project Conditions

- .1 Do not apply membrane when air or surface temperatures are below 4° C.
- .2 Do not apply to frozen concrete.
- .3 Ensure new concrete surfaces are fully cured.
 - .1 New concrete shall be in place a minimum 28 days before proceeding.
 - .2 Any cementitious repair mortars must have a full 7-day cure prior to coating unless otherwise approved in writing by Consultant.

1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.8 Warranty

- .1 The product manufacturer shall issue a written and signed document in the name of the Owner, certifying the product will meet all the physical characteristic published by the manufacturer, for a period of 10 years, starting from the date of Substantial Performance. No letter amending the manufacturer's standard warranty will be accepted and the warranty certificate must reflect these requirements.

PART 2 PRODUCTS

2.1 Waterproofing Membrane

- .1 Description: A self-adhesive waterproofing membrane composed of SBS modified bitumen and a Tri-Laminate Woven Polyethylene facer. The self-adhesive side shall be covered by a silicone release sheet.
- .2 Characteristics:
- .1 Thickness: 1.5 mm
 - .2 Roll size: Width: 1 m Length: 18.7 m
 - .3 Ultimate elongation (MD/XD) : 40 / 25 %
 - .4 Static puncture resistance : 400 N
 - .5 Tear resistance (MD/XD) : 375 / 400 N
 - .6 Tensile strength (MD/XD) : 11.3 / 15.4 kN/m
- .3 Basis of Design Products: COLPHENE 3000 by SOPREMA.

2.2 Primer for Self-Adhesive Membranes

- .1 Description: A blend of elastomeric bitumen, volatile solvents, and adhesive enhancing resins used to prime porous substrates and non-porous substrates such as wood, concrete or metal to enhance the adhesion of self-adhesive membranes at temperatures above 10 degrees C
- .2 Basis of Design Product: SOPRASEAL STICK PRIMER by SOPREMA

2.3 Accessories

- .1 Waterproofing Mastic
- .1 Description: Black, solvent-based mastic containing SBS modified bitumen, fibres and mineral fillers.
- .1 Basis of Design Product: SOPRAMASTIC by SOPREMA.
- .2 Drainage Board
- .1 Description: Dimpled high-density polyethylene panel with factory laminated geotextile.
- .2 Characteristics:
- .1 Compressive Strength (kPa): 550
 - .2 Roll dimensions (m): Width: 1.83 m - Length: 15.25 m
- .3 Basis of Design Product: SOPRADRAIN 10G by SOPREMA.

- .3 Termination Bar:
 - .1 As recommended by manufacturer.

PART 3 EXECUTION

3.1 Examination and Preparation

- .1 Examine surfaces to receive membrane. Notify Consultant if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.
- .2 Before waterproofing work begins, the Owner's representative and the membrane contractor's foreman will inspect and approve substrate condition and ensure that related work has been properly executed. If necessary, a non-conformity notice will be issued to the contractor so that required corrections can be made. The start of the membrane application will mean that substrate conditions are acceptable for work completion.
- .3 Before commencing work, all surfaces must be smooth, dry, clean and free of ice and debris as per manufacturer's recommendations.
- .4 No materials shall be installed during rain or snowfall.
- .5 Concrete must be cured a minimum of fourteen days and an adhesion test is recommended before membrane application.
- .6 Verify the compatibility of all membrane components with curing compounds, coatings or other materials which are already installed on the surfaces to be treated.
- .7 Any cracks over 3 mm wide shall be reported to the Consultant. After approval from the Consultant, the crack shall be filled in with waterproofing mastic. A 150 mm wide strip of membrane shall be installed, centered over the crack.

3.2 Method of Execution

- .1 Work shall be performed on a continuous basis as surface and weather conditions allow.
- .2 Adjoining surfaces shall be protected against any damage that could result from the waterproofing installation.
- .3 Maintain all equipment and tools in good working order.

3.3 Primer Application

- .1 Surface where membrane is applied shall receive an SBS synthetic rubber primer coating at the rate of: (porous surfaces: 0.3 to 0.5 L/m², non-porous surfaces: 0.1 to 0.25 L/m²). . If not covered the same day, primed surfaces must be re-primed.

3.4 Application

- .1 Apply waterproofing membrane system in accordance with manufacturer's instructions.
- .2 Select the proper product according to temperatures during application.

- .3 All small protrusions (pipes, etc.) through the waterproofing membrane, shall be pre-stripped with a membrane and sealed with waterproofing mastic.
- .4 To begin application, align the first roll of membrane to a previously drawn chalk line.
- .5 All edges must be pre-stripped with a 150 mm wide strip of membrane centered on the corner. This membrane must be installed in direct contact with the substrate not leaving any voids under the membrane strip.
- .6 Install the membrane onto the primed surface by peeling back the paper backing on the underside and adhering the membrane to the surface.
- .7 Subsequent rolls must be installed in the same manner and shall be aligned with the preceding roll with a side lap of at least 75 mm. End laps must be overlapped at least 150 mm.
- .8 Holes and tears in the membrane must be repaired with the appropriate membrane material. The repair must exceed the affected surface area by at least 75 mm. The membrane piece applied for the repair must be sealed around its edges with mastic.
- .9 Use a roller approved by manufacturer to apply pressure over the entire surface of the membrane to ensure perfect adhesion.
- .10 The contractor shall verify meticulously the membrane installation at the end of each day of work and before backfilling.
- .11 The uppermost edge of the membrane is to be mechanically fastened to the concrete substrate using applicable fasteners and termination bars.
- .12 Apply mastic on the top edge of membrane to prevent water infiltration.
- .13 Any waterproofing membrane left exposed after backfilling shall be protected from ultraviolet and mechanical damages.

3.5 Drainage Board Installation

- .1 Drape the drainage board and secure without fastening through the waterproofing membrane or tape to the waterproofing membrane.
- .2 Drainage board must be installed with the fabric towards the backfill.

3.6 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 07 13 26.16 Self-Adhering Sheet Waterproofing
- .3 Section 07 26 00 Vapour Retarders
- .4 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C272/C272M-18(2024) Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions
 - .2 ASTM C518-21 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
 - .3 ASTM D1621-16(2023) Standard Test Method for Compressive Properties of Rigid Cellular Plastics
 - .4 ASTM D2842-25 Standard Test Method for Water Absorption of Rigid Cellular Plastics
 - .5 ASTM E96/E96M-24a Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
- .2 Underwriters Laboratories Canada (ULC)
 - .1 ULC 701.1 Standard for Thermal Insulation, Polystyrene Boards
 - .2 ULC 704 Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit insulation manufacturer's product literature including specified physical properties for each type of insulation specified.
- .3 Submit certification that product complies with specification requirements and is suitable for the use indicated.

1.5 Environmental Requirements

- .1 Insulation shall not be produced with, or contain, any of the regulated CFC compounds listed in the Montreal Protocol of the United Nations Environmental Program.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Deliver material to the site in the original unbroken packages bearing the name of manufacturer.

- .4 Store materials in an approved manner at the site preceding application and protect from damage at all times.
- .5 Remove damaged or deteriorated materials from site.

1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.8 Warranty

- .1 Provide written warranty that the actual thermal resistance of the extruded polystyrene foam insulation will not vary by more than 10% from its published thermal resistance.
- .2 Warranty period is 15 years after date of Substantial Performance.

PART 2 PRODUCTS

2.1 Board Insulation

- .1 Rigid insulation at perimeter of ground floor slab and below grade: Extruded expanded polystyrene to ULC S701.1 TYPE 4. HFO blowing agents. Thickness as detailed, 400 x 2440 mm boards with butt edges. Material shall have the following characteristics when tested to the reference standards:
 - .1 Minimum Compressive Strength: ASTM D1621: 210 kPa.
 - .2 Water Absorption: ASTM D2842: maximum 0.7% by volume.
 - .3 Water Absorption: ASTM C272: maximum 0.1% by volume.
 - .4 Water Vapour Permeance, ASTM E96: 52 ng/Pa•s•m²
 - .5 Thermal resistance RSI: ASTM C518: 0.88/25 mm
 - .1 Basis of Design: Soprema XPS-30
- .2 Adhesives: As recommended by material manufacturer, compatible with insulation and substrate membrane, waterproof, conforming to CGSB 71-GP-24M.
- .3 Primer for concrete surfaces recommended by the adhesive manufacturer for the materials to be adhered.

2.2 Accessories

- .1 Vapour Retarder: As specified in Section 07 26 00.

PART 3 EXECUTION

3.1 Installation – General

- .1 Install insulation of types indicated, or, where not indicated, as appropriate, to provide a continuously un-interrupted building envelope in accordance with the requirements of the reference standards.
- .2 Install insulation after building substrate materials are dry.
- .3 Install insulation to maintain continuity of thermal protection to building elements and spaces.

- .4 Fit insulation tightly around all structural angles, penetrations and other protrusions.
- .5 Cut and trim insulation neatly to fit spaces. Butt joints tightly; offset vertical joints.
- .6 Insulation board materials shall be free from chipped or broken edges.
- .7 Do not enclose or conceal insulation until it has been inspected by the Consultant.

3.2 Perimeter Insulation

- .1 Do not proceed with installation until concrete surfaces are dry and cured, and water proofing membranes have been inspected and approved.
- .2 Install perimeter insulation vertically just prior to backfilling.
- .3 Prime porous concrete surfaces.
- .4 Apply adhesive in gobs or pads to the back of the insulation board in accordance with manufacturer's instructions. Joints shall be left dry with joints brought into tight contact. Apply insulation to the wall with a slight sliding motion to ensure good contact.
- .5 Protect insulation from damage until time for backfilling.
- .6 Following backfilling and prior to placement of underslab vapour barriers, install horizontal insulation. Install rigid insulation at perimeter of all exterior walls and for extent as indicated. Tightly butt joints.

3.3 Underslab Insulation

- .1 Under slab application: Following backfilling and prior to placement of underslab vapour barriers, install horizontal insulation. Install rigid insulation for extent as indicated. Lay boards on level compacted fill. Tightly butt joints. Stagger joints in multiple layers as indicated.
- .2 Extend boards as indicated on Drawings, and as follows:
 - .1 Lay boards on level compacted fill.
 - .2 Protect top surface of horizontal insulation from damage during concrete work.

3.4 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 07 21 13 Building Insulation
- .3 Section 07 92 00 Joint Sealants
- .4 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM E84-26a Standard Test Method for Surface Burning Characteristics of Building Materials
 - .2 ASTM E96/E96M-24a Standard Test Methods for Water Vapor Transmission of Materials
 - .3 ASTM E154/E154M-08a(2025) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground CoverASTM E1643-18a Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
 - .4 ASTM E1745-17(2023) Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
 - .5 ASTM F1249-20 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor
- .2 American Concrete Institute (ACI)
 - .1 ACI 302.1R Guide for Concrete Floor and Slab Construction

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's product data including certification that materials meet the requirements of the reference standards, and application instructions.

1.5 Project Conditions

- .1 Products specified are not intended for uses subject to abuse or permanent exposure to the elements.
- .2 Do not apply membranes on frozen ground.

1.6 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 federal, provincial and local regulations controlling use of

volatile organic compounds (VOCs).

1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- .4 Store materials in a clean dry area in accordance with manufacturer's instructions. Stack membrane on smooth ground or wood platform to eliminate warping.
- .5 Protect materials during handling and application to prevent damage or contamination.
- .6 Ensure membrane is stamped with manufacturer's name, product name, and membrane thickness at intervals of no more than 220 cm.

1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Sheet Vapour Barrier for Below Concrete Slabs on Grade

- .1 Vapour retarder membrane shall be manufactured from virgin polyolefin resins, and when tested according to all requirements of ASTM E1745, shall meet the following minimum performance requirements:
 - .1 Maximum Water Vapour Permeance (ASTM E154 Sections 7, 8, 11, 12, 13, by ASTM E96, Method B or ASTM F1249).
 - .1 As received: 0.0063 perms.
 - .2 After Wetting and Drying: 0.0052 perms.
 - .3 Resistance to Plastic Flow and Temperature: 0.0057 perms.
 - .4 Effect Low Temperature and Flexibility: 0.0052 perms.
 - .5 Resistance to Deterioration from Organisms and Substances in Contacting Soil: 0.0052 perms.
 - .2 Puncture Resistance (ASTM D1709): >3,200 grams.
 - .3 Tensile Strength ASTM E154, Section 9: 72 Lb. Force/Inch
 - .4 Acceptable product:
 - .1 Perminator 15 mil, as manufactured by W.R. Meadows
 - .2 Stego Wrap Vapor Barrier by Stego Industries LLC.
- .2 Seam Tape: High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 100 mm.
 - .1 Perminator Tape by W.R. Meadows
 - .2 Stego Tape by Stego Industries LLC.
- .3 Pipe Collars: Construct pipe collars from vapour retarder material and pressure sensitive tape per manufacturer's instructions.

- .4 Seam Tape: High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 100 mm.
 - .1 Perminator Tape by W.R. Meadows
 - .2 Stego Tape by Stego Industries LLC.
- .5 Pipe Collars: Construct pipe collars from vapor barrier material and pressure sensitive tape per manufacturer's instructions.

PART 3 EXECUTION

3.1 Vapour Retarders Below Slabs

- .1 Install sheet vapour retarder below all concrete slabs on grade.
- .2 Prepare surfaces in accordance with manufacturers recommendations.
- .3 Level, tamp, or roll earth or granular material beneath the slab base.
- .4 Install vapour retarder below floor slab immediately prior to concrete reinforcement placement and in accordance with ASTM E1643
- .5 Unroll vapour retarder with the longest dimension parallel with the direction of the pour.
- .6 Lap vapour retarder over footings and seal to foundation walls.
- .7 Overlap joints 150 mm and seal with manufacturer's tape.
- .8 Seal all penetrations (including pipes and conduits) with manufacturer's pipe boot.
- .9 No penetration of the vapour retarder is allowed except for reinforcing steel and permanent utilities.
- .10 Repair damaged areas by cutting patches of vapour retarder, overlapping damaged area 150 mm and taping all four sides with tape.
- .11 Restrict traffic over vapour retarder.
- .12 Prior to placing concrete inspect vapour retarder and repair all tears and punctures.

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

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 05 12 23 Structural Steel
- .2 Section 07 84 00 Firestopping
- .3 Section 07 81 16 Cementitious Fireproofing
- .4 Section 09 91 23 Interior Painting

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM D2240-15(2021) Standard Test Method for Rubber Property—Durometer Hardness
 - .2 ASTM D2794-93(2019) Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
 - .3 ASTM D3960-05(2018) Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
 - .4 ASTM D4060-19 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
 - .5 ASTM E84-26a Standard Test Method for Surface Burning Characteristics of Building Materials
 - .6 ASTM E119-20 Standard Test Methods for Fire Tests of Building Construction and Materials
 - .7 ASTM E595-15(2021) Standard Test Method for Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in a Vacuum Environment
 - .8 ASTM E736/E736M-19 Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
 - .9 ASTM E759/E759M-92(2020) Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members
 - .10 ASTM E761/E761M - 92(2020) Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
 - .11 ASTM E2924-14(2020) Standard Practice for Intumescent Coatings
- .2 Association of the Wall and Ceiling Industries - International (AWCI)
 - .1 Technical Manual 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire-Resistive Materials; an Annotated Guide.
- .3 Underwriters' Laboratories of Canada (ULC)
 - .1 List of Equipment and Materials, Fire Resistance, current edition.
- .4 Underwriters Laboratories Inc. (ULI)
 - .1 Fire Resistance Directory, Volume 1, current edition.
 - .2 ULC 101 Standard Methods of Fire Endurance Tests of Building Construction and Materials.
- .5 Intertek Testing Services / Warnock Hersey International, Inc. (ITS/WH):
 - .1 Directory of Listed Products, current edition.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit product data for specified products. Include product data indicating product characteristics, performance and limitation criteria.

- .3 Samples: Submit full range of manufacturer's standard topcoat colours for selection by the Consultant.
- .4 Quality Assurance/Control Submittals:
 - .1 Design Data: ULC and FM published test designs for fire resistive coating application to substrate materials required and test reports showing compliance with specified physical performance characteristics and physical properties.
 - .2 Manufacturer's installation instructions.

1.5 Quality Assurance

- .1 Manufacturer Qualifications:
 - .1 Company specializing in manufacturing products of this section for a minimum of 10 years.
 - .2 Company's quality management system shall have been assessed and registered by an independent registrar as conforming to the requirements of the standard ISO 9001:1994.
- .2 Applicator Qualifications:
 - .1 Approved, certified and supervised by manufacturer of fire resistive coating materials.
 - .2 Company shall have minimum five years documented experience.
- .3 Product Qualifications: Manufactured under ULI, ULC, ITS/WH and/or FM Follow-up Programs. Each container or package shall bear ULI, ULC, ITS/WH and/or FM label.
- .4 Regulatory Requirements: Conform to applicable codes for fire resistance ratings. Submit certification of acceptability of fire resistive coating materials to consultant and authority having jurisdiction.

1.6 Project Conditions

- .1 Environmental Requirements
 - .1 Protect work area from windblown dust and rain. Protect adjacent areas from overspray.
 - .2 Provide ventilation in areas to receive work of this Section, during application and for 24 hours (minimum) after application.
- .2 Provide metal pans or adequate tarpaulin to protect surfaces in areas assigned for the storage and mixing of paints.
- .3 Temperature and Humidity Requirements:
 - .1 Do not apply thin-film intumescent fire-resistive coating when temperature of substrate and/or surrounding air is below 10 °C. Use electric or natural gas heat, if supplemental heat is required.
 - .2 Relative humidity of 40 percent to 60 percent is recommended in work area. Relative humidity in work area must not exceed 75 percent throughout the total period of application and drying for the intumescent coating, and must not exceed 65 percent throughout the application and drying for the protective decorative finish coat.
 - .3 Manufacturer's recommended temperature and humidity conditions must be maintained throughout the entire application and drying period until intumescent coating and basecoat are fully dried and top coated, including any interim period prior to application of the topcoat.

1.7 System Descriptions

- .1 Design Requirements: Thin-film intumescent fire-resistive coating system shall provide a fire resistance rating as indicated on the drawings.

1.8 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification label intact.
- .4 Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
- .5 Store materials at a temperature not less than 10 °C in a dry, protected area, off ground in original, undamaged, sealed containers with manufacturer's labels and seals intact.
- .6 Protect from freezing.
- .7 Do not store in direct sunlight.
- .8 Discard any materials that have come into contact with contaminants prior to actual use.

1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Manufacturers

- .1 A/D Fire Protection Systems, 420 Tapscott Rd., Scarborough, Ontario M1B 1Y4.
- .2 Equivalent products as manufactured by the following are acceptable subject to compliance with performance requirements specified herein.
 - .1 3M
 - .2 Cafco Industries Inc,
 - .3 Carboline
 - .4 Isolotek

2.2 Products

- .1 Proprietary Systems: A/D FIREFILM III Intumescent Coating.
- .2 Primer: Select primer from manufacturer's list of approved primers, or other only as approved by manufacturer.
- .3 Basecoat: A/D BASECOAT by A/D Fire Protection Systems.
- .4 Topcoat: A/D COLORCOAT by A/D Fire Protection Systems.

- .5 Products/Systems Testing: Listed by ULC and bearing the ULC label.

2.3 Materials

- .1 Fire Resistive Coating Material: Thin-film, intumescent coating: A/D FIREFILM III as manufactured by A/D Fire Protection Systems listed by ULC and bearing ULC label on each container or package.
- .1 Water based.
 - .2 Hardness (Shore "D"): Durometer D81.8, creep 1 at 15 s, 230° C.
 - .3 Surface Burning Characteristics (ASTM E84): Flame Spread: 0-20, Smoke Development: 0-50, Class "A".
 - .4 Density 1,366 g/l.
 - .5 Dry Weight: 2.2 kg/m² at 1.6 mm dry.
 - .6 Cohesion/Adhesion (Bond or Tensile) (ASTM E736): 3.24 kg/m² at 3 mm dry.
 - .7 Compressive strength (ASTM E761): 7.6 MPa at 10 percent deformation.
 - .8 Deflection Resistance (ASTM E759): Pass without spalling, cracking or delaminating.
 - .9 Impact Resistance (ASTM D2794): 3.3 kg-m (direct) at 3 mm, 1.4 kg-m (direct) at 1.6 mm.
 - .10 Abrasion Resistance (ASTM D4060): 508 cycles per mil at 1.6 mm dry.
 - .11 Off gassing (ASTM E595): TML 0.82, CVCM 0.00, WVR 0.49), NASA SP-R-0022A and ESA PSS-01-702.

2.4 Mixing

- .1 Paints shall be ready mixed.
- .2 Mix gently in order to minimize introduction of air to the product. Do not add water or solvent.
- .3 Mix topcoat by boxing and stirring. Do not add water or solvent.

PART 3 EXECUTION

3.1 General

- .1 Application of intumescent coatings shall be completed in the steel fabricators shop prior to delivery to site.

3.2 Examination

- .1 Examine surfaces to receive work of this Section and report any defects that may affect the work of this section. Identification marking of steel components must be by wax crayon to facilitate ease of removal prior to application of this intumescent fireproofing.
- .2 Verify that substrate surfaces have been prepared in accordance with manufacturer's recommendations.
- .3 Verify that all clips hangers, sleeves and similar devices have been attached. Confirm compatibility of surfaces to receive fireproofing materials. Steel surfaces must be primed with a compatible primer.
- .4 Beginning of installation means acceptance of substrate.

- .5 Verify substrate and workspace temperature and humidity conditions are in accordance with manufacturer's recommendations.

3.3 Preparation

- .1 Protection: Protect adjacent surfaces, work areas, finished surfaces and equipment from over-spray/damage during product application.
- .2 Surface Preparation: Clean substrate free of dust, dirt, grease or other foreign matter that would impair bond of fire resistance material.
- .3 Weld flashes shall be ground smooth prior to commencement of application.

3.4 Application

- .1 Spray Equipment: Use equipment recommended by manufacturer.
- .2 Apply primer and basecoat by in accordance with manufacturer's product data, including technical bulletins, product catalogue, application instructions and product markings for installation in sufficient thickness to achieve required fire resistance rating.
- .3 Priming: Use only primer as approved by manufacturer. Follow primer manufacturer's instructions.
- .4 Drying and Recoat Time: Drying time will vary with temperature and humidity conditions. Apply next coat only after previous coat is dry
- .5 Application Rates and Thickness Measurements:
 - .1 Comply with fire test designs or manufacturer's thickness selection tables for determination of dry film thickness of intumescent coatings required for size of steel element to be protected and for required fire resistance ratings.
 - .2 Apply basecoat at a maximum rate of 60-mil wet per coat.
 - .3 Apply intumescent coatings at a maximum rate of 1.14 mm wet or approximately 0.58 mm dry per coat.
 - .4 Final dry film thickness must be measured with a dry-film thickness gauge. For method of thickness determination refer to AWC Technical Manual 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire-Resistive Materials; an Annotated Guide.
- .6 Topcoat Application:
 - .1 Apply topcoat decorative finish according to manufacturer's recommendations.
 - .2 Allow a minimum of 24 hours between application of the final coat of basecoat and application of topcoat. Recommended site conditions must be maintained for any interim period after final coat of basecoat and until topcoat has been applied and dried. Basecoat must be dry before application of topcoat.
 - .3 Do not apply topcoat until it has been determined that the required dry film thickness of basecoat materials has been provided.
 - .4 Thickness: Apply topcoat to a minimum dry film thickness as recommended by manufacturer to achieve required fire resistance ratings but not less than 0.05 - 0.10 mm.

3.5 Field Quality Control

- .1 Field Samples: An independent testing laboratory/company shall be selected by the Consultant to test random samples as applied, to verify thickness of thin-film intumescent fire-resistive coating in accordance with AWCI Technical Manual 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire Resistive Materials; an Annotated Guide. Inspection shall be carried out immediately following final thickness of thin film intumescent coatings and just before application of topcoat.
- .2 All test results must be made available to all parties at the completion of each designated area and approved prior to the application of top-coat.
- .3 In-place fire protection material not in compliance with the specification requirements must be corrected prior to the application of the decorative top-coat.
- .4 Prior to application, random pre-determined liquid samples of the water borne intumescent material must be submitted for material characterization (fingerprinting) in accordance with the procedures detailed in the ISO 20340 Standard. Sample frequency will be pre-determined by the Consultant and testing performed by an independent testing laboratory or the intumescent material manufacturer.

3.6 Protection

- .1 Protect intumescent coatings from damage until date of Substantial Performance.
- .2 Touch up any areas damaged in accordance with manufacturer's recommendations and to the entire satisfaction of the Consultant.
- .3 Patch and repair any fire resistive coating that has been damaged in accordance with patching recommendations of material manufacturer. If coating becomes damaged, rebuild thickness by spray or brush. Fill small areas with trowel. When dry, smooth and finish with topcoat to match.
- .4 All patching of and repair to thin-film fire resistive material, due to damage by other trades, shall be performed under this Section. Patching shall be performed by an applicator with expertise in the installation of fire resistive or similar materials. Repair shall be in accordance with UL design number guidelines and manufacturer's written application instructions.

3.7 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions. Remove and legally dispose of construction debris.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-In-Place Concrete
- .2 Section 07 21 13 Building Insulation
- .3 Section 07 26 00 Vapour Retarders
- .4 Section 31 54 13 Erosion and Sedimentation Control
- .5 Section 31 64 16 Excavated Caissons
- .6 Section 33 46 13 Foundation Drainage

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM D698-12(2021) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³))
 - .2 ASTM D1557-12(2021) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
- .2 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 805 Construction Specification for Temporary Erosion and Sediment Control Measures
 - .2 OPSS 180 General Specification for the Management of Excess Materials
 - .3 OPSS 206 Construction Specification for Grading
 - .4 OPSS 1010 Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
- .3 Ontario Regulation O Reg 406/19 On-Site and Excess Soil Management

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit shop drawings of shoring and bracing required in connection with excavation. Drawings to show clearly procedural sequence to be followed.

1.5 Definitions

- .1 Earth: Site excavated material, including shale, rubble rock, building debris, shrub and tree roots and soil.
- .2 Soil: Site excavated material, free from shale, rubble rock, building debris, shrub and tree roots.
- .3 Fill: Approved materials, other than earth, clay and unapproved soil. Approved soil may be used only with approval of the Consultant in writing.
- .4 Rock: All solid rock in ledges, stratified deposits, unstratified masses, and all conglomerate deposits or any other material so firmly cemented by process of nature as to present all the characteristics of solid rock, being so hard or firmly cemented that it cannot be excavated and removed with a power shovel except after thorough and continuous drilling and blasting.
- .5 Backfilling: The operation of supplying and installing fill and approved soil materials.

Engineered Fill: Approved material used to build-up to design elevations.

1.6 Examination

- .1 Examine the building site and determine the nature and extent of the materials to be removed or the additional fill required to provide depths and levels indicated on drawings. Field check the site to review existing conditions. Verify locations of all existing utilities and services that will affect the work.
- .2 Refer to drawings for all building and site development details.

1.7 Setting Out Work

- .1 The drawings indicate the building components location and proposed and final grades. Be responsible to construct the work according to levels and locations shown on the drawings. Report any errors or discrepancies to the Consultant before commencing work.
- .2 Commencement of any part of the work shall constitute acceptance of drawings as being correct.
- .3 Employ a competent instrument man and provide all lines and levels, limit lines and boundary stakes for the execution of the work as required. All benchmarks shall be carefully protected.
- .4 Provide and be responsible for, all lines, levels and dimensions which trades require to relate their work to the work of other trades. All trades shall be notified that all such levels and dimensions must be obtained from the Contractor.

1.8 Existing Underground Utilities

- .1 Arrange underground locates of all utility assets prior to excavating. Do not commence excavation in a location prior to utility members marking the location of their utilities or indicating that none exist within the outlined excavation limits. Where necessary, employ the services of a private utility locator to ensure that all utilities are located in a timely manner.
- .2 Verify the location and elevation of all existing utilities within the limits of the Work. Observe the locations of the stake outs, prior to commencing the Work. In the event there is a discrepancy between the locations of the stake outs and the locations shown on the Contract Documents, that may affect the Work, immediately notify the Consultant and the affected utility companies, in order to resolve the conflict.
- .3 All existing buried utilities located within the excavation zone and any other facilities adjacent to the excavation shall be carefully supported and protected from damage as a result of the Contractor's operations. Be responsible for repairing any damaged underground utilities, as a result of actions during the course of the work at no extra cost to the Owner.
- .4 All costs associated with this work shall be considered incidental to all related items of work in the Contract. No separate payment will be made for costs incurred in obtaining utility locates.

1.9 Protection of Existing Services

- .1 Notify the Owner, Public Utility or Municipal authorities in advance of planned excavations adjacent to their services.
- .2 Take care not to damage or displace encountered known and unknown services.

- .3 When such services are encountered during the execution of work, immediately notify the Consultant and protect, brace and support active services. Where repairs to these services become necessary use the following procedure:
 - .1 Known services, repair at no expense to the Owner.
 - .2 Unknown services, forward to the Consultant a complete breakdown of the estimated cost of such work. Proceed only upon written authorization.
- .4 In the case of damage to, or cutting off of an essential service, notify Consultant, the Owner, and Public Utility or Municipal authorities immediately and repair the service under the Consultant's direction.

1.10 Inspection and Testing

- .1 Provide proper and sufficient samples, ample opportunity and access at all times for the Consultant or Testing Agency to inspect materials, operations and completed works carried out under this Section.
- .2 Sample and test excavated material prior to shipping to landfill off the site in accordance with the requirements of O. Reg. 406/19. Samples shall be tested for compliance of acceptable material for landfill. Furnish to the Owner the results of all testing and location of landfill site used. This testing will not be undertaken by the Owner's Inspection and Testing Agency.
- .3 Provide 24 hours notice to inspection laboratory and request tests as follows:
 - .1 Sieve Analysis: Proposed fill materials will be tested to confirm stability for intended use and conformity with specifications.
 - .2 Density Test: Tests will be conducted on compacted fill, to ASTM D698.
 - .3 Frequency Test: Excavated Surfaces: When existing compacted fill surface is being prepared, make a series of three tests of surface for each 500 m² area.
 - .4 Fills under Pavement or Slabs on Grade: Make three tests for every two lifts of compacted fill for each 500 m² area.
 - .5 Backfill Structural Walls: Test each different material for approximately each 30 metres of wall being backfilled at depth increments of 610 mm.

1.11 Standards

- .1 Carry out all work in accordance with the applicable OPSS, OPSD and site drawings. The applicable Ontario Provincial Standard Specifications are listed hereafter.
- .2 The following shall apply:
 - .1 OPS 180 Management and Disposal of Excess Material
 - .2 OPS 206 Grading, Nov. 2005
 - .3 OPS 314 Untreated Granular Subbase, Base, Surface, Shoulder and Stockpiling
 - .4 OPS 408 Adjusting or Rebuilding Maintenance Holes, Catch Basins Ditch Inlets and Valve Chambers
 - .5 OPS 805 Temporary Erosion and Sediment Control Measures

1.12 Shoring and Bracing

- .1 Shoring and trench timbering, in addition to requirements of local authorities, shall be carried out in accordance with the requirements of The Occupational Health and Safety Act, "November 1992 Ontario Regulation 213/91" and Regulations for Construction Projects by Ontario Ministry of Labour and to Construction Safety Association brochure "Trenching Safety April 1994".

- .2 Erect necessary shoring for excavations in such a manner that:
 - .1 Whenever a trench or excavated face is necessary, shore and brace to prevent failure. Engage a registered Professional Engineer fully qualified in this line of work to design, stamp shop drawings and assume responsibility for the shoring and bracing. Submit shop drawings to the Consultant.
 - .2 It will properly retain the banks of the excavations and prevent caving-in or displacement or damage to surrounding or adjacent buildings or other property.
 - .3 All other work in connection with this Contract, including the Mechanical and Electrical Trades, may be carried out while it is still in place if necessary.
 - .4 It will be entirely free of footings, foundation walls or other such work so that it may be removed entirely or in sections when it is no longer required or when directed, without causing any damage or injury to the structural work that has been completed.

1.13 Dewatering

- .1 Keep excavations and backfill dry at all times.

PART 2 PRODUCTS

2.1 Materials

- .1 Type A Fill: Class "A" material conforming to OPSS1010, latest edition.
- .2 Type B Fill: Class "B" material conforming to OPSS 1010, latest edition.
- .3 Sand Fill: Clean, well graded compactable sand to OPSS 1010, Granular "M" fill.
- .4 Crushed Stone: Crushed stone shall be composed of clean, hard, durable coarse gravel, or crushed rock fragments such that 100% of the particles pass the 18 mm sieve and not more than 10% of the particles pass the No. 4 sieve. No clay or other objectionable materials shall be present.
- .5 Engineered Fill: fill placed below Type A and Type B fill to bring excavation to the design elevations. To be Type B fill or approved fill, approved in writing by the Consultant.

PART 3 EXECUTION

3.1 Preparation

- .1 Lines and Levels: Refer to Section 01 71 00 - Examination and Preparation.
- .2 Stock Piles: Materials shall not be stockpiled on the site except with the prior approval of the Consultant. Where permitted, stockpile materials in a manner to prevent segregation and contamination. Piles not to exceed 2000 mm in height. Stockpile materials in a location and manner not interfering with ongoing operation and use of the site and building by the Owner.

3.2 Excavation Work

- .1 Excavate to elevations and dimensions indicated or required by the work, plus sufficient space to permit erection of forms, shoring and inspection. Excavation shall be made to clean lines to minimize quantity of fill material required.

- .2 Remove large rocks, stumps and other obstructions of whatever nature encountered in the course of excavation and haul away off the site. Remove all concrete, masonry, rubble or other construction debris encountered during the work.
- .3 Unauthorized Excavation - Excavation to greater than required depth shall be corrected by the Contractor at his own expense in a manner as directed by the Consultant. Fill over-excavated areas under structure bearing surfaces and footings with concrete as specified for foundations.
- .4 Keep excavation free of water by bailing, pumping or a system of drainage as required and provide pumps, suction and discharge lines or well points of sufficient capacity and maintain until such time as the permanent drainage system is installed or until the Consultant's approval of removal of equipment is obtained. Take all necessary measures to prevent flow of water into the excavation.
- .5 Protect the bottom and sides of excavated pits and trenches from freezing. Protect also from exposure to the sun and wet weather to prevent cave-ins and softening of the bed upon which concrete or drains rest.
- .6 Excavations must not interfere with the normal 45 degree plane of bearing from the bottom of any footing.
- .7 Keep bottoms of excavations clean and clear of loose materials levelled and stepped at changes of levels with exception of excavations made for drainage purposes and those to slope as required.
- .8 If the excavations reveal seepage zones, springs or other unexpected sub-surface conditions which may necessitate revisions or additions to any drainage system, inform the Consultant immediately so that remedial action can be taken.
- .9 If removal of earth causes displacement of adjacent earth, the earth so disturbed shall be removed at no additional cost to the Owner.
- .10 Conditions of Excavated Surfaces
 - .1 Excavate to a depth sufficient to expose firm undisturbed subsoil, free of organic matter and to the Testing Agency's approval.
 - .2 Remove soft, wet or unconsolidated ground and organic material encountered in excavating.
 - .3 Should the nature of the sub-soil at the depths shown prove to be unsatisfactory to the Consultant for the placing of the concrete work, then upon the Consultant's written order, the Contractor shall excavate to greater depth until a satisfactory bottom is reached.
- .11 Tolerances: General excavation shall be to the elevations shown on the drawings, plus or minus 25 mm.

3.3 Hydro Excavation

- .1 Utilize hydro excavation services when working near and around known utilities to avoid damage.

3.4 Backfilling

- .1 Proceed promptly with backfilling as the building progresses, and as work to be backfilled has been inspected and approved by the Consultant. The backfill in areas where settlement cannot be tolerated, e.g. service and footing trenches under the floor slab, should be compacted to at least 100 per cent of its Standard Proctor Maximum Dry Density. The backfill should be placed in lifts not

greater than 200 mm thick in the loose state, each lift being compacted with a suitable compactor to the specified density.

- .2 Do not commence backfilling operations until mechanical and electrical services, site drainage systems, perimeter and underslab insulation, and waterproofing has been inspected and approved by Consultant and authorities having jurisdiction. Existing floor subgrade must be proof rolled before backfilling.
- .3 Withdraw shoring material during backfill. Lumber left in place without the Consultant's approval will not be paid for by the Owner.
- .4 Backfill evenly on both sides of foundation walls to avoid unequal fill pressures on walls.
- .5 Place fill around foundation walls and footings so that footings will have a minimum of 1200 mm coverage, measured at an angle of 45 degrees from bottom of footing to protect against frost until final grading is complete.
- .6 Where fill is placed adjacent to structures or vulnerable building components or in restricted areas, the fill shall be compacted to the same degree as specified by suitable equipment approved by the Consultant. Avoid damage to or displacement of walls, columns, piers, underground services, and process/ production equipment.
- .7 Add water in amounts required only to achieve the optimum moisture content, in accordance with ASTM D1557.
- .8 Backfill shall be free of snow and ice, topsoil, construction debris and oversized boulders greater than 150 mm.

3.5 Rough Grading

- .1 Preparation and Layout
 - .1 Establish extent of grading by area and elevation.
 - .2 Prior to commencement of grading work, establish location and extent of all underground utilities occurring in work areas. Maintain, reroute or extend as required. Pay all costs for this work, except costs borne by utilities companies.
 - .3 Slope grade away from building as indicated on drawings.
 - .4 Cut temporary drainage swales and create containment ponds and structures for temporary surface run-offs, until storm sewer system is installed.
 - .5 Regrade all areas that retain or pond water.
 - .6 Rough grade all areas to tolerance of plus or minus 50 mm.

3.6 Fills Under Concrete Slab

- .1 The fill shall be deposited in layers of such thickness that the equipment being used for compacting can produce the specified density but in no cases, more than 200 mm thickness. If lumps are present in the material each layer shall be continuously disced in order to ensure proper compaction.
- .2 The exposed subgrade shall be proof rolled to ensure its integrity. If the subgrade consists of engineered fill, the fill shall be compacted to at least 98% of its maximum Standard Proctor Dry Density for native materials or 100% compaction for Granular "A" and "B" materials, using equipment approved by the Consultant. Any loose, wet or deleterious material shall be

sub-excavated and replaced by the Contractor with Type B Engineered fill which must be compacted to 98% Standard Proctor Maximum Density.

- .3 Immediately after levelling, each layer of fill shall be thoroughly compacted by the use of approved mechanical equipment.

3.7 Compaction Density

- .1 Use approved equipment for compaction. Maintain materials at optimum moisture content to obtain required compaction. Special care shall be taken to prevent disturbance of the existing subgrade and adjacent structures and equipment.
- .2 Be responsible for damage to the subgrade and installed materials due to improper compaction methods. Make good to approval of the Consultant.
- .3 The minimum density of fill in place shall be the following values of Standard proctor densities for corresponding locations in accordance with ASTM D698.
 - .1 Type A Fill: To 100% Standard Proctor Maximum Density.
 - .2 Type B Fill: To 100% Standard Proctor Maximum Density.
 - .3 Engineered Fill: To 98% Standard Proctor Maximum Density.
- .4 If during progress of work, tests indicate that compacted materials do not meet specified requirements, remove defective work, replace and retest at own expense.
- .5 Ensure compacted fills are tested and approved before proceeding with placement of surface materials.

3.8 Fill Locations

- .1 Type A Fill:
 - .1 Under all interior and exterior concrete slabs 150 mm minimum thickness.
 - .2 Below all mechanical or electrical services, from 150 mm below invert, to springline.
- .2 Type B Fill:
 - .1 Around all footings, foundations, grade beams and walls up to the underside of Type A fill.
 - .2 From top of approved compacted subgrade to underside of concrete slabs (interior or exterior) but not less than 200 mm thickness.
 - .3 At all areas on the site indicated to be paved with asphalt.
- .3 Sand Fill:
 - .1 Below all mechanical or electrical services, minimum 150 mm deep.
 - .2 Above all mechanical or electrical pipes and trenches, from springline to 300 mm above pipe obvert.
- .4 Crushed Stone: around all foundation drainage and subdrainage piping, minimum 200 mm thick.
- .5 Engineered Fill: All fill locations up to the underside of Type B fill and where required to fill up to design elevations.
- .6 Site excavated material: as backfill to exterior side of foundation walls only when permitted and approved by the Geotechnical engineer and below all sodded or seeded areas up to underside of topsoil, but not within 600 mm of foundation walls or structures.

3.9 Water on Prepared Surfaces

- .1 Promptly remove, by approved methods, water rising from seeping of the soil or resulting from rainfall wherever such water is on the surface of sub-grade soil and compacted fill.
- .2 Where proper drainage and pumping is not carried out as specified herein, and any prepared sub-grade soil for under structural work, and any compacted fill for under concrete slabs, is softened or disturbed by water due to improper drainage and pumping, the Contractor shall remove the unsatisfactory soil and fill, and bear all incidental costs in connection with additional excavation and placing and compacting of granular fill under floor slabs.

3.10 Adjustments

- .1 All manhole frames and covers, catch basin frames and covers, drains and valves including those existing scheduled to remain, shall be adjusted and set flush with finished elevation.
- .2 Adjustments to manholes and catch basins shall be done using concrete adjustment units as per OPSS 408 and OPSD 704.010

3.11 Surplus Soil Disposal

- .1 Surplus soil and excavated material shall be promptly removed and disposed of off the site at legal dump sites. Conform to local bylaw requirements for trucking and disposal.
- .2 Comply with the requirements of Ontario Regulation O. REG 406/19, "On-Site and Excess Soil Management", for the importation of new soils and fill materials and the exportation, removal and disposal off-site, of excavated materials. Complete testing of imported and exported materials as required. Unless noted elsewhere, costs for such testing is the responsibility of the contractor and is not included in any allowances. Maintain and submit to authorities having jurisdiction all required test reports, certificates and documentation.

3.12 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 As excavation proceeds, keep roads and aisles clean of dirt and excavated material.
- .3 Clean up and wash down to remove all dirt and excavated materials caused by the work of this section daily.

End of Section

PART 1 GENERAL

1.1 General Requirements

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 31 23 10 Excavating, Trenching and Backfilling
- .2 Section 31 64 16 Excavated Caissons

1.3 References

- .1 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 805 Construction Specification for Temporary Erosion and Sediment Control Measures
 - .2 OPSS 1001 Material Specification for Aggregates – General
 - .3 OPSS 1860 Material Specification for Geotextiles
- .2 Ontario Provincial Standard Details (OPSD)
 - .1 OPSD 219.110 Heavy Duty Silt Fence Barrier

1.4 Submittals

- .1 Submit samples in accordance with Section 01 30 00.

PART 2 PRODUCTS

2.1 Materials

- .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.
- .2 Clear stone for mud mat and along bottom of silt control fencing: 50 mm clear stone in accordance with OPSS 1001.
- .3 Geotextile for siltation control fence shall be Class I non-woven geotextile fabric in accordance with OPSS 1860.
- .4 Straw bales:
 - .1 Straw shall be either wheat or oat straw.
 - .2 Straw bales shall be dry and firm, be tied tightly in at least two places, show no evidence of straw or tie decay, and be free of sediment. They shall be of agricultural, rectangular formation and dimensions, as specified in the Contract Documents

PART 3 EXECUTION

3.1 Installation

- .1 Complete erosion and sedimentation controls at perimeter of work areas limits in accordance with OPSS 805.
- .2 Protect existing catch basins.

- .1 Light-duty straw bale barriers shall be constructed as specified.
 - .2 Straw bales shall be placed completely around catch basins and ditch inlets without gaps. When a double row of straw bales is specified in the Contract Documents, the straw bales shall be placed such that the joints between the straw bales of each row are not in-line with the joints of the straw bales of the adjacent row.
 - .3 Stakes securing the bales shall be driven through the bales without breaking the bale ties or otherwise disturbing bale firmness and shape.
 - .4 Maintenance shall include the replacement of each bale at intervals not exceeding 45 Days
- .3 Silt Control Fence:
- .1 Install silt control fence according to OPSD 219.110 along construction site perimeter as per EMP detail and as shown on plan.
 - .2 Protect existing drainage structures, catch basins and manholes as indicated an in accordance with OPSS standards.
- .4 Mud Mat Installation:
- .1 Mud mats shall be installed on all access roadways at the point of connection to a municipal right-of-way. Unless otherwise indicated, the mud mat shall be a minimum 6.0m in width, 30m in length and be constructed of a 0.5m depth of 50mm diameter clear stone. The mud mats shall be maintained and stone replaced if deemed necessary by the Consultant.
 - .2 Remove and replace top layers of clear stone when they become laden with mud and the mud mat becomes ineffective in removing mud from equipment exiting the site.
 - .3 The mud mat installation does not alleviate the contractor's responsibility to clean mud from adjacent roadways as a result of the construction.

3.2 Maintenance

- .1 Maintain silt control fencing for the duration of the demolition project and replace as required until the site is stabilized.
- .2 Maintain the mud mat and replace clear stone as required during the demolition project as required to maintain the function of the mud mat.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 10 00 Concrete Forming and Accessories
- .2 Section 03 20 00 Concrete Reinforcing
- .3 Section 03 30 00 Cast-in-Place Concrete
- .4 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM A36/A36M-19 Standard Specification for Carbon Structural Steel
 - .2 ASTM A252/A252M-26 Standard Specification for Welded and Seamless Steel Pipe Piles
 - .3 ASTM A929/A929M-24 Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe
 - .4 ASTM C150/C150M-24 Standard Specification for Portland Cement
- .2 CSA Group (CSA)
 - .1 CSA A23.1:19/A23.2:19 Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Installation Procedure: Submit for review, and before commencing work, a written description of the complete installation procedure, including concreting and liner withdrawal.

1.5 Quality Control

- .1 The work of this Section will be reviewed both at the source and in the field by Inspection and Testing Company appointed by the Owner.
- .2 Cooperate and provide access to inspections required by Owner. Give 24 hour notice to Owner's Inspection and Testing company prior to concrete placement.
- .3 The cost of additional inspection and testing, including load testing, because of failure of the work to meet specified requirements and/or loading or, because of changes to the Contract Documents requested by the Contractor, shall be paid at the Contractor's expense.
- .4 Test concrete in accordance with Section 03 30 00.
- .5 Refer to Part 3 of this Section for the details of the Inspection and Testing Company's review of caisson installation in the field.
- .6 The review provided by the Inspection and Testing Company does not relieve the Contractor of his sole responsibility for quality control over the Work and the performance or nonperformance of the Inspection and Testing Company shall not limit, reduce or relieve, the Contractor of his responsibilities in complying with the requirements of the Specification.

- .7 Job Records:
 - .1 Maintain concrete pour and delivery records as specified in Section 03 30 00.
 - .2 Record soil conditions encountered, founding and top elevations of caissons and dimensioned position of caissons on a location drawing. Report immediately all conditions which are inconsistent with the Contract Documents.

1.6 Quality Assurance

- .1 Allowable Tolerances:
 - .1 For centre line of caisson shaft: maximum of 75 mm from location indicated.
 - .2 For vertical caissons: plumb within 2% of total length.
 - .3 For diameter: within 25 mm of specified dimension at any cross section of shaft and/or bell.
 - .4 For top of caisson: within 25 mm of indicated elevation.

1.7 Project Conditions

- .1 Environmental Conditions:
 - .1 Comply with specified environmental conditions of Section 03 30 00 for concrete work.
- .2 Protection:
 - .1 Provide protection of work and persons as required by jurisdictional authorities, including standby pumps, lighting and equipment to provide continuous ventilation while persons are in the caisson excavation.
 - .2 Provide a watertight curb 450 mm high around the tops of caisson excavations. Curbs may be removed after concrete has been placed.
 - .3 Cover tops of open caisson excavations with two thicknesses of 38 mm thick wood planks, or equivalent, secured against displacement.
 - .4 Accept full responsibility for open caissons and damage to other work or property due to work of this Section.

1.8 Shipping, Handling and Storage

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

1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Concrete: Provide materials, mix design and proportioning as specified in Section 03 30 00. Use a mix designed for placement by tremie to provide the strength indicated on the Drawings. Where necessary to prevent arching when liner is removed, use a mix designed for increased slump and, if required, designed to employ a retarder, all to provide the strength indicated on the Drawings.
 - .1 Use Type 10, Normal Portland Cement to ASTM C150.

- .2 Steel Liners: As approved by Consultant for thickness, type of steel and design. Design liners to resist earth and/or water pressures which may be encountered during excavation, and with a lip fit where sections of liners butt together.
 - .1 Steel Pipe Casings: ASTM A252, Grade 2 or ASTM A36.
 - .2 Corrugated Steel Casings; ASTM A929.

PART 3 EXECUTION

3.1 Examination

- .1 Verify that established lines and levels are properly related to the building and are satisfactory to ensure proper execution of work of this Section.
- .2 Determine location of underground services at site to ensure that none is damaged by work. Report to Owner services that are discovered which may interfere with caissons.
- .3 Ensure that excavation by others has been completed as required for execution of work of this Section.
- .4 Soil Investigation: The Owner will provide Inspection and Testing company to carry out a soil investigation of caissons as required.

3.2 Excavation

- .1 Excavate caissons, of diameter not less than indicated on drawings, down to bearing stratum capable of safely sustaining the pressures indicated on the structural drawings. Remove excavated material from the site.
- .2 Carefully excavate to 1800 mm below finished grade with backhoe before drilling to verify that underground surfaces are not present.
- .3 Include in work of this Section augering through overburden to solid bearing.
- .4 Remove loose, friable and jointed material from the bearing stratum to provide a sound bearing, level with maximum 1/24 slope.
- .5 Report to the Owner immediately, all unusual or abnormal conditions or changes in the general nature of the soil encountered in carrying out this work.
- .6 Water Removal:
 - .1 Operate and maintain adequate means for immediate and continuous removal of water from caisson excavations by pumping to an approved place of disposal.
 - .2 Dewater caisson excavations to facilitate inspection.
- .7 Test Caisson: Consider the first caisson constructed as a test caisson. Maintain an accurate record of conditions encountered during excavation of this caisson. Record the nature of the soil and the amount of water encountered at various levels. Report to the Consultant immediately, conditions which vary from those described in the Contract Documents.

3.3 Liner Installation

- .1 Temporary Liner: Install where required to prevent entry of soil or water into excavation and where required for inspection of bottom of caisson excavation.

3.4 Concrete Placement

- .1 Before placing concrete, arrange for, and obtain inspection and verification of caisson excavation.
- .2 Place concrete as soon as possible after field quality control verification has been obtained and within 24 hours of completion of excavation.
- .3 When necessary to control sloughing of soil from sides of excavation, place concrete immediately after field quality control verification is obtained.
- .4 Place concrete in caissons by means of a chute so arranged that a discharge can be controlled to obtain an evenly spread uniform mixture over the whole area without segregation or voids.
- .5 Place concrete in each caisson in one continuous operation to completion.
- .6 Install steel reinforcing dowels, verticals and ties supplied under work of Section 03 20 00.
- .7 Vibrate top two metres of concrete, but only after liner has been pulled, or when liner is permanent.

3.5 Liner Removal

- .1 Pull out temporary liner vertically from excavation while concrete is being placed.
- .2 Pull out temporary liner smoothly to maintain the level of concrete 1500 mm above bottom of liner and a minimum of 1500 mm above external water level.
- .3 Obtain Consultant's approval before leaving any temporary liner in place permanently.

3.6 Field Quality Control

- .1 The Inspection and Testing Company appointed as specified for Source Quality Control elsewhere in this Section shall perform site sampling, inspection on testing of work of this Section to ensure that it is performed in accordance with this Section.
- .2 Inspect and test concrete as specified in Section 03 30 00.
- .3 Field Quality Control Inspection and Testing shall include:
 - .1 Verification that sub-surface conditions are consistent with the soils report and confirmation that the bearing capacity at the bearing stratum of every caisson is consistent with the design bearing capacity given on the Drawings.
 - .2 Verification that the shafts are properly formed and that the bottom of the caisson is free of loose material and debris.
 - .3 Verification that specified tolerances have been maintained.
 - .4 Verification that drilling at bottom of caisson excavation has confirmed that sound soil is present.
 - .5 Verification that recording of work and record drawings have been properly completed.
 - .6 Written inspection reports.
 - .7 Verbal reports to the Consultant, confirmed by written reports, whenever site conditions are such that the verifications noted above cannot be given.

- .4 Replace defective work in a manner approved by Consultant.

3.7 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clear away from the building site excess and waste materials and debris resulting from work of this Section.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 07 13 26.16 Self-Adhering Sheet Waterproofing
- .3 Section 07 21 13 Building Insulation
- .4 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM D1248-25 Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
- .2 CSA Group (CSA)
 - .1 CSA A23.1:19 Concrete Materials and Methods of Concrete Construction
 - .2 CSA B182.1 Plastic Drain and Sewer Pipe and Pipe Fittings
- .3 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 1840 Material Specification for Non-Pressure Polyethylene (PE) Plastic Pipe Products
- .4 Ontario Building Code 2012, Part 7 - Plumbing

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's technical literature and installation instructions.

1.5 Shipping, Handling and Storage

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

1.6 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Perforated plastic pipe and fittings: to CSA 182.1. Nominal pipe size 100 mm diameter. Manufactured from high density polyethylene resin which meets or exceeds the requirements of Type III, Category 4 or 5, Grade P33 or P34, Class C as per ASTM D1248.
- .2 Joining System: snap, insert or split coupler
- .3 Filter Sock: Woven polyester.

- .4 Acceptable product: Big 'O' Perforated Corrugated with Polyester Sock Filter as manufactured by Armtec Ltd
- .5 Coarse filter aggregate: to CSA-A23.1, Table 2, Group 1, 20-5 mm.
- .6 Fine filter aggregate: to CSA-A23.1, Table 1.
- .7 Filter Mat: Non-Woven Polypropylene Geotextile
 - .1 Terrafix 200R by Terrafix Geosynthetics Inc.
 - .2 Mirafi 140N by TC Mirafi.

PART 3 EXECUTION

3.1 Layout

- .1 Establish grades and inverts from appropriate bench marks. Lay out lines as shown on Drawings.
- .2 Slope drainage pipes at least 1%. Pipe grade shall not vary more than 10% of internal diameter of pipe withing a given run. Such deviation shall be gradual and over a distance of not less than 9.0 m.
- .3 Lay pipe in straight lines; turn corners using 45° bends.

3.2 Installation

- .1 Coordinate work of this Section with that of other related Sections.
- .2 Do not place pipe in direct contact with rigid materials such as rock, brick, or wood. Do not use grade stakes, stones, masonry or concrete fragments or any type of shim under pipe.
- .3 Join pipe sections by means of couplings. Provide end plugs on open ends of pipe runs at high points. Provide fittings such as elbows, bends, tees, adapters, reducers, as required to form a complete drainage system. Carefully tap tapered fittings into pipe; do not overdrive.
- .4 Install perforated pipe with holes and coupling slots facing down.
- .5 Aggregate materials shall be damp when placed. If necessary, spray with water using fog nozzle to assist hydraulic consolidation.
- .6 Place aggregate materials by hand around and above pipe in successive 150 mm lifts.
- .7 Consolidate each lift by tamping moderately; prevent damage to pipes.
- .8 Do not cover pipes until inspected and approved by Consultant.
- .9 Supply rigid non-corrosive sleeves for insertion into foundation walls and other building elements where pipe penetrates such elements. Sleeve diameter shall be 50 mm larger than pipe diameter. Pack joint between pipe and sleeve with moisture resistant compressible pre-moulded filler.

3.3 Perimeter Drainage

- .1 Provide perimeter drainage where indicated at base of foundation walls.
- .2 Connect to existing subdrainage system.

- .3 Place filter fabric into prepared excavation. Size filter fabric to completely wrap drainage course, lapping at joints minimum 300 mm.
- .4 Place minimum 150 mm coarse filter aggregate on top of filter fabric and consolidate.
- .5 Lay drainage pipe to layout shown. Unless other size is indicated, provide 100 mm diameter perforated pipe. Connect to existing outfall as directed by Owner's Representative.
- .6 Provide minimum 150 mm thick coarse filter aggregate at sides and top of drainage pipe.
- .7 Close filter fabric over top of drainage course and secure lap in place.
- .8 Cover filter fabric with 300 mm fine filter aggregate.

3.4 Inspection

- .1 Arrange for inspection of foundation drainage systems by Municipal Inspectors and the Consultant prior to placing backfill.

3.5 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.

End of Section