APPENDIX E

Dugout and Bullpen Improvements
Specifications

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Section 01 29 00	Payment Procedures
Section 01 31 19	Project Meetings
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END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 Title and description of Work.

.2 Contract Method.

.3 Contractor use of premises.

1.2 RELATED SECTIONS

.1 OPSS General Conditions (November 2018)

1.3 WORK COVERED BY CONTRACT DOCUMENTS

.1 Without limiting the scope of work, the Contract includes all products, labour, equipment, materials and temporary facilities as required, or implied by the specifications to complete the Work, complete with all necessary incidentals.

.2 The work involved in this contract includes, but is not limited to the removal and disposal of the existing dugouts and concrete foundations, sod, infield irrigation heads and piping, chainlink fencing and retaining wall. The contract includes the supply and installation of precast concrete dugouts, foundations, concrete paving, chainlink fencing, bullpens, infield clay mixes and irrigation system.

.3 The following is a partial list of items, the cost of which are to be included in the price. No additional payment will be made for the following:

a) Cost of establishing site boundaries and project layout.

b) Applying for and paying for permits not identified for payment by the Owner. The Contractor is responsible for applying for and paying for the building permit required for the dugouts.

c) Cost of providing and maintaining a field office (if deemed required by the contractor) and site privy or water closet unless a specific item for payment exists in the Schedule of Itemized Prices.

d) Cost of maintaining uninterrupted access to private properties that may be impacted by the construction.

e) Cost of coordination of any work that may be associated with utility companies who may be effected by the project, or may be required to perform work simultaneously with the work of this Contract.

f) Cost of normal roadway maintenance on existing roads and streets which may be effected by the Contractor's operations for the duration of the Contract.

g) Cost of supporting and protecting existing utilities and services.

h) Cost of preparing, maintaining, updating and providing a detailed project work schedule to the Consultant.

i) Cost of organization, maintenance and administration of a Project Safety Committee.

j) Cost of preparing and submitting any shop drawings, as may be required under this Contract

k) Cost of construction barricades, traffic permits, traffic control and construction signage

l) Cost of site layout.

.4 The contract works shall include, without limitation, the following:

a) All labour, equipment, and material required to bring equipment and materials to the site, and to remove equipment and surplus materials from the site

b) The supply, installation, maintenance and removal of the site office trailer if required at the discretion of the contractor.

c) The supply, erection, maintenance and ultimate removal of all traffic control signs for detours, road closures, etc.

d) All insurance requirements.

1.4 CONTRACT METHOD

.1 Construct the Work under the Niagara Peninsula Standard Contract.

.2 **OPSS General Conditions of Contract, and the City of Niagara Falls General Conditions of Contract Supplementary will take precedence for payment methods, holdbacks and completion items.**

1.5 CONTRACTOR USE OF PREMISES

.1 Contractor has unrestricted use of site until Substantial Performance.

.2 Assume full responsibility for protection and safekeeping of products under this Contract.

.3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

2 PRODUCTS

.1 Not used.

3 EXECUTION

.1 Not used.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 Applications for payments.

.2 Substantial performance procedures.

.3 Release of holdback procedures.

.4 Schedule of values.

1.2 REFERENCES

.1 OPSS General Conditions of Contract, and the City of Niagara Falls General Conditions of Contract Supplementary will take precedence for payment methods, holdbacks and completion items.

1.3 APPLICATIONS FOR PROGRESS PAYMENT

.1 Refer to OPSS GC 8.0

.2 Make applications for payment on account as provided on a monthly basis as Work progresses.

.3 Date applications for payment last day of agreed monthly payment period and ensure amount claimed is for value, proportionate to amount of Contract, of Work performed and Products delivered to Place of Work at that date.

.4 Submit to Consultant, at least 14 days before first application for payment. Schedule of values for parts of Work, aggregating total amount of Contract Price, so as to facilitate evaluation of applications for payment.

1.4 SCHEDULE OF VALUES

.1 Refer to OPSS GC 8.0

.2 Make schedule of values out in such form and supported by such evidence as Consultant may reasonably direct and when accepted by Consultant, be used as basis for applications for payment.

.3 Include statement based on schedule of values with each application for payment.

.4 Support claims for products delivered to Place of Work but not yet incorporated into Work by such evidence as Consultant may reasonably require to establish value and delivery of products.

1.5 PREPARING SCHEDULE OF VALUES

.1 Itemize separate line item cost for each of following general cost items:

.1 Performance and Payment Bonds.

.2 Mobilization and Demobilization.

.3 Allowances

.2 Itemize separate line item cost for Work associated with each line item within the schedule of unit rates.

.3 Round off figures to nearest ten dollars.

1.6 PROGRESS PAYMENT

.1 Refer to OPSS GC 8.0

.2 Consultant will issue to Owner, no later than 10 days after receipt of an application for payment, certificate for payment in amount applied for or in such other amount as Consultant determines to be properly due. If Consultant amends application, Consultant will give notification in writing giving reasons for amendment.

1.7 SUBSTANTIAL PERFORMANCE OF WORK

.1 Refer to OPSS 8.0

.2 Prepare and submit to Consultant comprehensive list of items to be completed or corrected and apply for a review by Consultant to establish Substantial Performance of Work or substantial performance of designated portion of Work when [Work is substantially performed if permitted by lien legislation applicable to Place of Work designated portion thereof which Owner agrees to accept separately is substantially performed. Failure to include an item on list does not alter responsibility to complete Contract.

.3 No later than 10 days after receipt of list and application, Consultant will review Work to verify validity of application, and no later than 7 days after completing review, will notify Contractor if Work or designated portion of Work is substantially performed.

.4 Consultant shall state date of Substantial Performance of Work or designated portion of Work in certificate.

.5 Immediately following issuance of certificate of Substantial Performance of Work, in consultation with Consultant, establish reasonable date for finishing Work.

1.8 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF WORK

.1 Refer to OPSS 8.0

.2 After issuance of certificate of Substantial Performance of Work:

.1 Submit an application for payment of holdback amount.

.2 Submit sworn statement that all accounts for labour, subcontracts, products,

construction machinery and equipment, and other indebtedness which may have been incurred in Substantial Performance of Work and for which Owner might in any way be held responsible have been paid in full, except for amounts properly retained as holdback or as identified amount in dispute.

.3 After receipt of application for payment and sworn statement, Consultant will issue certificate for payment of holdback amount.

.4 Where holdback amount has not been placed in a separate holdback account, Owner shall, 10 days prior to expiry of holdback period stipulated in lien legislation applicable to Place of Work, place holdback amount in bank account in joint names of Owner and Contractor.

.5 Amount authorized by certificate for payment of holdback amount is due and payable on day following expiration of holdback period stipulated in lien legislation applicable to Place of Work. Where lien legislation does not exist or apply, holdback amount is due and payable in accordance with other legislation, industry practice, or provisions which may be agreed to between parties. Owner may retain out of holdback amount any sums required by law to satisfy any liens against Work or, if permitted by lien legislation applicable to Place of Work, other third party monetary claims against Contractor which are enforceable against Owner.

1.9 PROGRESSIVE RELEASE OF HOLDBACK

.1 Refer to OPSS 8.0

.2 Where legislation permits, if Consultant has certified that Work of subcontractor or supplier has been performed prior to Substantial Performance of Work, Owner shall pay holdback amount retained for such subcontract Work, or products supplied by such supplier, on day following expiration of holdback period for such Work stipulated in lien legislation applicable to Place of Work.

.3 Notwithstanding provisions of preceding paragraph, and notwithstanding wording of such certificates, ensure that such subcontract Work or products is protected pending issuance of final certificate for payment and be responsible for correction of defects or Work not performed regardless of whether or not such was apparent when such certificates were issued.

1.10 FINAL PAYMENT

.1 Refer to OPSS 8.0

.2 Submit an application for final payment when Work is completed.

.3 Consultant will, no later than 10 days after receipt of an application for final payment, review Work to verify validity of application. Consultant will give notification that application is valid or give reasons why it is not valid, no later than 7 days after reviewing Work.

.4 Consultant will issue final certificate for payment when application for final payment is found valid.

2 PRODUCTS

.1 Not used.

3 EXECUTION

.1 Not used.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 Coordination Work with other subcontractors.

.2 Scheduled preconstruction, progress, substantial completion, final completion and warranty meetings.

1.2 RELATED SECTIONS

.1 Section 01 11 00- Summary of Work

1.3 DESCRIPTION

.1 Coordination of progress schedules, submittals, use of site, temporary utilities, construction facilities, and construction Work.

1.4 PROJECT MEETINGS

.1 Schedule and administer bi-weekly project meetings throughout progress of Work as determined by the Consultant.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting five days in advance of meeting date to Consultant and Owner.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

.6 Record minutes. Include significant proceedings and decisions. Identify action by parties.

.7 Reproduce and distribute copies of minutes within three days after each meeting and transmit to meeting participants, affected parties not in attendance Consultant and Owner.

1.5 CONSTRUCTION ORGANIZATION AND START-UP

.1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Senior representatives of the Owner, Consultant, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum five days before meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.5 Agenda to include following:

.1 Appointment of official representative of participants in Work.

.2 Schedule of Work and progress scheduling in accordance with Section 01 32 .13.19 – Construction Progress Schedule – Bar Chart.

.3 Schedule of submission of shop drawings, samples, colour chips in accordance with Section 01 33 00 - Submittal Procedures.

.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 510 0 - Temporary Utilities.

.5 Site security in accordance with Section 01 52 00 - Construction Facilities.

.6 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements (GC).

.7 Owner provided Products.

.8 Record drawings in accordance with Section 01 78 00 - Closeout Submittals.

.9 Take-over procedures, acceptance, and warranties in accordance with Section 01 77 00 - Closeout Procedures and 01 78 00 - Closeout Submittals.

.10 Monthly progress claims, administrative procedures, photographs, and holdbacks (GC).

.11 Appointment of inspection and testing agencies or firms in accordance with Section 01 45 00 - Quality Control.

.12 Insurances and transcript of policies (GC).

.6 Comply with Consultant's allocation of mobilization areas of site; for field offices, access, traffic, and parking facilities.

.7 Comply with instructions of Consultant for use of temporary utilities and construction facilities.

1.6 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.

.5 Change orders.

.6 Other modifications to Contract.

.7 Field test reports.

.8 Copy of approved Work schedule.

.9 Manufacturers' installation and application instructions.

1.7 SCHEDULES

.1 Submit preliminary construction progress schedule in accordance with Section 01 32 16.19 - Construction Progress Schedule – Bar Chart to Consultant.

.2 After review, revise and resubmit schedule to comply with revised project schedule.

.3 During progress of Work revise and resubmit as directed by Consultant.

1.8 CONSTRUCTION PROGRESS MEETINGS

.1 During course of Work and two weeks prior to project completion, schedule progress meetings bi-weekly.

.2 Contractor, major subcontractors involved in Work and Consultant and Owner are to be in attendance.

.3 Notify parties minimum five days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within three days after meeting.

.5 Agenda to include following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for affect on construction schedule and on completion

date.

.12 Other business.

1.9 SUBMITTALS

.1 Make submittal to Consultant for review.

.2 Submit preliminary shop drawings, product data and samples [in accordance with Section 01 33 00 – Submittals for review for compliance with Contract Documents; for field dimensions and clearances, for relation to available space, and for relation to Work of other contracts. After review, revise and resubmit for transmittal to Consultant.

.3 Submit requests for payment for review, and for transmittal to Consultant.

.4 Submit requests for interpretation of Contract Documents and obtain instructions through Consultant.

.5 Process substitutions through Consultant.

.6 Process change orders through Consultant.

.7 Deliver closeout submittals for review and preliminary inspections, for transmittal to Consultant.

1.10 COORDINATION DRAWINGS

.1 Provide information required by Consultant for preparation of coordination drawings.

.2 Review and approve revised drawings for submittal to Consultant.

1.11 CLOSEOUT PROCEDURES

.1 Notify Consultant when Work is considered ready for Substantial Performance.

.2 Accompany Consultant and Owner on preliminary inspection to determine items listed for completion or correction.

.3 Comply with Consultant's instructions for correction of items of Work listed in executed certificate of Substantial Performance.

.4 Notify Consultant of instructions for completion of items of Work determined in Consultant's final inspection.

2 PRODUCTS

.1 Not used.

3 EXECUTION

.1 Not used.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 Schedule, form, content.

.2 Staged construction.

.3 Scheduled revisions.

.4 Critical path scheduling.

1.2 RELATED SECTIONS

.1 Section 01 77 00 - Closeout 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 Submittal Schedule for timeliness of Owner furnished Products.

.5 Product Delivery Schedule.

.6 Cash Allowance Schedule for purchasing Products.

.7 Shutdown or closure activity.

1.4 FORMAT

.1 Prepare schedule in form of a horizontal Gantt bar chart.

.2 Provide a separate bar for each major item of work or operation.

.3 Split horizontally for projected and actual performance.

.4 Provide horizontal time scale identifying first and last work day of each week.

.5 Format for listings: Chronological order of start of each item of work.

.6 Identification of listings: By Item/Task description.

1.5 SUBMISSION

.1 Submit initial format of schedules within 15 working days after award of Contract.

.2 Submit schedules in electronic format, forward USB or email as a pdf file.

.3 Consultant will review schedule and return review copy within five days after receipt.

.5 Resubmit finalized schedule within five days after return of review copy.

.7 Submit revised progress schedule with each application for payment.

.8 Distribute copies of revised schedule to:

.1 Job site office.

.2 Subcontractors.

.3 Other concerned parties.

.9 Instruct recipients to report to Contractor within five days, any problems anticipated by timetable shown in schedule.

1.6 CRITICAL PATH SCHEDULING

.1 Include complete sequence of construction activities.

.2 Include dates for commencement and completion of each major element of construction

.3 Show projected percentage of completion of each item as of first day of month.

.4 Indicate progress of each activity to date of submission schedule.

.5 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.

.6 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 PROGRESS PHOTOGRAPHS

.1 Provide site progress photos as specific in Section 01 45 00 – Quality Control

1.8 SUBMITTALS SCHEDULE

.1 Include schedule for submitting shop drawings, product data, and samples.

.2 Indicate dates for submitting, review time, resubmission time, last date for meeting fabrication schedule.

.3 Include dates when delivery will be required for Owner-furnished products.

.4 Include dates when reviewed submittals will be required from Consultant.

2 PRODUCTS

.1 Not used.

3 EXECUTION

.1 Not used.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 Shop drawings and product data.

.2 Samples.

.3 Certificates and transcripts.

1.2 RELATED SECTIONS

.1 Section 01 32 00 - Construction Progress Documentation

.2 Section 01 45 00 - Quality Control

.3 Section 01 82 00 - Demonstration and Training

.4 Section 01 78 00 - Closeout Submittals

1.3 REFERENCES

..1 OPSS General Conditions (November 2018)

1.4 ADMINISTRATIVE

.1 Submit to Consultant submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an 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 SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and shall be considered rejected.

.6 Notify Consultant, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are coordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant review.

.10 Keep one reviewed copy of each submission on site.

1.5 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 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.

.3 Allow five days for Consultant's review of each submission.

.4 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.

.5 Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of any revisions other than those requested.

.6 Accompany submissions with transmittal letter, in 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.

.7 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.

.9 After Consultant's review, distribute copies.

.10 Submit one hard copy and an electronic copy (pdf) of shop drawings for each requirement requested in specification Sections and as consultant may reasonably request.

.11 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.

.12 Delete information not applicable to project.

.13 Supplement standard information to provide details applicable to project.

.14 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.

1.6 SAMPLES

.1 Submit for review as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Consultant's business address or the site office.

.3 Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

.6 Make changes in samples which Consultant may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.7 MOCK-UPS

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

1.8 PROGRESS PHOTOGRAPHS

.1 Submit progress photographs in accordance with Section 01 45 00 – Quality Control.

1.9 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status and transcription of insurances.

2 PRODUCTS

.1 Not used.

3 EXECUTION

.1 Not used.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Information for Tenderers.

1.2 REFERENCES

.1 Canada Labour Code, Par 2, Canada Occupational Safety and Health Regulations

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit site specific Health and Safety Plan with 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site-specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation.

.3 Submit electronic copy of Contractor's authorized representatives work site health and safety inspection reports.

.4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Submit WHMIS MSDS sheet in accordance with specification section or as requested by the Consultant.

.7 Owner will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 days after receipt of plan. Revise plan as appropriate and resubmit plan to Owner within 5 days after receipt of comments.

.8 Owner's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.9 Submit on site Contingency and Emergency Response Plan: address standard operation procedures to be implemented during emergency situations.

1.4 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to beginning or Work.

1.5 GENERAL REQUIREMENTS

.1 Schedule and administer health and Safety meeting with the Owner as requested.

.2 the Owner reserves the right to demand the implementation of safe work procedures or practices that will ensure at all tie the safe completion of work.

1.6 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statues regulations, and ordinances, and with site specific health and safety plan.

1.7 UNFORESEEN HAZARDS

.1 When unforeseen or peculiar safety relate factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province or Territory having jurisdiction and advise Owner verbally and in writing.

1.8 HEALTH AND SAFETY COORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:

.1 Have site related working experience specific to activities associated with projects of similar type and scope.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site the perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site specific Contractor's Health and Safety Plan.

1.9 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posed in conspicuous location on site in accordance with Acts and Regulation of Province or Territory having jurisdiction, and in consultation with Owner.

.2 Site Identification – There shall be suitable signs posted at all entry points to the work site identifying the construction site, hard hat area, safety shoe requirements, or any other particular safety requirements. Signs shall be easily read with lettering a minimum of 75mm height.

1.10 PERSONAL PROTECTIVE EQUIPMENT

.1 It is the responsibility of the Contractor and the subcontractors to develop, implement and post:

.1 Respirator program dealing with selection criteria of respirators, worker training in use, maintenance and storage of respirators.

.2 Hearing protection program dealing with selection and use of hearing protection and identification and tagging of source of noise above 85dB.

.3 Eye protection program dealing with selection and use of eye protectors and screening areas around arc welding etc.

.4 Other protective equipment and clothing such as gloves, coveralls, fall arresting devices etc.

1.11 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction, Owner or Consultant.

.2 Provide Owner with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Owner or Consultant may stop Work in non-compliance of health and safety regulations is not corrected. The Contractor and the subcontractors are deemed responsible for any cost arising from such work stoppages.

1.12 REPORTING OF HAZARDOUS WORK CONDITIONS AND ACTS

.1 The Contractor and the subcontractors shall implement a program establishing:

.1 Means for workers, including Owner's workers, to report hazardous conditions or unsafe act observed at the job site.

.2 Responsibilities of the job supervisor for implementing immediate remedial actions.

.3 Steps for workers to follow who refuse to work under conditions of perceived imminent danger.

1.13 MINIMUM WORK PRACTICE – PRODUCTS CONTAINING ASBESTOS

.1 No materials containing asbestos shall be utilized on site.

.2 Should material resembling spray or trowel applied asbestos be encountered in demolition work, stop work and notify the Owner immediately. Don't proceed until written instructions have been received from the Owner and Consultant.

1.14 REPORTING OF SERIUOS ACCIDENTS

.1 It is required that the Contractor and the subcontractors investigate employee accidents in accordance with this section.

.2 Serious accents must be reported immediately to the Contractor, Ministry of Labour, Owner and the Consultant.

2 PRODUCTS

.1 Not used.

3 EXECUTION

.1 Not used.

END OF SECTION

1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 78 00 – Closeout Submittals

1.2 REFERENCES

.1 OPSS General Conditions (November 2018)

1.3 INSPECTION

.1 Refer to OPSS GC .7

.2 Allow 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 may order any 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.

1.4 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by the Contractor for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the Contractor.

.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 the Consultant at no cost to the Owner. Pay costs for retesting and reinspection.

1.5 ACCESS TO WORK

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

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

1.6 PROCEDURES

.1 Notify appropriate agency and Consultant 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 an orderly sequence so as not to cause delay 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.

1.7 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 Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of the Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by the Consultant.

1.8 REPORTS

.1 Submit (2) two hard copies and (1) Digital of inspection and test reports to the Consultant.

.2 Provide copies to Subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.

1.9 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as may be requested.

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

.3 Contractor shall assume one set of concrete cyclinders will be required for each dugout floor slab.

1.10 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.

.2 Construct in all locations acceptable to the Consultant.

.3 Prepare mock-ups for Consultant's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 If requested, the Consultant will assist in preparing a schedule fixing dates for preparation.

.6 Remove mock-up at conclusion of Work or when acceptable to Consultant.

.7 Mock-ups may remain as part of Work.

.8 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.11 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario of Canada.

.3 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 co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Time allowed for Consultant’s review of each submission to be determined at start-up meeting, but shall not exceed more than one (1) week.

.5 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.

.6 Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of revisions other than those requested.

.7 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.

.8 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.

.9 Submit electronic copies of test reports for requirements requested in specifications.

1.12 SAMPLES

.1 Submit for review samples as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Consultant's business address.

.3 Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

.6 Make changes in samples which Consultant may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.13 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in jpg or tif format, standard resolution as work progresses and at milestone events or to indicate issues to Consultant.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Take a minimum of 10 photographs a week during construction of features currently under construction.

.4 Submit a package of progress photos on a weekly basis to the Consultant. Images to be submitted electronically either via email or USB drive.

2 PRODUCTS

.1 Not use.

3 EXECUTION

.1 Not used.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 Temporary utilities.

1.2 RELATED SECTIONS

.1 Section 01 52 00 - Construction Facilities

.2 Section 01 56 00 - Temporary Barriers and Enclosures

1.3 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.4 DEWATERING

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water. Cost shall be borne by Contractor.

1.5 WATER SUPPLY

.1 Contract shall provide continuous supply of potable water for construction use.

.2 Arrange for connection with appropriate utility company and pay all costs for installation, maintenance and removal.

.3 Contractor shall for utility charges at prevailing rates.

1.6 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 non-flameless type. Solid fuel salamanders are not permitted.

.3 Provide temporary heat and ventilation in enclosed areas as required to:

.1 Facilitate progress of Work.

.2 Protect Work and products against dampness and cold.

.3 Prevent moisture condensation on surfaces.

.4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.

.5 Provide adequate ventilation to meet health regulations for safe working environment.

.4 Maintain temperatures of minimum 10 degrees C in areas where construction is in

progress.

.5 Ventilating:

.1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.

.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.

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

.4 Ventilate storage spaces containing hazardous or volatile materials.

.5 Ventilate temporary sanitary facilities.

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

.6 Permanent heating system of building may be used when available. 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, and clean all ductwork

.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 with applicable codes and standards.

.2 Enforce safe practices.

.3 Prevent abuse of services.

.4 Prevent damage to finishes.

.5 Vent direct-fired combustion units to outside.

.11 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.7 TEMPORARY POWER AND LIGHT

.1 Contractor shall arrange and pay for temporary power during construction.

.2 Arrange for connection with appropriate utility company. Pay all costs for installation, maintenance and removal.

.6 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Consultant provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 months.

1.8 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary telephone/communications hook up necessary for own use.

1.9 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on site.

2 PRODUCTS

.1 Not used.

3 EXECUTION

.1 Not used.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 Office and sheds.

.2 Parking.

.3 Project identification.

1.2 RELATED SECTIONS

.1 Section 01 51 00 - Temporary Utilities

.2 Section 01 56 00 - Temporary Barriers and Enclosures

1.3 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CGSB 1-GP-189M- [84] , Primer, Alkyd, Wood, Exterior.

.2 CGSB 1.59- [96] , Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA)

.1 CSA-0121- [M1978] , Douglas Fir Plywood.

.2 CAN3-Z321- [96] , Signs and Symbols for the Workplace.

1.4 INSTALLATION AND REMOVAL

.1 Provide construction facilities in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.5 SITE STORAGE/LOADING

.1 Confine work and operations of employees by Contract Documents. 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.

1.6 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project site.

.3 Build and maintain temporary roads where indicated or directed by Consultant and provide snow removal during period of Work.

.4 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.7 SECURITY

.1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays at the discretion of the Contractor.

1.8 OFFICES

.1 Provide office heated to 22 C, lighted and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.

.2 Provide a clearly marked and fully stocked first-aid case in a readily available location.

.3 Subcontractors may provide their own offices as necessary. Direct location of these offices.

1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds or containers for storage of tools, equipment and materials as required by the Works.

.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.

.3 When permanent water and drain connections are completed, provide temporary water closets and urinals complete with temporary enclosures, inside building. Permanent facilities may be used on approval of Consultant.

1.11 CONSTRUCTION SIGNAGE

.1 Provide and erect, within three weeks of signing Contract, a project sign in a location designated by Consultant.

.2 Construction sign 1200mm x 2400mm, of wood frame and plywood construction painted with exhibit lettering produced by a professional sign painter.

.3 Indicate on sign, name and logo of Owner, Consultant name and logo, Contractor name and logo of a design style established by Consultant.

.4 No other signs or advertisements, other than warning signs, are permitted on site.

.5 Project Identification Site Sign:

.1 Provide project identification site sign comprising framing, and one 1200 x 2400mm signboard as detailed and as described below.

.1 Framework and battens: Select Structural White Spruce, Douglas Fir or Western Red Cedar, dressed 4 sides.

.2 Signboard: 19 mm Medium Density Overlaid Douglas Fir Plywood to CSA 0121.

.3 Paint: alkyd type, without silicone additives. Primer to CGSB 1-GP-189, enamel to CGSB 1.59.

.4 Fasteners: hot-dip galvanized carriage bolts.

.5 Vinyl sign face: printed project identification, self adhesive, vinyl film overlay, supplied by Contractor.

.2 Locate project identification sign as directed by Consultant and construct as follows:

.1 Erect framework, and attach signboard to framing as indicated.

.2 Paint all surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.

.3 Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.

.6 Safety and Instruction Signs and Notices:

.1 Signs and notices for safety and instruction shall be in both official languages Graphic symbols shall conform to CAN3-Z321.

.2 Maintain approved signs and notices in good condition for duration of project and dispose of off site on completion of project or earlier if directed by Consultant.

2 PRODUCTS

.1 Not used.

3 EXECUTION

.1 Not used.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 Barriers.

.2 Environmental Controls.

.3 Traffic Controls.

.4 Fire Routes.

1.2 RELATED SECTIONS

.1 Section 01 51 00 - Temporary Utilities

.2 Section 01 52 00 - Construction Facilities

1.3 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.4 HOARDING

.1 Utilize existing chainlink fence surrounding the site. Close any gaps using 1800mm height Modu-Loc fencing.

.2 Provide one lockable truck entrance gate and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.

.3 Provide barriers around trees and plants designated to remain as per the Contract Drawings. Protect from damage by equipment and construction procedures.

1.5 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.

1.6 ACCESS TO SITE

.1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.7 PUBLIC TRAFFIC FLOW

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

1.8 FIRE ROUTES

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

1.9 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.

2 PRODUCTS

.1 Not used.

3 EXECUTION

.1 Not used.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 Field engineering survey services to measure and stake site.

.2 Survey services to establish and confirm inverts for Work.

.3 Recording of subsurface conditions found.

1.2 REFERENCES

.1 OPSS General Conditions (November 2018)

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

1.3 QUALIFICATIONS OF SURVEYOR

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

1.4 SURVEY REFERENCE POINTS

.1 Existing base horizontal and vertical control points are designated on drawings.

.2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction. Should it be found that existing topographic conditions are not as identified on the Contract Drawings the Contractor must submit a claim to the Consultant prior to commencement of any on site earthworks. Should the Contractor commence work prior to the submission of a claim there will be no consideration for additional payment.

.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.

1.5 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 Stake civil structure locations. Establish pipe invert elevations.

.6 Stake batter boards for concrete work

.7 Establish foundations/column locations and floor elevations.

.8 Establish lines and levels for mechanical and electrical work.

1.6 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Consultant of findings.

.2 Remove abandoned service lines within 2m of structures. Cap or otherwise seal lines at cut-off points as directed by Consultant.

1.7 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Consultant of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Consultant.

1.8 RECORDS

.1 Maintain a complete, accurate log of control and survey work as it progresses.

.2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.

.3 Record locations of maintained, re-routed and abandoned service lines.

1.9 SUBMITTALS

.1 Submit name and address of Surveyor to Consultant.

.2 On request of Consultant, submit documentation to verify accuracy of field engineering work.

.3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract Documents.

.4 At completion of project submit to Consultant a site survey with topographical information at the same frequency as provided in the Contract Documents. Survey should identify location and elevations of all civil structures, pathways, sport fields, tree plantings, planting be extents and light pole and electrical appurtenance locations. Provide AutoCad file of survey.

1.10 SUBSURFACE CONDITIONS

.1 Refer to OPSS GC 2.01

.2 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.

.3 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work as provided in OPSS GC 3.10.

2 PRODUCTS

.1 Not used.

3 EXECUTION

.1 Not used.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED SECTIONS

.1 Section 01 11 00 - Summary of Work

.2 Section 01 33 00 - Submittal Procedures

.3 Individual product Sections: cutting and patching incidental to work of section. Advance notification to other sections required.

1.3 SUBMITTALS

.1 Submit written request in advance of cutting or alteration which affects:

.1 Structural integrity of any element of Project.

.2 Integrity of weather-exposed or moisture-resistant elements.

.3 Efficiency, maintenance, or safety of any operational element.

.4 Visual qualities of sight-exposed elements.

.5 Work of Owner or separate contractor.

.2 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 Written permission of affected separate contractor.

.8 Date and time work will be executed.

1.4 MATERIALS

.1 Required for original installation.

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

1.5 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.

1.6 EXECUTION

.1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.6 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.7 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.8 Restore work with new products in accordance with requirements of Contract Documents.

.9 Refinish surfaces to match adjacent finishes: For continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.

2 PRODUCTS

.1 Not used.

3 EXECUTION

.1 Not used.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 Progressive cleaning.

.2 Final cleaning.

1.2 RELATED SECTION

.1 Section 01 77 00 - Closeout Procedures

1.3 REFERENCE STANDARDS

.1 OPSS General Conditions (November 2018)

1.4 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. 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 recyling.

.7 Remove waste material and debris from site and deposit in waste container at end of each working day.

.8 Dispose of waste materials and debris at designated dumping areas on Crown off site.

.9 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.

.10 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.11 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.12 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.13 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.5 FINAL CLEANING

.1 Refer to OPSS, GC 7.15

.2 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

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

.4 Prior to final review, remove surplus products, tools, construction machinery and equipment.

.5 Remove waste products and debris including that caused by Owner or other Contractors.

.6 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.

.7 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.8 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.

.9 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls and floors.

.10 Clean lighting reflectors, lenses, and other lighting surfaces.

.11 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

.12 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.

.13 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.14 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.15 Remove dirt and other disfiguration from exterior surfaces.

.16 Clean and sweep roofs, gutters, areaways, and sunken wells.

.17 Sweep and wash clean paved areas.

.18 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.

.19 Clean roofs, downspouts, and drainage systems.

.20 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.21 Remove snow and ice from access to building.

2 PRODUCTS

.1 Not used.

3 EXECUTION

.1 Not used.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED SECTIONS

.1 Section 01 78 00- Closeout Submittals

1.3 REFERENCES

.1 OPSS General Conditions (November 2018)

1.4 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Consultant in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.

.2 Request Consultant’s Inspection.

.2 Consultant’s Inspection: Consultant and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and systems have been tested, adjusted and balanced and are fully operational.

.4 Certificates required by Utility companies and Municipality have been submitted.

.5 Operation of systems have been demonstrated to Owner's personnel.

.6 Work is complete and ready for Final Inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Owner, Consultant , and Contractor. If Work is deemed incomplete by Owner and Consultant, complete outstanding items and request reinspection.

.5 Declaration of Substantial Performance: when Owner and Consultant consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance. Refer to OPSS, General Conditions GC8.02.04.04 - Substantial Performance of Work for specifics to application.

.6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment: When Owner and Consultant consider final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. Refer to OPSS, General Conditions GC 8.02.04.07 for specifics to application. If Work is deemed incomplete by Owner and Consultant, complete outstanding items and request reinspection.

.8 Payment of Holdback: After issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount in accordance with OPSS , General Conditions GC 8.02.04.05.

1.5 DEMONSTRATIONS AND TRAINING

.1 The Contractor shall demonstrate operation and maintenance of products, equipment and systems to Consultant and the Owner’s personnel.

.2 The Contractor shall provide 2 weeks’ notice of demonstrations to allow Consultant to co-ordinate attendance of Owner’s personnel.

.3 Use operation and maintenance manuals as basis for instruction during demonstrations and training.

.4 Review contents of manuals with Owner’s personnel in detail to explain all aspects of operation and maintenance.

.5 Allow sufficient time in construction schedule for completion of demonstrations and training.

.6 For products or equipment requiring seasonal operation, ensure the demonstration is performed within the season of operation.

.7 All demonstrations and training shall be completed prior to Substantial Performance.

1.6 FINAL CLEANING

.1 Clean in accordance with Section 01 74 11 – Cleaning.

.2 Remove surplus materials, excess materials, rubbish, tools and equipment.

2 PRODUCTS

.1 Not used.

3 EXECUTION

.1 Not used.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 As-built, samples, and specifications.

.2 Equipment and systems.

.3 Product data, materials and finishes, and related information.

.4 Operation and maintenance data.

.5 Spare parts, special tools and maintenance materials.

.6 Warranties and bonds.

.7 Final site survey.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 01 45 00 - Quality Control

.3 Section 01 74 11 - Cleaning

.4 Section 01 77 00 - Closeout Procedures

1.3 SUBMISSION

.1 Prepare instructions and data by personnel experienced in maintenance and operation of described products.

.2 Copy will be returned after final inspection with Consultant's comments.

.3 Revise content of documents as required prior to final submittal.

.4 Two weeks prior to Substantial Performance of the Work, submit to the Consultant three final copies of operating and maintenance manuals in English.

.5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.6 If requested, furnish evidence as to type, source and quality of products provided.

.7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.8 Pay costs of transportation.

1.4 FORMAT

.1 Organize data in the form of an instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf with spine and face pockets.

.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

.4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: Manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in dwg format on a USB drive.

1.5 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;

.1 date of submission; names,

.2 addresses, and telephone numbers of Consultant and Contractor with name of responsible parties;

.3 schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

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

1.6 AS-BUILTS AND SAMPLES

.1 In addition to requirements in General Conditions, maintain at the site for Consultant and Owner one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to the Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

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

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

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

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

1.7 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of drawings, and in copy of Project Manual, provided by Consultant.

.2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:

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

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

.3 Measured locations of utilities and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Drawings.

.7 References to related shop drawings and modifications.

.5 Specifications: legibly mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications,[inspection certifications, field test records, required by individual specifications sections.

1.8 FINAL SURVEY

.1 Submit final site survey certificate certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.9 EQUIPMENT AND SYSTEMS

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include test and balancing reports as specified in Section 01 45 00] - Quality Control.

.15 Additional requirements: As specified in individual specification sections.

1.10 MATERIALS AND FINISHES

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional Requirements: as specified in individual specifications sections.

1.11 SPARE PARTS

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed ; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.12 MAINTENANCE MATERIALS

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

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed ; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Consultant . Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.13 SPECIAL TOOLS

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

1.14 STORAGE, HANDLING AND PROTECTION

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Consultant.

1.15 WARRANTIES AND BONDS

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.

.4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties and bonds until time specified for submittal.

2 PRODUCTS

.1 Not used.

3 EXECUTION

.1 Not used.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 23 00 - Excavation and Fill

.3 Section 32 91 19.13 - Topsoil Placement and Grading

.4 Section 31 14 13 - Soil Stripping and Stockpiling

1.2 PROTECTION

.1 Prevent movement, settlement or damage of adjacent parts of existing items to remain. Make good damage and be liable for injury caused by demolition and removal.

1.3 MEASUREMENT PROCEDURES

.1 Demolition, removals and disposal as indicated on Drawings or required to complete the work will not be measured for payment and are considered incidental to Work.

1.4 SAFETY CODE

.1 Unless otherwise specified, carry out demolition work in accordance with Municipal Construction / Demolition Waste Management Guidelines and Disposal and CSA S350-M1980 (R2003).

1.5 DELIVERY, STORAGE AND HANDLING

.1 Storage and Protection

.1 Protect existing items designated to remain and items designated for salvage.

.2 In event of damage of such item, immediately replace or make repairs to approval of Consultant and at no cost to the Owner.

.2 Remove and store materials to be salvaged, in manner to prevent damage and as specified on the drawings.

.3 Store and protect in accordance with requirements for maximum preservation of material.

.4 Handle salvaged materials as new materials.

.5 Protect municipal sidewalks from heavy vehicular damage and keep all roadways, lanes and sidewalks clean and clear of dirt, debris, etc. resulting from the work.

.6 Erect warning signs and protective barriers in accordance with all applicable regulations.

.7 Post danger signs in conspicuous locations to warn persons that demolition is in progress.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Municipal regulations.

.2 Separate and recycle materials that cannot be salvaged for reuse.

.1 Including wood, metal, concrete, and asphalt.

.3 Hazardous materials:

.1 Place materials defined as hazardous or toxic in designated containers.

.2 Handle and dispose of hazardous materials in accordance with CEPA, Regional, and Municipal regulations.

.3 Ensure emptied containers are sealed and stored safely.

.4 Salvaged Materials:

.1 Label locations of storage areas for salvaged materials.

.2 Provide barriers and security devices.

.5 Remove materials that cannot be recycled or salvaged for reuse and dispose of them in accordance with applicable codes at licensed facilities.

1.7 SITE CONDITIONS

.1 Site Environmental Requirements:

.1 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.2 Do not dispose of volatile materials including but not limited to mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.

.3 Ensure proper disposal procedures are maintained throughout the project.

.4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.

.5 Control disposal of runoff water containing suspended materials or other harmful substances in accordance with local authorities and as directed by Consultant.

.6 Protect trees, plants and foliage on site and adjacent properties where indicated on the drawings and in accordance with Section 32 01 90.33 – Tree and Shrub Preservation.

.7 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

2 PRODUCTS

2.1 Not used.

3 EXECUTION

3.1 PREPARATION

.1 Inspect site prior to demolition with Consultant and verify extent and locations of items designated for removal, disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities.

.1 Active utilities traversing site to be maintained in operating condition.

.3 Notify and obtain approval as required of utility companies before starting demolition.

3.2 REMOVAL OPERATIONS

.1 Prepare schedule of removals to indicate timing of activities and obtain Consultant's written approval prior to proceeding.

.2 Remove items as indicated on the drawings. Items shall include, but are not limited to Dugouts, retaining walls, footings and concrete pads.

.3 Do not disturb items designated to remain in place as indicated on the drawings.

.4 Removal of Pavements, Curbs, Walkways:

.1 Square up adjacent surfaces to remain in place by saw cutting to full depth.

.2 Protect adjacent joints and load transfer devices.

.3 Protect underlying and adjacent granular materials.

.5 Prevent contamination with base course aggregates, when removing asphalt pavement for subsequent incorporation into hot mix asphalt concrete paving.

.6 Remove designated trees during demolition.

.7 Grind, chip or shred other vegetation for mulching and composting, or use as mill pulp.

.8 Stockpile topsoil for fill in accordance with Section 31 14 13 - Soil Stripping and Stockpiling.

.9 Dispose of materials not designated for salvage or reuse on site as indicated by Consultant at authorized facilities.

.10 Backfill in areas as indicated and in accordance with Section 31 23 00 – Excavation and Fill.

3.3 DEMOLITION AND REMOVAL

.1 Sort materials into appropriate piles for reuse, recycling and disposal.

.2 Remove stockpiled material as directed by Consultant when it interferes with operations of the project.

.3 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.

.4 Dispose of removed materials, to appropriate recycling facilities, reuse facilities or disposal facilities except where specified otherwise, in accordance with authority having jurisdictions. All material not to be reused or recycled shall be disposed offsite in a legal manner.

3.4 RESTORATION

.1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of work to match condition of adjacent, undisturbed areas.

.2 Use soil treatments and procedures, which are not harmful to health, are not injurious to plants and do not endanger wildlife, adjacent watercourses or groundwater.

3.5 CLEANING

.1 Upon completion of work; remove debris, trim surfaces and leave work site clean.

.2 Use cleaning solutions and procedures, which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent watercourses or groundwater.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 Formwork for cast-in-place concrete, with shoring, bracing and anchorage.

.2 Openings in forms for other work.

.3 Form accessories.

.4 Form stripping.

1.2 RELATED SECTIONS

.1 Section 01 29 83 – Payment Procedures for Testing Laboratory Services

.2 Section 01 33 00 – Submittal Procedures

.3 Section 01 45 00 – Quality Control

.4 Section 03 30 00 – Cast in Place Concrete

1.3 REFERENCES

.1 ACI 301-05 - Specification for Structural Concrete for Buildings.

.2 ASME A17.1-2007/CSA-B44-07 – Safety Code for Elevators and Escalators (Canada/USA harmonized standard).

.3 CSA-S269.1-1975 (R2003) - Falsework for Construction Purposes.

.4 CAN/CSA-S269.3-M92 (R2008) - Concrete Formwork.

.5 CSA-A23.1-09/A23.2-09 - Concrete Materials and Methods of Concrete Construction / Methods of Test for Concrete.

.6 CSA-O121-08 - Douglas Fir Plywood.

.7 CSA-O151-09 - Canadian Softwood Plywood.

.8 CSA-O153-M1980 (R2008) - Poplar Plywood.

.9 CSA-O437 Series-93 (R2006) - OSB and Waferboard.

.10 CSA-S269.1-1975 (R2003) - Falsework for Construction Purposes.

.11 COFI (Council of Forest Industries of British Columbia) - Exterior Plywood for Concrete Formwork.

1.4 DESIGN REQUIREMENTS

.1 Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

.2 Conform to CSA-S269.3.

1.5 QUALITY ASSURANCE

.1 Perform Work in accordance with CAN/CSA-S269.3.

1.6 REGULATORY REQUIREMENTS

.1 Conform to applicable code for design, fabrication, erection and removal of formwork.

1.7 INSPECTION AND TESTING

.1 Materials and workmanship will be subject to inspection at any time. Co-operate in permitting access for inspection at all places where work is being done.

.2 Do not enclose formwork until reinforcing steel has been reviewed.

1.8 DELIVERY, STORAGE, AND PROTECTION

.1 Separate waste materials for reuse and recycling.

.2 Place materials defined as hazardous or toxic in designated containers.

.3 Store off ground in ventilated and protected manner to prevent deterioration from moisture.

2 PRODUCTS

2.1 WOOD FORM MATERIALS

.1 Formwork materials:

.1 For non-“architectural” concrete, use wood and wood product formwork materials to CSA-O121, CAN/CSA-O86, CSA-O437 Series, and/or CSA-O153, or better.

2.2 FORMWORK ACCESSORIES

.1 Form Ties where required:

.1 Use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25mm diameter in concrete surface. Twisted wire ties are not permitted.

.2 For architectural concrete walls, use snap ties complete with plastic cones and light grey concrete plugs.

.2 Form Release Agent: non-toxic, biodegradable, and/or low VOC.

.3 Form Stripping Agent: Colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 70 and 110s Saybolt Universal, 15 to 24 mm2/s at 40°C, flashpoint minimum 150°C, open cup.

.4 Corners: Use 25mm chamfer strips on external corners and 25mm fillets at interior corners and joints, unless specified otherwise.

3 EXECUTION

3.1 EXAMINATION

.1 Refer to Section 01 71 00 – Examination and Preparation

.2 Verify lines, levels and centres before proceeding with formwork.

.3 Ensure that dimensions agree with drawings.

3.2 EARTH FORMS

.1 Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

.2 Obtain Consultant's approval for use of earth forms not indicated on drawings.

3.3 ERECTION – FORMWORK

.1 Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of CAN/CSA-S269.3.

.2 Fabricate and erect false work in accordance with CSA-S269.1
.

.3 Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

.4 Do not place shores and mud sills on frozen ground.

.5 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.6 Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

.7 Align joints and make watertight. Keep form joints to a minimum.

.8 Form expansion and control joints as indicated.

.9 Coordinate this section with other sections of work which require attachment of components to formwork.

.10 If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Consultant.

3.4 APPLICATION - FORM RELEASE AGENT

.1 Apply form release agent on formwork in accordance with manufacturer's recommendations.

.2 Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

.3 Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

.1 Provide formed openings where required for items to be embedded in passing through concrete work.

.2 Locate and set in place items which will be cast directly into concrete.

.3 Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.

.4 Install accessories in accordance with manufacturer's written instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.

.5 As applicable, install waterstops to manufacturer's written instructions continuous without displacing reinforcement. Heat seal joints watertight.

.6 Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

.7 Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING

.1 Clean forms as erection proceeds, to remove foreign matter within forms.

.2 Clean formed cavities of debris prior to placing concrete.

.3 Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

.4 During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.7 FORMWORK TOLERANCES

.1 Construct formwork to maintain tolerances in accordance with CSA-A23.1.

3.8 FIELD QUALITY CONTROL

.1 Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

3.9 FORM REMOVAL

.1 Leave formwork in place for following minimum periods of time after placing concrete
.

.1 3 days for walls and sides of beams.

.2 3 days for columns.

.3 7 days for beam soffits, slabs, decks, sloped walls and other structural members, or 3 days when replaced immediately with adequate shoring to standard specified for falsework.

.4 1 day (24 hours) for curbs, footings and abutments.

.2 Remove formwork when concrete has reached 75% of its design strength or minimum period noted above, whichever comes later.

.3 Provide necessary reshoring of members until concrete has reached 100% of its design

strength or where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.4 Space reshoring in each principal direction at not more than 3000mm (10ft) apart.

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

.6 Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

.7 Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

3.10 FINISHING

.1 Complete finishing of concrete per Section 03 30 00 – Cast in Place Concrete.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 Site work cast-in-place concrete for retaining walls, sidewalks, curbs, light pole base, flagpole base, thrust blocks and manholes.

.2 Control, expansion and contraction joint devices associated with concrete work including embedments.

1.2 RELATED SECTIONS

.1 Section 01 29 83 – Payment Procedures for Testing Laboratory Services

.2 Section 01 33 00 – Submittal Procedures

.3 Section 01 45 00 – Quality Control

.4 Section 31 23 10 - Excavation, Backfilling and Grading

1.3 REFERENCES

.1 ACI 305R-05 - Hot Weather Concreting.

.2 ACI 306R-88(2002) - Cold Weather Concreting.

.3 ASTM C260-10a - Air-Entraining Admixtures for Concrete.

.4 ASTM C330-09 - Lightweight Aggregates for Structural Concrete.

.5 ASTM C494/C494M-08a - Chemical Admixtures for Concrete

.

.6 CAN/CSA-S269.3-M92 (R2008) - Concrete Formwork.

.7 CAN/CSA-S474-04 (R2009) - Concrete Structures.

.8 CSA-A23.1-09/A23.2-09 - Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete.

.9 CSA-A23.3-04 - Design of Concrete Structures.

.10 CSA-S269.1-1975 (R2003) - Falsework for Construction Purposes.

1.4 SUBMITTALS FOR REVIEW

.1 Provide submittal as per Section 01 33 00 – Submittal Procedures.

.2 Product Data: Provide data on joint devices, attachment accessories and admixtures.

.3 Samples: Submit two (2) samples and product data sheet for concrete sealer, expansion and control joint material and waterstops.

1.5 SUBMITTALS FOR INFORMATION

.1 Provide submittals as per Section 01 33 00 – Submittal Procedures

.2 Test Data: Minimum four (4) weeks prior to starting concrete work, submit manufacturer's test data and certification by qualified independent inspection and testing laboratory that following materials will meet specified requirements:

.1 Portland cement.

.2 Blended hydraulic cement.

.3 Supplementary cementing materials.

.4 Grout.

.5 Admixtures.

.6 Aggregates.

.7 Water.

.3 Certification: Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CSAA23.1.

.4 Certification: Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA-A23.1.

.5 Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent Work.

.6 Submit testing and inspection results and reports for review by Consultant and do not proceed without written approval when deviations from mix design or parameters are found.

.7 Concrete hauling time: A maximum time limit of 120 minutes from the time of initial mixing to complete discharge shall be observed. Any deviations shall be reported to the Consultant.

1.6 CLOSEOUT SUBMITTALS

.1 Provide submittal as per Section 01 33 00 – Submittal Procedures..

.2 Record Documentation: Accurately record actual locations of embedded utilities and components.

1.7 QUALITY ASSURANCE

.1 Perform Work in accordance with CSA-A23.1/A23.2.

.2 Acquire cement and aggregate from same source for all work

.

.3 Submit to Consultant, a minimum 4 weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.

.4 Conform to CSA-A23.1 when concreting during hot and cold weather.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Store material in accordance with CAN/CSA-A23.1.

.2 Concrete hauling time: maximum allowable time limit for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.

.1 Modifications to maximum time limit must be agreed to by Consultant and concrete producer as described in CSA-A23.1/A23.2.

.2 Deviations to be submitted for review by Consultant.

.3 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

.4 Cement and aggregate shall be stored in such a manner as to prevent deterioration or intrusion of foreign matter. Liquid mixtures shall be protected from freezing and from setline out of solution. Any deteriorated or damaged materials shall not be used for concrete.

1.9 INSPECTION AND TESTING

.1 An independent inspection and testing company provided by the Contractor and approved by the Consultant may carry out inspection and testing as required.

.2 The contractor shall arrange with the inspector and the Consultant for review of construction.

.3 Tests will be carried out under the appropriate CSA standards and as directed by the Consultant.

.4 A minimum of three (3) compression test specimens are to be taken for each concrete placement, but not less than three (3) cylinders for each 40 cubic metres of individual placement, all in accordance with CAN/CSA-A23.2. One (1) cylinder shall be tested at seven (7) days and the remaining cylinders at twenty-eight (28) days. Additional test specimens shall be taken at the discretion of the Consultant. Preparation of test cylinders, curing procedure and testing, shall all be carried out by the Inspection and Testing Company.

.5 A copy of all test results are to be forwarded directly to the Consultant the Inspection and Testing Company.

.6 Materials and workmanship will be subject to the inspection at any time. Co-operate in permitting access for inspection at all places where work is being done or stock is being stored.

.7 The Contractor shall supply all necessary samples to the Testing Laboratory for testing. Supply additional labour required to assist the Testing Laboratory in making such tests. The costs of this material and labour shall be borne by the Contractor.

.8 Where Work, in the opinion of the Consultant, requires re-inspection, or more stringent inspections because of previous requirements of re-inspections of similar work, such re-inspections shall be at the Contractor’s expense.

1.10 SCHEDULING

.1 Check the drawings and specifications for the requirements of other trades which will affect the forming and placing of concrete and reinforcing steel

.

.2 Give instruction and information in writing, or by schedule to other trades, of the requirements necessary for services, materials, or inserts prepared and/or supplied by other trades which will affect the work of this division.

.3 Prior to placing concrete, request review of formwork and reinforcing steel by the Consultant. Concrete shall not be placed until the Consultant has completed the review.

.4 Before placement, all equipment for mixing and transporting the concrete shall be cleaned, and all debris and ice shall be removed from the places to be occupied by concrete. Reinforcement shall be thoroughly cleaned of ice, dirt, scale or other coatings.

1.11 COOPERATION WITH OTHER TRADES

.1 Set sleeves, ties, anchor bolts, pipe hangers and other inserts, openings and sleeves in concrete work, as required by other Sections.

.2 Read the specifications and examine the drawings covering the work of other interfacing trades. Consult with the trades concerned to give them all necessary facilities and directions and information to complete the work of their trade.

.3 Confine operations to the immediate vicinity of the item's final location in the Work, and co-operate fully in order to permit work adjacent to or appurtenant to the work to be carried out with a minimum of interference.

1.12 ENVIRONMENTAL CONDITIONS

.1 Cold Weather Requirements:

.1 When the air temperature is at or below 5 degrees Celsius or when there is a probability of it falling to that limit within 24 hours of placing, the concrete temperature shall be maintained in accordance with CAN/CSA-A23.1.

.2 Ensure that the surface on which finished slabs and toppings are placed, including soil, is at a temperature of at least +13 degrees Celsius (e.g. finished concrete). Ensure that any surface against which concrete is placed, including soil, is at a temperature of at least +5 degrees Celsius (e.g. footings).

.3 In cold weather, concrete shall be delivered to the Work having a temperature of not less than 18 degrees Celsius and not more than 32 degrees Celsius.

.4 Provide temporary heating equipment as necessary. Exhaust heaters producing carbon dioxide shall be vented directly to the outside. Protect concrete surfaces from direct exposure to the combustion gases of heaters.

.5 Provide protection for concrete such that all sections of the concrete and surrounding air will remain continuously at a temperature of between +10 degrees Celsius and +27 degrees Celsius for 5 days after placing.

.6 The housing, covering or other protection used in connection with curing shall remain in place and intact at least twenty-four hours and until the air temperature in the enclosure has reached the outside air temperature after the artificial heating is discontinued. No dependence shall be placed on salt or other chemicals for the prevention of freezing.

.2 Hot Weather Requirements:

.1 When the air temperature is at or above 27 degrees Celsius or when there is a

probability of it rising to 27 degrees Celsius during the placing period, special effort shall be made to maintain the concrete temperature in accordance with CAN/CSA-A23.1 Curing and Protection.

.2 Water down all formwork, steel deck, reinforcing, sub-grade and general area around the Work just before placing concrete to reduce the temperature and Increase the humidity. Do not permit water to puddle.

.3 In hot weather concrete shall be delivered to the Work having a temperature of not less than 10 degrees Celsius and not more than 27 degrees Celsius.

.4 Take suitable precautions to avoid drying of the concrete prior to finishing operations. Provide windbreaks, sunshades, fog sprays or other devices.

.5 Do not place concrete which has a temperature of 27 degrees Celsius or above.

1.13 QUALITY CONTROL

.1 Defective materials or quality of work whenever found at any time shall be rejected, regardless of previous inspection. Inspection is not to relieve the Contractor from responsibility, but is a precaution against oversight and errors. Defective materials shall be removed and replaced by the Contractor at their own expense, and without change to the Contract Time.

2 PRODUCTS

2.1 CONCRETE MATERIALS

.1 Cement: CSA-A3001, Type GU.

.2 Blended Hydraulic Cement: CSA-A3001, Type GUb or GU.

.3 Water: CSA-A23.1, clean and not detrimental to concrete.

.4 Reinforcing bars: to CAN/CSA-G30.18, Grade 400R.

.5 Welded steel wire fabric: to ASTM A185.

.6 Premoulded joint filler:

.7 Bituminous impregnated fibreboard: to ASTM D1751.

.8 Joint sealer/filler: see Section 03 35 11.

.9 Shrinkage compensating grout: premixed compound consisting of metallic and/or non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSAA23.1/A23.2.

.1 Compressive strength: 50 MPa at 28 days.

.2 Net shrinkage at 28 days: maximum 0.1%.

.10 Non-premixed dry pack grout: composition of non-metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 50 MPa at 28 days.

.11 Other concrete materials: to CSA-A23.1/A23.2.

2.2 MIXES

.1 Performance Method for specifying concrete: to meet Consultants performance criteria in accordance with CAN/CSA-A23.1/A23.2.

.1 Ensure concrete supplier meets performance criteria.

.2 Provide concrete mix per Contract Notes on Contract Drawings.

.3 If requested, provide concrete supplier's certification.

.4 Provide quality management plan to ensure verification of concrete quality to specified performance.

2.3 ADMIXTURES

.1 Admixtures will be permitted, as specified, only to correct deficiency in mixture or to make correct placement requirements as recommended by the Testing Laboratory and approved by the Consultant.

.2 Approval will be withdrawn of the use of the admixture, if, during the course of the Work, concrete performance appears unsatisfactory.

.3 Accelerating admixtures may be used, subject to approval, in cold weather. If approved, the use of admixture will not relax the cold weather placement requirements of CAN/CSA-A23.1.

.4 Set-retarding admixture may be used, subject to approval, during hot weather to allow for proper finishing of concrete.

.5 For all concrete exposed to weather provide air entrainment per Table 10 of CAN/CSAA23.1 or as indicated on Contract Drawings.

3 EXECUTION

3.1 EXAMINATION

.1 Section 01 71 00 – Examination and Preparation. Contractor shall verify existing conditions before starting work.

.2 Verify all dimensions and locations required on drawings.

.3 Verify requirements for concrete cover over reinforcement.

.4 Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not impede concrete placement.

.5 Verify locations of all openings and embedments required for other structural, architectural, mechanical and electrical work.

3.2 PREPARATION

.1 Place concrete reinforcing in accordance with Section 03 20 00 and Contract drawings.

.2 During concreting operation:

.1 Development of cold joints not allowed.

.2 Ensure concrete delivery and handling facilitates placing with minimum of rehandling, and without damage to existing structure or Work.

.3 Protect previous Work from staining.

.4 Clean and remove stains prior to application of concrete finishes.

.5 Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

3.3 PLACING CONCRETE

.1 Place concrete in accordance with CSA-A23.1.

.2 Notify Consultant minimum 48 hours prior to commencement of operations.

.3 Obtain Consultant's review of forms and reinforcing before placing any concrete
.

.4 Do not place concrete during or prior to rain. If rain occurs after placing and before initial set of concrete, cover with a waterproof material until set.

.5 Unless otherwise agreed by the Consultant, consolidate all concrete in place by means of internal vibrators. Use the largest vibrator consistent with the type and location of concrete being placed. Vibrators shall be in accordance with CAN/CSA-A23.1, Table 17.

.6 Apply vibrators systemically and at such spacing that the zones of influence overlap. Do not over-vibrate.

.7 Concrete shall be thoroughly worked around reinforcement and embedded items and into the corners of forms.

.8 Ensure reinforcement, inserts, embedded parts and formed expansion/contraction joints are not disturbed during concrete placement.

.9 Methods of conveying and placing are to be such that concrete components do not segregate. Do not use vibrators to convey concrete.

.10 Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to re-handling or flowing. The placing of concrete shall be carried on at such a rate that concrete is at all times plastic and flows readily into spaces between bars No concrete that has been contaminated by foreign material shall be used.

.11 Once the placing of concrete has started, it shall be carried on as a continuous operation until the placement of the panel or section is complete.

.12 The time between adding mixing water to the ready-mix concrete at the ready-mix plant, until the discharge of concrete into final location, must not exceed 2 hours.

.13 Concrete shall be homogenous, uniformly workable, and readily placeable into corners and angle of forms and around reinforcement, without permitting materials to segregate, or excessive free water to collect on surface.

.14 Concrete, when hardened, shall have required strength, durability, resistance to abrasion, water tightness, appearance and other qualities specified or noted.

.15 Separate slabs on grade from vertical surfaces with 13 mm (1/2") thick joint filler.

.16 Set top of joint filler to required elevations. Secure to resist movement by wet concrete.

.17 Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

.18 Place concrete continuously between predetermined expansion, control, and construction joints.

.19 Do not interrupt successive placement; do not permit cold joints to occur.

.20 Where indicated, saw cut joints within 24 hours after placing. Refer to Contract drawings for depth and spacing of saw cuts.

.21 Screed floors and slabs on grade level, maintaining surface flatness to tolerances in accordance with CSA-A23.1/A23.2.

3.4 CONCRETE FINISHING

.1 Finish all concrete to CSA-A23.1-A23.2.

.2 Pavements, walks, curbs and exposed site concrete:

.1 Screed to plan surfaces and use aluminum, magnesium or wood floats.

.2 Provide round edges and joint spacings using standard tools.

.3 Trowel smooth to provide lightly brushed non-slip finish.

3.5 CURING AND PROTECTION

.1 Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical damage.

.2 Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

3.6 FIELD QUALITY CONTROL

.1 Provide free access to Work and cooperate with appointed firm.

.2 Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.

.3 Tests of cement and aggregates may be performed to ensure conformance with specified requirements.

.4 Testing in accordance with CAN/CSA-A23.1/A23.2 by testing laboratory.

3.7 PATCHING

.1 Allow Consultant to inspect concrete surfaces immediately upon removal of forms.

.2 Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Consultant upon discovery.

.3 Patch imperfections in accordance with CSA-A23.1.

3.8 DEFECTIVE CONCRETE

.1 Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

.2 Repair or replacement of defective concrete will be determined by the Consultant.

.3 Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Consultant for each individual area.

3.9 GROUTING

.1 Grouting of steel base plates, wherever required, shall be with non-shrink grout, in accordance with the manufacturer's instructions.

3.10 PROTECTION

.1 Protect all exposed concrete work from staining and/or physical damage to structural integrity or finish.

.2 Replace damaged work which cannot be repaired or restored to the Consultant's approval.

3.11 CLEAN-UP

.1 Upon completion of the Work of this Section, all surplus material and debris caused by the Work and equipment shall be promptly removed from the site. The building and site must be left in a condition satisfactory to the Consultant.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA)

a. CSA-A23.1-09 / A23.2-09, Test Methods and Standard Practices for Concrete.
b. CSA-A23.3-04(R2010), Design of Concrete Structures.
c. CSA-A23.4-09, Precast Concrete – Materials and Construction.
d. CSA-W59-03, Weld Steel Construction
e. CSA-W186-M 1990 (R2002), Weld of Reinforcing bar in Reinforced Concrete.

.2 National Building Code of Canada, 2010

.3 Ontario Building Code, 2012

.4 Concrete Reinforcing Institute, “Manual of Standard Practice”

.5 Steel Door Institute, “Recommended Specification for Steel Doors and Frames” (SD-100)

1.2 QUALITY OF MANUFACTURER

.1 Manufacturer shall be certified by CSA, meeting requirements of CSA A23.4-09 for appropriate class of work.

.2 Manufacturer shall be certified in compliance with the Canadian Precast Concrete Quality Assurance (CPCQA) Certification Program.

.3 Manufacturer shall be fully experienced in and equipped for this type of work and shall be able to document minimum ten consecutive years of activity in the field and have successfully completed projects of similar size and complexity.

.4 Manufacturer shall be a member of the National Precast Concrete Association (NPCA).

.5 Manufacturer: **Hy-Grade Precast Concrete, Gina Lathan,** Cell: 585-409-8009# or approved equivalent.

1.3 DESIGN CRITERIA

.1 Building shall be pre-engineered.

.2 Design precast concrete elements to carry handling and expected service loads, without detrimental effects. Assumed Standard Loads as follows:

Standard Live Roof Load:	2.87 kPa (60 psf)
Standard Wind Load:	1.29 kPa (27 psf)
Standard Floor Load:	4.79 kPa (100 psf)

.3 Retain a structural engineer, registered in Ontario, experienced in the field of precast concrete to provide structural aspects of the design, shop drawings, manufacturing, transportation and installation of all precast concrete components, attachments, hardware and assemblies.

.4 Roof Style: Wall panels shall be fabricated as necessary to create a shed style roof application. Roof slabs are to be fabricated with a consistent thickness and a simulated metal seam finish. The roof slabs shall extend a minimum of 152mm

beyond the wall panels on all sides except the front ridge should extend 365mm.

.5 Unsupported roof slabs to be supported by minimum (2) steel posts; primed and painted to colour selection by the owner.

.6 All slabs, panels & connections to be designed to retain backfilled earth behind the building. Panels thickness to be determined by precast manufacturer.

.7 Cast-in-Place Floor slab to be provided with 13mm step-down around the entire perimeter to prevent water migration into the building along the bottom of wall panels.
Contractor/Building Supplier to provided engineered drawings sealed by a structural engineer licensed to practice in Ontario.

.8 For the purpose of this bid the Contractor shall assume a 200mm depth C-2 concrete pad with 10M rebar at 300mm O.C. both ways. Granular base shall be 500mm Granular 'B', 300mm Granular 'A'. 50mm Rigid SM insultation extending 1.0m beyond edge of slab is required.

1.4 QUALITY ASSURANCE

.1 Conform to requirements of CSA A23.4-09 for allowable tolerances.

1.5 SUBMITTALS

.1 Prepare and submit detailed drawings, containing all pertinent information in regard to the erection of the precast concrete building including:

a. Location of each panel / slab in the completed structure and identifying marks for each unit
b. Size and dimensions of each panel / slab complete with connection details
c. Grade of reinforcement, concrete strength and admixtures
d. Locations and details for lifting hooks and handling points
e. Sequence of erection and any special instructions that may be required in handling and setting.

.2 Shop drawings to be sealed by professional engineer licensed to practice in jurisdiction of this project.

1.6 DELIVERY, HANDLING AND STORAGE

.1 Proper lifting devices for the completed unit shall be incorporated to ensure that it will be safely and efficiently handled and not produce distortion, cracking or deflection nor strain or adversely affect the unit.

.2 Precast panels shall be handled and adequately protected during fabrication, curing, storage and transport by methods that will prevent damage, warping, cracking, breakage, chipping, staining or other disfigurement. Units shall not be permitted to contact the earth or other staining influences.

.3 Repair chipped, checked, cracked, blemished or defective units.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Cement Type: HE – Mix Design: MD-40

.2 Aggregates, water, admixtures: to CSA A23.4-09.

.3 Formwork materials: All forms shall be accurately constructed, well braced and

stiffened to avoid deformations under pressure of wet concrete and vibrators.

.4 Use same brands and source of cement and aggregate for entire project to ensure uniformity of colouration and other mix characteristics.

.5 Reinforcing steel: to CAN/CSA-G30.18-M92. All reinforcing steel to be wieldable grade 400W.

.6 Panel Connections: All panels shall be securely fastened together with minimum 9.5mm thick steel brackets. Steel is to be of structural quality, hot-rolled carbon complying with ASTM A283, Grade C and hot dipped galvanized after fabrication. All fasteners to be 13mm diameter bolts complying with ASTM A307 for low-carbon steel bolts. Cast-in anchors used for panel connections to be Dayton-Superior #F-42, or equal.

2.2 CONCRETE MIXES

2.3

.1 Use a concrete mix designed to produce minimum 30 MPa compressive strength at 28 Days.

2.4 FINISHES

.1 All exterior wall faces to have a Simulated Ashlar finish; stained to colour selection by the owner.

.2 All interior wall faces to have a Smooth steel form finish.

.3 Curing and Sealing:

Any simulated exterior surfaces will be finished with concrete stain, Sherwin Williams H&C Stain & Sealer, Colour selection by owner

.4 All exterior roof faces to have a simulated metal seam finish; stained to colour selection by the owner.

2.5 DOORS

.1 Doors and Frames:

a. The building's storage room shall be equipped with one 914mm x 2134mm x 44mm (36"x84"x1¾") 18 gauge metal door with lockseam construction and honeycomb interior.

b. The doors shall be installed in a 16 gauge galvanized steel door frame.

c. The door and frame paint colour to be selected by the owner from manufacturer's standard colours.

.2 Hardware:

a. Hinges: Taymor 4100 series, 114mm x 102mm grey primed with non- removable pins.

b. Lockset: Dorex TLA5132D – Standard Schlage

c. Threshold: KN Crowder – Extruded Aluminum CT-804

d. Sweep: KN Crowder – Extruded Aluminum W-13S-2 with Neoprene Inserts

e. Pull: Commercial grade 102mm x 406mm Plate with 178mm pull handle (each

door)

f. Check Chain: N157A with binder posts and fasteners

g. Drip Cap: KN Crowder – Extruded Aluminum W-3

h. Astragal: Weld on flat plat; finished same as door

2.6 LOUVRES

3

.1 The building's storage room shall be equipped with two 419mm x 121mm louvres

a. Model: Sunvent FL164 – 50mm deep stormproof louvre with perimeter flange.

b. Louvres come with stationary blades and a 19 gauge bird screen.

PART 3 – EXECUTION

3.1 SITE PREPARATION

.1 Precast structure to be erection on prepared concrete slab/foundation. Design and installation of concrete slab/foundation not in precast scope of work.

.2 GC is to provide appropriate foundation waterproofing membrane to building face & perimeter drain prior to backfilling.

.3 Backfill material placed behind precast building must include appropriate drainage zone (recommended 19mm crushed stone) to allow proper drainage of water into the perimeter drain.

3.2 INSTALLATION

.1 All work shall be executed using workers skilled in the trade of precast erection.

3.3 ACCESS

.1 Contractor must provide level unobstructed area large enough for a crane and a tractor-trailer to park adjacent to the pad. The crane must be able to place its' outriggers within 1.5m of the edge of the pad. The truck and crane must be able to get side-by-side under their own power. No overhead lines may be within a 22m radius of the center of the pad. A minimum or 610mm clearance is required between this building and adjacent buildings.

3.4 CLEANING

.1 Clean soiled precast concrete surfaces by approved means to satisfaction of consultant.

.2 Repair units that have minor visual defects to the satisfaction of consultant.

3.5 INSPECTION AND TESTING

.1 All inspection and testing as directed by consultant. Costs incurred for all inspection and testing shall be the responsibility of the contractor.

END OF SECTION

1 GENERAL

1.1 RELATED SECTIONS

.1 Section 31 23 33.01 - Excavation, Trenching and Backfilling

.2 Section 31 22 13 – Rough Grading

2 PRODUCTS

.1 Not used.

3 EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 STRIPPING OF TOPSOIL

.1 Ensure that procedures are conducted in accordance with applicable Municipal requirements.

.2 Strip topsoil to a depth of 100mm from finished. Proposed infield topsoil depth is 100mm. Avoid mixing topsoil with subsoil.

.3 Dispose of topsoil off-site.

3.3 STRIPPING OF INFIELD CLAY AND SPORT SAND

.1 Ensure that procedures are conducted in accordance with applicable Municipal requirements.

.2 Strip infield clay and sand base to a depth of 250mm from finished grade.

.3 Dispose of clay and sand off-site.

END OF SECTION

1 GENERAL

1.1 RELATED SECTIONS

.1 Section 02 41 13 - Selective Site Demolition

.2 Section 31 32 19.01 – Geotextiles

.3 Section 31 22 13 - Rough Grading

.4 Section 32 11 13.01 – Granular Subbase

.5 Section 32 11 23 – Aggregate Base Courses

.6 Section 33 46 17 – Subgrade Drainage Network

1.2 REFERENCES

.1 Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation

.1 OPSS PROV 1004 November 2012, Ontario Provincial Standard Specification, Material Specification for Aggregates - Miscellaneous.

.2 OPSS.PROV 1010 April 2013, Ontario Provincial Standard Specification, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.

.2 American Society for Testing and Materials (ASTM)

.1 ASTM C117-04, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D422-63 (2007), Standard Test Method for Particle Size Analysis of Soils.

.4 ASTM D698-07e1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600kN-m/m³)

.5 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.6 ASTM D 1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ü) (2,700 kN-m/m ü).

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

4 Canadian Standards Association (CSA International)

.1 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.1 CSA-A3001-03, Cementitious Materials for Use in Concrete.

.2 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.5 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution.2

1.3 DEFINITIONS

.1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.

.1 Rock : any solid material in excess of 0.25 m and which cannot be removed by means of duty mechanical excavating equipment having a [0.95 to 1.15] m bucket. Frozen material not classified as rock.

.2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.2 Unclassified excavation: excavation of deposits of whatever character encountered in work.

.3 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.4 Waste material: excavated material unsuitable for use in work or surplus to requirements.

.5 Borrow material: material obtained from locations outside area to be graded and required for construction of fill areas or for other portions of work.

.6 Unsuitable materials:

.1 Weak and compressible materials under excavated areas.

.2 Frost susceptible materials under excavated areas.

.3 Frost susceptible materials:

.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D 4318, and gradation within limits specified when tested to [ASTM D 422] [and] [ASTM C 136]: Sieve sizes to CAN/CGSB-8.1.

.2 Table

Sieve Designation	% Passing
2.00 mm	[100]
0.10 mm	[45 - 100]
0.02 mm	[10 - 80]
0.005 mm	[0 - 45]

.3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.

.7 Unshrinkable fill: very weak mixture of Portland cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.4 SAMPLES

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

.2 Inform Consultant at least 3 weeks prior to commencing work, of proposed source of off site fill materials and provide access for sampling.

.3 Submit 10kg sample of type of fill to geotechnical testing agency for testing including representative samples of excavated material.

1.5 PROTECTION OF EXISTING FEATURES

.1 Existing buried utilities and structures:

.1 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

.2 Prior to commencing excavation work, notify applicable owner or authorities having jurisdiction, establish location and state of use of buried utilities and structures. Owners or authorities having jurisdiction to clearly mark such locations to prevent disturbance during work.

.3 Confirm locations of buried utilities by careful test excavations.

.4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.

.5 Where utility lines or structures exist in area of excavation, obtain direction of Consultant before removing or re-routing. Costs for such work to be paid by the Contractor.

.6 Record location of maintained, re-routed and abandoned underground lines.

.2 Existing buildings and surface features:

.1 Conduct with Consultant a condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, pavement, survey bench marks and monuments which may be affected by work.

.2 Protect existing buildings and surface features from damage while work is in progress. In event of damage, immediately make repair to approval of Consultant.

.3 Where required for excavation, cut roots or branches as approved by Consultant in accordance with Section 32 01 90.33 - Tree and Shrub Preservation.

1.6 SHORING, BRACING AND UNDERPINNING

.1 Protect existing features in accordance with Section 01 56 00- Temporary Barriers and Enclosures and applicable local regulations.

.2 Engage services of qualified professional engineer who is registered or licensed in province of Ontario Canada in which work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for work.

.3 Submit design and supporting data at least 2 weeks prior to commencing work.

.4 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in province of Ontario, Canada.

.5 Professional engineer responsible for design of temporary structures to submit proof of insurance coverage for professional liability except where engineer is employee of contractor, in which case contractor shall submit proof that work by professional engineer is included in contractor's insurance coverage.

2 PRODUCTS

2.1 MATERIALS

.1 Type 1 fill: OPSS Granular A – clean, hard, durable crushed gravel or stone, free from shale, clay, friable materials, organic matter and other deleterious substances with physical properties and gradation to conform to OPSS 1010, max. size 19 mm.

.2 Type 2 fill: OPSS Granular B, Type 1 - clean, hard, durable crushed gravel or stone, free from shale, clay, friable materials, organic matter and other deleterious substances with physical properties and gradation to conform to OPSS 1010, max. size 65 mm.

.3 Type 3 fill: selected backfill material from excavation or other sources, approved by Consultant for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials to conform to OPSS 1010.

.4 Type 4 fill: OPSS Granular B, Type 2 - clean, hard, durable crushed gravel or stone, free from shale, clay, friable materials, organic matter and other deleterious substances with physical properties and gradation to conform to OPSS 1010. When used for granular backfill for pipe sub-drains, 100% of the material shall pass the 37.5 mm sieve.

.5 Clean Sand: clean sand, free of stone larger than 3mm, debris and vegetation.

.6 19 mm Clear Stone: clean, hard, durable crushed gravel or stone, free from shale, clay, friable materials, organic matter and other deleterious substances with physical properties and gradation to conform to OPSS 1004, Clear Stone Type1.

.7 Unshrinkable fill: proportioned and mixed to provide:

.1 Maximum compressive strength of 0.4MPa at 28 days.
.2 Maximum Portland cement content of 25kg/m³ .
.3 Minimum strength of 0.07 MPa at 24 h.
.4 Concrete aggregates: to CAN/CSA-A23.1-00.
.5 Portland cement: Type 10.
.6 Slump: 160 to 200 mm.

.8 Geotextiles: in accordance with Section 31 32 19.01 – Geotextiles.

3 EXECUTION

3.1 SITE PREPARATION

.1 Temporary Erosion Control and Sedimentation Control:

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls.

.4 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.5 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly in accordance with Section 02 41 13 – Selective Site Demolition.

3.2 STRIPPING OF TOPSOIL

.1 As per Specification Section 31 14 13 Soil Stripping and Stockpiling.

3.4 STOCKPILING

.1 Stockpile fill materials in areas designated by Consultant Stockpile granular materials in manner to prevent segregation.

.2 Protect stockpiled materials from contamination.

3.5 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while work is in progress.

.2 Submit for Consultant's approval] details of proposed dewatering or heave prevention methods, such as dikes, well points, and sheet pile cut-offs.

.3 Avoid excavation below groundwater table if quick condition or heave is likely to occur. Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

.4 Protect open excavations against flooding and damage due to surface run-off.

.5 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, water courses or drainage areas.

3.6 EXCAVATION

.1 Excavate to lines, grades, elevations and dimensions as indicated.

.2 Remove concrete, masonry, paving, and other obstructions encountered during excavation in accordance with Section 02 41 13 – Selective Site Demolition.

.3 Excavation must not interfere with normal 45degree splay of bearing from bottom of any footing.

.4 Do not disturb soil within branch spread of trees or shrubs that are to remain. If

excavating through roots, excavate by hand and cut roots with sharp axe or saw.

.5 For trench excavation, unless otherwise authorized by Consultant in writing, do not excavate more than 30m of trench in advance of installation operations and do not leave open more than 15m at end of day's operation.

.6 Dispose of surplus and unsuitable excavated material off site.

.7 Do not obstruct flow of surface drainage or natural watercourses.

.8 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.9 Notify Consultant when bottom of excavation is reached.

.10 Obtain Consultant approval of completed excavation.

.11 Remove unsuitable material from trench bottom to extent and depth as directed by Consultant.

.12 Correct unauthorized over-excavation as follows:

.1 Fill under bearing surfaces and footings with concrete specified for footings.

.2 Fill under other areas with Type 2 fill compacted to not less than 95% of corrected maximum dry density.

.13 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil. Clean out rock seams and fill with concrete mortar or grout to approval of Consultant.

.14 Install geotextiles in accordance with Section 32 31 19.01 – Geotextiles.

3.7 FILL TYPES AND COMPACTION

.1 Use fill of types as indicated or specified below. If not specified under Section, refer to Construction Drawings. Compaction densities are percentages of maximum densities obtained from standard Proctor maximum dry density.

.1 Type 1 – Granular A: to be used as base under areas to be paved, and to be backfill unstable areas in existing sub-grade, or as a base for built structures, subject to the Consultant’s approval.

.1 Compaction 98% in 50 mm lifts.

.2 Type 2 – Granular B, Type 1 and 2: to be used as sub-base under areas to be paved, and to backfill unstable areas in existing sub-grade, subject to the Consultant’s approval.

.2 Compaction 98% in 100 mm lifts

.3 Native and Imported Material: to be used under areas intended for sodding, seeding and other “soft” landscaping, subject to Consultant’s.

.4 19 mm Clear Stone: in areas requiring drainage.

.5 Stockpiled fill materials in areas approved by Consultant.

3.8 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Place and compact granular material for bedding and surround of underground services as specified in Section 32 00 00 – Irrigation, Section 33 44 00 - Storm Utility Drains, Section 33 11 17, Section 33 46 17 Subgrade Drainage Network.

.2 Place bedding and surround material in unfrozen condition.

3.9 BACKFILLING

.1 Use vibratory equipment suitable for installation and of size to achieve specified compaction.

.2 Do not proceed with backfilling operations until Consultant has inspected and approved installations.

.3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.4 Do not use backfill material which is frozen or contains ice, snow or debris.

.5 Place backfill material in uniform layers not exceeding 150mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.6 Backfill around installations.

.7 Place unshrinkable fill in areas as indicated. Consolidate and level unshrinkable fill with internal vibrators.

.1 Place bedding and surround material as specified elsewhere.

.2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.

.3 Place layers simultaneously on both sides of installed work to equalize loading.

.4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:

.1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Consultant or:

.2 If approved by Consultant, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Consultant.

.8 Install drainage system in backfill as indicated.

3.10 RESTORATION

.1 Upon completion of work, remove waste materials and debris, trim slopes, and correct defects as directed by Consultant.

.2 Replace topsoil as indicated.

.3 Reinstate pavement and sidewalks and lawns to elevation which existed before excavation.

.4 Clean and reinstate areas affected by work as directed by Consultant.

.5 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

.6 Protect newly graded areas from traffic and erosion and maintain free of trash and debris.

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 Materials and installation of polymeric geotextiles used for filtration and drainage structures, the purpose of which is to:

.1 Separate and prevent mixing of granular materials of different grading.

.2 Not permitting passage of water while retaining soil strength of granular structure.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 31 18 23 – Artificial Turf

1.3 REFERENCES

.1 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS 1860- March 1998, Material Specification for Geotextiles

1.4 SUBMITTALS

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

.2 Submit to Consultant two copies of product data at least 4 weeks prior to installation.

1.5 DELIVERY, STORAGE AND HANDLING

.1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse or recycling in accordance with Municipal Construction/Demolition Waste Management and Disposal Regulations.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Fold metal banding, flatten and place in designated area for recycling.

2 PRODUCTS

2.1 MATERIALS

.1 Geotextile to be Mirafi 140N or approved equal.

3 EXECUTION

3.1 INSTALLATION

.1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with weights.

.2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.

.3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile

.4 Overlap each successive strip of geotextile 600 mm over previously laid strip.

.5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.

.6 Replace damaged or deteriorated geotextile to approval of Consultant.

.7 Place and compact soil layers in accordance with Section 31 23 00 Excavation and Fill

3.2 CLEANING

.1 Remove and dispose of construction debris in an environmentally responsible and legal manner.

3.1 PROTECTION

.1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Include GENERAL CONDITIONS and all other parts of Division 1 – General Requirements as part of this Section.

.2 Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.

.3 Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 PROTECTION

.1 Prevent movement, settlement or damage of adjacent parts of existing items to remain. Make good damage and be liable for injury caused by demolition and removal.

1.3 SUBMITTALS

.1 Submit manufacturer's product data for each type of material and / or equipment required.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver manufactured products in manufacturer's original, unopened, and undamaged containers with labels intact and legible.

.2 Store and handle manufactured products to prevent damage and deterioration.

1.5 PROJECT CONDITIONS

.1 General: The Contractor shall visit and accept the site as he finds it, and shall inform himself of the character and the type of site. The Contractor shall walk the site with the Owner’s Representative prior to commencing work to determine the full scope of work.

.2 Damage or loss to site improvements shall be at the risk of the Contractor from and after the date of Contract execution, and no such damage or loss shall relieve the Contractor from any obligation under the Contract.

.3 Do not begin equipment work before completion of final grading and surfacing.

2 PRODUCTS

2.1 PITCHERS MOUND MIX

.1 Shall be Mar-Co Mound Clay or approved equivalent:

1.1 Density: 2,500 lbs. per cubic yard.

1.2 Mechanical Analysis: Sand – 25-35%; Silt – 35-45%; Clay – 35-45%

1.3 Sieve Analysis:

Vhyh#& #	Vhyh#Vlyh#	(#Sdvvlqj #
7#	71:9#p p #ru#6249õ#	433#
:#	51;6#p p #ru#42;õ#	<3(433#
53#	31;7#p p #	;3(<3#
93#	3158#p p #	:3(;3#
433#	3148#p p #	98(:8#
533#	313:8#p p #	93(:3#

2.2 PITCHERS MOUND CLAY BRICKS

.1 Shall be Mar-Co Clay Bricks or approved equivalent made of the same material as Mar-Co Mound Clay.

2.3 HOME BASE BLEND

.1 Shall be Mar-Co Mound Home Base Blend or approved equivalent:

1.1 Density: 2,400 lbs. per cubic yard.

1.2 Mechanical Analysis: Sand – 55-65%; Silt – 18-25%; Clay – 20-25%

1.3 Sieve Analysis:

Vhyh#& #	Vhyh#Vlyh#	(#Sdvvlqj #
7#	71:9#p p #ru#6249õ#	433#
:#	51;6#p p #ru#42;õ#	<8(433#
53#	31;7#p p #	98(:8#
93#	3158#p p #	93(98#
433#	3148#p p #	83(93#
533#	313:8#p p #	73(83#

2.4 INFIELD BLEND

.1 Shall be Mar-Co 15 Series Standard or approved equivalent:

1.1 Density: 2,300 lbs. per cubic yard.

1.2 Mechanical Analysis: Sand – 65-75%; Silt – 10-20%; Clay – 15-22%

1.3 Sieve Analysis:

Vhyh#& #	Vhyh#Vlyh#	(#Sdvvlqj #
7#	71:9#p p #ru#6249õ#	433#
:#	51;6#p p #ru#42;õ#	<8(433#
53#	31;7#p p #	98(:8#
93#	3158#p p #	88(98#
473#	31438#p p #	78(88#
533#	313:8#p p #	73(83#

2.5 WARNING TRACK

.1 Shall be Mar-Co Clay Track Surfacer 20 or approved equivalent:

1.1 Density: 2,200 lbs. per cubic yard.

1.2 Mechanical Analysis: Sand – 90-95%; Silt – 1-3%; Clay – 2-5%

1.3 Sieve Analysis:

Vlhyh#x#	Vlhyh#Vlh#	(#Sdvvlqj#
7#	71:9#p p #ru#6249c#	<3(<8#
:#	51;6#p p #ru#42;c#	63(73#
53#	31;7#p p #	58(68#
93#	3158#p p #	43(53#
473#	3l438#p p #	8(48#
533#	313:8#p p #	3(43#

2.6 SPORT SAND

.1 Sport sand for infield sub base shall be Mar-Co sport sand, 3/16” nominal available from Mar-Co Clay.

3 EXECUTION

3.1 INSPECTION

.1 Obtain the written approval of the Owner’s Representative for subgrade prior to spreading of the infield mix and warning track materials. By spreading the infield mix/warning track and mound/batter’s box clay prior to receiving the written approval of the Owner’s Representative, the Contractor assumes acceptance of the subgrade condition and the responsibility to repair deficiencies resulting from incorrect grades at his sole cost.

3.2 PREPARATION

.1 Remove loose material and debris from base surface before installing/compacting the base material.

.2 Locate and layout all areas and obtain contract administrators approval prior to installation.

3.3 INSTALLATION OF PITCHERS MOUND

.1 Install pitching rubber using compacted mound clay over prepared subgrade. Pitching rubber shall be level and elevated as specified on the Contract Drawings.

.2 Spread mound clay and compact at the plateau and landing area to elevations noted on the contract drawings.

.3 Dampen mound clay with water and install the clay field bricks in a tight patter as identified on the Contract Drawings. Spread a thin layer of mound clay to fill any cracks and firmly tamp.

.4 Spread home base blend inside the mound radius and grade and compact as identified on the Contract Drawings.

.5 Soak area heavily and tamp to cure.

3.4 INSTALLATION OF INFIELD

.1 Reclaimed and new materials shall be installed to a finished compacted depth of four (4) inches. During installation, no more than 2” of material should be added at one time. Each 2” “lift” of material shall be compacted with a three (3) ton roller. The material should be rough graded with a dual laser-guided blade each time after rolling to ensure consistent depth of installation. Final grading shall be performed with a dual laser-guided blade and roll as required.

#

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 Section Includes: Labour, Products, equipment and services necessary to complete the work of this Section.

.2 Control, expansion and contraction joint devices associated with concrete work including embedments.

1.2 RELATED SECTIONS

.1 Section 01 29 83 – Payment Procedures for Testing Laboratory Services

.2 Section 01 33 00 – Submittal Procedures

.3 Section 01 33 19 – Field Testing

.4 Section 01 45 00 – Quality Control

.5 Section 03 30 00 – Cast in Place Concrete

.6 Section 31 18 23 - Artificial Turf

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C117-04, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D422-63 (2007), Standard Test Method for Particle Size Analysis of Soils.

.4 ASTM D698-07e1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600kN-m/m^3)

.5 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.6 ASTM D4791-05e1, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.7 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small Size Course Aggregate by Abrasion and Impact in the Los Angeles Machine.

.2 ASTM D1883-07e2, Standard Test Method of CBR (California Bearing Ratio) of Laboratory Compacted Soils.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.3 SOURCE QUALITY CONTROL

.1 Submit samples, shop drawings, product data and mark-ups in accordance with Section 01 33 00 Submittal Procedures

.2 At least 2 weeks prior to commencing works, inform Consultant of proposed source of aggregates and provide geotechnical agency access for sampling

1.4 CERTIFICATES

.1 Minimum 2 weeks prior to starting work submit to Consultant manufacturer's test data.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver and stockpile aggregates minimum 50% of total aggregate required prior to beginning operation.

2 PRODUCTS

2.1 MATERIALS

.1 Granular sub-bases to conform to OPSS 1004 and OPSS 1010.

.1 Granular A:

.1 Hard, durable, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.2 Granular B:

.1 Hard, durable, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.3 Granular O:

.1 Hard, durable, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

3 EXECUTION

3.1 INSPECTION

.1 Verify grades of subgrade drains and other items set in paving area for conformity with elevations and sections before placing granular base and sub-base material.

3.2 PLACING

.1 Place granular base after sub-grade surface is inspected and approved by Consultant.

.2 Construct granular base to depth and grade in areas indicated.

.3 Ensure no frozen material is placed.

.4 Place material only on clean unfrozen surface, free from snow and ice.

.5 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.

.6 Shape each layer to smooth contour and compacted to specified density before succeeding layer is placed.

.7 Remove and replace that portion of layer in which material becomes segregated during spreading.

3.3 COMPACTION

.1 Compaction requirement to be capable of obtaining required material densities.

.2 Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received Consultant before use.

.3 Equipped with device that records hours of actual work, not motor running hours.

.4 Compact to 98% maximum dry density in accordance with ASTM D698.

.5 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

.6 Apply water as necessary during compaction to obtain specified density.

.7 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Consultant.

.8 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.4 PROOF ROLLING

.1 Obtain approval from Consultant to use non-standard proof rolling equipment.

.1 If use of non-standard proof rolling equipment is approved, Consultant to determine level of proof rolling.

.2 Proof roll at level in granular base as indicated.

.3 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

.4 Where proof rolling reveals areas of defective subgrade:

.1 Remove base, sub base and subgrade material to depth and extent as directed by Consultant.

.2 Backfill excavated subgrade with material approved by Consultant.

.3 Replace sub base material and compact.

.4 Replace base material and compact in accordance with this Section.

3.5 FIELD TESTING

.1 Inspection and testing of granular base compaction shall be in accordance with Section 01 33 19 - Field Testing.

.1 Inspection and testing of granular base compaction to be carried out by a CCIL certified testing laboratory approved by the Consultant.

.2 Minimum testing frequency: 1 test per 200 m²/lift.

.3 Compaction test results shall be submitted in accordance with Section 01 33 00 – Submittal Procedures for review and approval as they become available.

.4 Any test with failing results will be rectified and retested at the Contractor's expense.

3.6 SITE TOLERANCES

.1 Finished base surface for concrete and asphalt to be within plus or minus 10 mm of established grade and cross section; but not uniformly high or low.

.2 Finished base surface for artificial turf to be in conformance with Section 31 18 23 – Artificial Turf.

3.7 PROTECTION

.1 Maintain finished base in condition conforming to this Section until succeeding material is applied.

END OF SECTION

1 GENERAL

1.1 SUMMARY

.1 The section applies to the supply and installation of a Texturized Polypropylene artificial turf with sand infill.

.2 Furnish all labour, materials, tools and equipment necessary to install in place all material as indicated on the drawings and as specified. The installation of all new materials shall be performed in strict accordance with the manufacturer's written instruction, and in accordance with all approved shop drawings.

.3 The contractor shall be fully acquainted with the existing site and shall fully understand the difficulties and restrictions attending the execution of the work under this contract. The contractor shall advise at the time of the bid, any restrictions or anticipated difficulties. Prior to submitting a price for the work, the contractor must seek clarification from the consultant for any items within the drawings and specifications that may appear to be unclear or conflicting.

.4 The artificial turf bullpens to be installed under the Contract shall be used by the Owner for permitted purposes.

.5 The uses and sports will include but, not be limited to:

.1 Baseball pitching.

.6 In accordance with the unlimited use requirements for the artificial turf, the bullpens will be used on a seasonal.

1.2 RELATED SECTIONS

.1 Section 01 29 83 – Payment Procedures for Testing Laboratory Services

.2 Section 01 33 00 – Submittal Procedures

.3 Section 01 13 19 – Field Testing

.4 Section 01 45 00 – Quality Control

.5 Section 31 32 19.16 - Geotextile

.6 Section 32 11 23 – Aggregate Base Courses

.7 Section 33 41 16 – Subdrainage Piping

1.3 REFERENCES

.1 ASTM – American Society for Testing and Materials

.2 DIN – National Standards in Germany

.3 CEN (EN) – European Committee for Standardization

.4 MSDS – Material Safety Data Sheet

.5 OPSS – Ontario Provincial Standard Specification

.

.6 STC – Synthetic Turf Council

1.4 SUBMITTALS FOR REVIEW

.1 Provide submittal as per Section 01 33 00 – Submittal Procedures.

.2 The following **may** be requested to be submitted prior to award of contract for review. Bidder's will be notified during the tender process if these submissions are required.

.1 Synthetic Turf:

.1 Submit one (1) 300 mm x 300 mm sample without infill properly labelled with turf name and fiber length

.2 Submit one (1) of primary backing complete with specifications (see data sheet at the end of this specification) including construction, elongation at break and percentage of shrinkage.

.2 Seam:

.1 Submit one (1) sample seam length of 300 mm – sewn or glued.

.2 Submit one (1) tufted coloured line, 100 mm to 200 mm wide, white in colour.

.3 Submit one (1) tufted coloured line, 100 mm to 200 mm wide, yellow in colour.

1.5 SUBMITTALS FOR INFORMATION

.1 Provide submittals as per Section 01 33 00 – Submittal Procedures

.2 The following information is to be submitted **with the bid documentation**:

.1 Provide technical data sheets of the turf system and completed data sheet (available at the end of this specification).

.2 Provide a letter certifying that the products that you are offering meet or exceed specified requirements.

.3 Provide a resume of the installation supervisor who will be on site during the installation.

.4 The manufacturer shall specify in writing that their turf system does not violate any other manufacturer's patents, patents allowed or patents pending.

.5 Provide certification that all products and components used for the construction of the artificial infill turf field meets all current Canadian Federal, Provincial and Municipal public health and safety requirements, and that all products and components comply with all current Canadian Federal, Provincial and Municipal environmental legislation, and regulations, and that all material used in the construction of the field are non toxic for the intended uses.

.6 Provide a copy of the eight (8) year warranty

.3 The following information is to be submitted **prior to construction**:

.1 Shop drawings for the turf roll and seam layout

.2 Laboratory and field testing reports prepared by third party testing agency.

.3 A signed letter stating that the planarity of the bullpen is acceptable and that provided field test results relative to the base compaction are acceptable to be provided. (a visual inspection is mandatory by an experienced and qualified artificial turf technician.)

.4 Submit to the consultant a report from an independent testing agency stating the lead content, if any, of the synthetic turf fibres.

.5 MSDS sheets on all individual components of the artificial turf system.

1.6 CLOSEOUT SUBMITTALS

.1 Provide submittal as per Section 01 33 00 – Submittal Procedures.

.2 The Contractor shall provide the following:

1. Three maintenance manual, including detailed recommended maintenance methods, recommended maintenance schedules, product repair materials, methods of repair and any equipment required to carry out maintenance and repairs. The recommended maintenance methods must describe how to maintain the turf as to ensure that over the lifetime of the warranty any G-Max testing on the field to ASTM F355 procedure A requirements will yield results that will not exceed the requirements noted herein.

2. Maintenance instructions to include at minimum, cleaning, paint removal, minor seam repair, dragging or redistribution of any infill materials and management of infill compaction.

3. One copy of the eight (8) year manufacturer’s warranty covering products and installation. All turf warranties shall be non-prorated, limited to repair or replacement of the affected areas, at the option of the Manufacturer, and shall include all necessary materials, labour, transportation costs, etc. to complete said repairs. The artificial field must maintain an ASTM 355 G-max of between 130 - 160 for the life of the warranty.

4. Conform with Section 01 79 00 – Demonstration and Training. Prior to final acceptance, the Turf Contractor will train the owner’s facility maintenance staff in the use of the turf Manufacturer’s recommended groomer and maintenance methods required during the warranty. The turf contractor to allow for eight (8) hours of training.

1.7 QUALITY ASSURANCE

.1 The Contractor shall employ only qualified, experienced supervisors and technicians skilled in the installation of this system. The Project Superintendent shall have a minimum of five years' experience and ten (10) filled systems.

.2 The Contractor shall:

.1 Not have had a Surety or Bonding Company finish work on any contract within the last five(5) years.

.2 Not have been disqualified or barred from performing work for any public owner or other contracting entity.

.3 Shall have demonstrable resources to fully service and warrant the systems installed.

.4 Execute work in this Section only by a Contractor who has adequate equipment, skilled tradesmen, and materials to perform it expeditiously and to the specifications and who has at least two similar installations to that specified over the previous three years. Previous installations must have been installed under the same company ownership and with the same skilled workman positions filled with the personnel proposed for this project.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver and store products in the original manufacturer's packaging with labels intact.

.2 Store products where they will be protected from damage.

1.9 INSPECTION AND TESTING

.1 Conform with Section 01 45 00 – Quality Control and 01 13 19 – Field Testing.

.2 An independent inspection and testing company provided by the Contractor and approved by the Consultant may carry out inspection and testing as required.

.3 The contractor shall arrange with the inspector and the Consultant for review of construction.

.4 Prior to delivery of the turf system:

.1 The turf product submitted will be tested and evaluated as per the testing data listed in this document. All testing will be provided from an independent testing laboratory. All of the following testing protocols must be done at the source by an independent 3rd party testing agency prior artificial turf being shipped.

.1 ASTM D1335 tuft bind (excluding in-fill).

.2 ASTM D1577 method A for min. yarn denier.

.3 ASTM D5034 grab tear strength.

.4 ASTM D2256 yarn braking strength.

.5 ASTM D418 min. pile height

.6 ASTM D5848 pile face weight

.5 Prior to installation of the turf system:

.1 Two (2) samples of the synthetic turf material to be installed by the Contractor shall be removed by the Consultant from randomly selected rolls or sheets of material that has been delivered to the site. This material will be sent to an independent lab to verify that it meets the specifications for the product as prescribed herein. The test results of the samples taken on-site must also meet or exceed the test results that are specified.

TO ACCOMMODATE THE REMOVAL OF MATERIAL FOR TESTING, ALL ROLLS DELIVERED MUST BE ABLE TO ACCOMMODATE THE REMOVAL OF TWO SAMPLES 600mm DEEP BY THE WIDTH OF THE ROLL WITHOUT AFFECTING THE INSTALLATION OF THE PRODUCT.

The cost for this testing will be at the Contractors's expense. All subsequent materials, and testing costs to verify if the remedial work is required, are to be at the Contractor's expense. The Contractor must use the testing agency appointed by the Owner. The Contractor is to allow the Consultant seven (7) working days to complete the testing prior to the installation of the material. Installation can only commence if the material has passed the required testing.

.2 Once the turf contractor has accepted the base, it is the turf contractor's responsibility to keep the base clean and free of contaminants (dirt, mud etc.) until the installation of the artificial turf surface begins. No vehicle traffic shall be allowed on the base until the installation begins.

.6 The Contractor shall supply all necessary samples to the Testing Laboratory for testing. Supply additional labour required to assist the Testing Laboratory in making such tests. The costs of this material and labour shall be borne by the Contractor.

1.10 SCHEDULING

.1 Check the drawings and specifications for the requirements of other trades which will affect the installation of the artificial turf.
.

.2 Give instruction and information in writing, or by schedule to other trades, of the requirements necessary for services, materials, or inserts prepared and/or supplied by other trades which will affect the work of this division.

.3 Prior to installing turf provide all laboratory and field tests as specified. Turf shall not be installed until the Consultant has completed the review.

1.11 WARRANTY

.1 Eight (8) year warranty against workmanship and materials on the proposed artificial turf system. The contractor shall also provide proof in advance of intent and ability to provide manufacturer's warranty that guarantees the serviceability and playability of the artificial grass system for its intended uses for an eight (8) year period commencing with the date of substantial completion. The warranty shall be for full performance and shall not be prorated. The warranty submitted must have the following characteristics.

.1 Must provide full coverage for eight (8) years from the date of Substantial Completion.

.2 Must warrant that the materials proposed meet or exceed the product specifications.

.3 The turf contractor shall warrant that the artificial turf system offered shall not fade in colour, shrink, wrinkle, show excessive wear or fail. The contractor, at their sole expense and cost, shall replace all areas of the artificial turf system that does not perform to these standards for the life of the warranty. The warranty must be non-prorated for eight (8) years based on the estimated 2300 hours of programmed usage per year.

.4 Definitions:

.1 RE: “shall not fade” - No significant loss of colour shall be evidenced during the life of the warranty. The polyethylene materials will maintain a shade of green or white or yellow that is uniform throughout the field.

.2 RE: “shall not show excessive wear or fail” - In the context of this warranty, this shall mean that the face weight of the yarn and the length of the yarn in the artificial turf surface shall not have been decreased by more than 10% per year according to ASTM D418 nor exceed 50% during the warranty period. In the event that the synthetic turf system does not retain it’s height, shock absorbency, or G-max and is consequently no longer serviceable during the warranty period, the contractor shall, at their sole expense, replace such portions of the system that are no longer serviceable.

.3 All artificial turf seams shall not separate or become unattached. The Warranty must specifically state that any and all seams that come apart will be repaired within fourteen (14) days upon request from the owner, as time is of the essence. The Contractor is responsible for all costs associated with ensuring a successful repair, even under inclement weather conditions.

.4 The Contractor shall promptly replace or repair, to the specifications herein, any areas of the synthetic turf playing field system that are not performing to the standards of the warranties at the sole expense of the Contractor.

1.12 QUALITY CONTROL

.1 Defective materials or quality of work whenever found at any time shall be rejected, regardless of previous inspection. Inspection is not to relieve the Contractor from responsibility, but is a precaution against oversight and errors. Defective materials shall be removed and replaced by the Contractor at their own expense, and without change to the Contract Time.

1.13 PATENT RIGHTS AND INFRINGEMENT

.1 There are various established performance criteria throughout this request for products and services. There may exist patent coverage for some means and methods of achieving those performance criteria. Bidders are responsible for ascertaining that means and methods of the products and services which they are providing are not being provided in violation of any such patent rights. Bidders responsibilities are as follows:

.1 To hold harmless, the Owner and Consultants as to any violation to

include dollar amounts that could be owed as a result of damages for infringement including potential treble damages as provided for under US and Canadian Patent Law.

.2 Any and all costs that the Owner and Consultants would incur in replacing materials and services which are determined to infringe patent rights.

.3 All administrative, legal and other costs that would be incurred as a result of an infringement.

.2 If any product or services proposed to be provided by the Bidder are known by the Bidder to be subject to any existing claims of infringement, Bidder shall notify Owner and Consultants of such claim and provide evidence of financial ability to perform on the above hold harmless requirements.

2 PRODUCTS

2.1 GENERAL

.1 The artificial turf infill system must be an approved, standard product, manufactured and/or supplied by a manufacturer who has satisfied the terms and conditions of a mono filament product meeting or exceeding the project specifications.

.2 The artificial turf supplier must provide (2) extra pitchers boxes and (2) extra batter boxes for each bullpen.

.2 The entire system, including all materials such as turf, scrim, glue, infill rubber, etc. that is employed and becomes a permanent part of the system is to be resistant to weather, insects, rot and mildew, fungus, be non-toxic, and resist ultraviolet degradation.

.3 The entire artificial turf infill system and all its parts shall be constructed to provide a safe playing surface that will resist damage through normal wear and tear for the stipulated uses as well as movements of maintenance vehicles and emergency services vehicles and will remain dimensionally stable and true to line. The finished surface shall not shift, move, slide or separate from the supporting base and shall remain smooth and consistent. Irregularities in the planarity of the field or the finished surface at any time during the lifespan are unacceptable and the responsibility of the Contractor and Manufacturer issuing the Warranty Certificate and/or Insurance Certificate.

2.2 ARTIFICIAL TURF

.1 The synthetic turf surface system must be manufactured using Texturized Polypropylene artificial turf.

.2 The yarn shall be tufted into a Dual Layered Woven Polypropylene

.3 The turf must meet or exceed the following performance requirements:

.1 The fibre shall be tufted to a finished pile height of not less than 14mm. (9/16”)

.2 Pile face weight shall be a minimum of 36 oz. per sq. yd.

.3 Tuft bind (excluding in-fill) shall be a minimum of 8 lbs. average

.4 Yarn denier shall be a minimum of 4,800/8 Denier (per tuft).

.5 Grab tear strength shall be a minimum of 200 lbs.

.5 Materials for all line and event markings are to be of the same material and manufacturing process as the material for the main synthetic turf field. There are to be no painted lines or event markings on this project. All continuous lines and event markings are to be inlaid during the manufacturing process All other line markings are to be either factory tufted or in-laid on site as specified on the approved project Shop Drawing. Seams may be sewn or glued. Seaming tape and glue method will must conform to FIFA requirements. In-laid lines shall be the same material produced from the same manufacturing process for the main body of turf, colour to match the approved shop drawings and shall match the pile direction of the main body of turf. Inlaid lines must be at the same height as the regular turf. Inlaid lines that sit above the surrounding main body of turf will be rejected.

.6 Source Limitations: Obtain Infilled Synthetic Turf System including tufted synthetic turf yarn and carpet backings from a single Tufted Synthetic Turf Manufacturer. Provide additional system components including anchoring materials, seaming products, binders and adhesives, resilient underlayment (where applicable) and infill materials meeting the project specifications.

.7 The colours for the installation shall be green for the body of bullpen. Home plate will be white. Batters box and catchers box will be brown.

.8 The turf material shall have satisfied the test results related to PILL Flammability - ASTM D2859 and Melting Point Index - ASTM D789 and have flame spread ratings not greater than those required by the Building Code.

.9 The turf rolls shall be no less than 12’ wide and must extend the entire width (rolling direction axis) of the bullpen from sideline to sideline.

.10 All rolls not exhibiting uniform colour, width, pile direction and pile height will be rejected by the Consultant as failing to conform to the Contract Documents and shall be immediately removed from the Place of Work by the Contractor and replaced promptly in accordance with the Contract Documents.

.11 Delivery of the turf must include a Certificate of Compliance from the supplier stating that the materials comply with EN 71-3

2.3 INFILL

.1 Stabilizing Infill - silica-sand, gradation 0.5 - 0.8 mm, min. 80% round of shape can be used as required.

2.4 FASTENERS

.1 All fasteners that are to be employed in fastening the edges of the turf must be suitable for the intended use and be manufactured as to prevent corrosion while in use over the life of the warranty period.

2.6 GRANULAR BASE AND DRAINAGE SYSTEM

.1 Conform with:

.1 Section 32 11 23 – Aggregate Base Courses

3 EXECUTION

3.1 EXAMINATION

.1 Contractor shall verify existing conditions before starting work.

.2 Verify all dimensions and elevations required on drawings.

.3 Work is to commence and continue only if the environmental and site conditions are in accordance with the manufacturer's recommendations for product replacement.

3.2 INSTALLATION

.1 The installation methods and procedures must be in strict accordance with the Manufacturer's specifications and instructions in accordance with the Contract Documents. The finished installation must provide for a high quality facility for the duration of Warranty Period.

.2 The Contractor shall fine grade the granular base, including proper rolling and compaction, to achieve a tolerance of 6mm in 3m and a consistent slope of 0.5% across the entire surface. The field shall be crowned down the length.

.4 Playing field rolls shall be laid straight, true and flat and be laid parallel to the width (rolling direction axis) of the main field. Subsequent rolls to be placed straight and true to the preceding roll. Fitted or tapered pieces to true the alignment or infill gaps in seams are not acceptable. Turf rolls beyond the sideline will be run parallel to the field length. Cross seams are not permitted except for game lines and event markings

.5 Tufted Synthetic Turf shall be installed with no wrinkles, ripples or bubbles. Shearing of fibers, slits in the fabric or driven spikes or staples to relieve such defects will not be permitted.

.6 All seams shall run perpendicularly across the bullpen. Seams shall be flat, tight, and permanent with no separation or fraying. Tufted Synthetic Turf Yarn pile shall not be trapped between seams. If some fibers are trapped, they shall be freed from the seams by hand or other approved method to an upright position prior to brushing and infilling.

.7 All Tufted Synthetic Turf field markings shall be adhered in accordance with manufacturers specifications. Inlay seams shall be flat, tight, and permanent with no separation or fraying. Tufted Synthetic Turf Yarn pile that is trapped or glued between inlay seams shall be freed from the seams by hand or other approved method to an upright position prior to brushing and infilling.

.8 Turf Vendor/Installer is to accurately survey and layout all line applications in accordance with the approved shop drawings. Install inlaid lines and construct seams as per approved shop drawing. Line work shall have clean, sharp, distinct edges and be free from fraying or yarn pull out to the satisfaction of the Consultant and the Owner.

.9 Infill materials shall be properly screened and bagged off site and applied in numerous thin lifts using special broad-casting equipment. The grass fabric shall be brushed or otherwise fibrillated prior to applying the infill mix. The grass shall be raked and brushed properly as the mixture is applied, and shall be rolled with weighted rollers.

3.3 CLEANING

.1 Upon completion of the Work of this Section, all surplus material and debris caused by the Work and equipment shall be promptly removed from the site. The building and site must be left in a condition satisfactory to the Consultant.

.2 Clean turf surface and all loose rubber granules are to be swept and vacuumed and otherwise removed from the site and legally disposed of. Upon completion of the installation, thoroughly clean surfaces, remove and dispose of off-site all infill spills, refuse, debris, surplus materials, containers and packaging.

THE FOLLOWING TECHNICAL DATA SHEET MUST BE SUBMITTED WITH BID

OAKES PARK BASEBALL DIAMOND IMPROVEMENTS
Technical Data Sheet for Artificial Turf

Technical Product Data Sheet

Provide the following technical specification information for each of the in-filled synthetic turf products to be submitted. Note that the following information will form the basis for the minimum specification levels for testing should the Owner select the product.

Product Name: _____

Property	Minimum Spec.	Units	ASTM.
Pile yarn type			
Minimum yarn denier			D1577
Maximum yarn denier			D1577
Yarn breaking strength		gms./denier	D2256
Yarn melting point		degrees F	D789
Minimum pile height		inches	D418
Maximum pile height		inches	D418
Pile weight		oz./sq.yd.	D418
Primary backing weight		oz./sq.yd.	D418
Secondary backing weight		oz./sq.yd.	D418
Total weight		oz./sq.yd.	D418
No. of stitches		per inch	D418
Gauge		per inch	D418
Tuft bind(without infill)		lbs.	D1335
Grab tear strength		lb.	D1682
Pill burn strength		(Pass/Fail)	D2859
Impact attenuation (max) at end of year 8		G-max	D355
Impact attenuation (max) at end of year 2		G-max	D355
Total depth of infill material		inches	
Weight of SBR Rubber		Per square foot	
Weight of Sand Infill		Per square foot	

Granulated SBR rubber size distribution								
	mm -		mm			% -		%
	mm -		mm			% -		%
	mm -		mm			% -		%
	mm -		mm			% -		%
	mm -		mm			% -		%

Signature of
Manufacturer _____

Primary Backing Manufacturer:

Full Company Name _____

Country _____

Product Trade Name _____

Product Trade Code _____

Nature of Product _____

Primary Backing:

Primary Backing Thickness (mm) _____

Weight per m2 in grams _____

Secondary Backing (i.e. latex) _____

Total Weight per (primary plus secondary backing in grams) _____

***THIS FORM MUST BE COMPLETED IN FULL**

END OF SECTION

1 GENERAL

1.1 SECTION INCLUDES

.1 This Section specifies the requirements for the supply and installation of galvanized chain link fencing and gates indicated on the Contract Drawings.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 03 30 00 – Cast in Place Concrete

.3 Section 32 92 23 - Sodding

1.3 REFERENCES

.1 Construction Specification for Chain Link Fence - OPSS 541

.2 CSA Standards W47.1-03 Certification of Companies for Fusion Welding of Steel

.3 CSA Standards W47.1S1-M1989 (R1998) Certification of Companies for Fusion Welding of Aluminium

.4 Welded Steel Construction CSA Standard W59-03

.5 Welded Aluminum Construction CSA Standard W59.2-M1991 (R2003)

.6 CAN/CGSB 138.1-96 Chain Link Fence Fabric

.7 CAN/CGSB 138.2-96 Steel Framework for Chain Link Fence

.8 CAN/CGSB 138.3-96 Installation of Chain Link Fence

.9 CAN/CGSB 138.4-96 Gates for Chain Link Fence

.10 CSA G162.1- M1977(R2003) Methods for Determining Mass Coating of Zinc Coated (Galvanized) Steel Wire

.11 CAN/CSA-G164

1.4 PRODUCT DELIVERY, STORAGE AND HANDLIING

.1 Any damaged material stored on site will be rejected by the Consultant

.

.2 Remove and dispose of unsuitable materials or contaminated materials from the site and dispose of off-site to an approved waste disposal site arranged and paid for by the Contractor.

.3 The Contractor shall comply with all provincial regulations and the requirements any other authority having jurisdiction over the Work.

.4 The Contractor will be responsible for any damage to Corporate or private property which may be incurred.

.5 No storage of equipment or material will be permitted upon existing roads, parking lots or other existing hard surface areas, within or adjacent to the construction site.

1.5 QUALITY ASSURANCE

.1 The Contractor must have a minimum 5 years experience in the construction of chain link fencing projects of a similar nature.

.2 The Contractor is to ensure that the preparatory work in advance of the chain link fence installation, subgrade or subbase materials, and site compaction have been reviewed by the Consultant before placing fencing posts.

.3 Obtain approval from the Consultant of site layout required for the execution of the work including finished elevations, and location for fence line on the site.

1.6 SUBMITTALS

.1 Submittals shall conform to Section 01 33 00 – Submittal Procedures. Submit samples of materials for the project prior to delivery to site when requested by the Consultant. All materials for the project shall be consistent with the approved samples.

2. Any work not meeting the standards of the approved sample or the specifications herein shall be corrected by the Contractor at his own expense.

1.7 JOB CONDITIONS

.1 All work in this section shall be undertaken in suitable weather conditions and in accordance with the Manufacturer's requirements. Organize and carry out all operations to keep the site dewatered and prevent construction delays. Protect the Work at all times from the intrusion of water from any an all sources and maintain the site in a dewatered condition.

.2 Do not install materials or products susceptible to damage or improper installation if the site is wet or during rain.

1.8 WARRANTY

.1 Warranty all material and workmanship in this section from movement, settlement, sinking, deterioration, rusting of any component or any other change in finish quality for a period of two years from date of the Substantial Performance of Work.

1.9 INSPECTION

.1 All materials shall be inspected by the Contractor for damage in transit. No defective material shall be delivered to the site. Any material subsequently damaged shall be removed from the site immediately.

.2 The Consultant may order tests made of any material delivered to the site and may reject materials pending the result of tests. When requested, the Contractor shall supply the Consultant with a 0.6 m (2'-0") square piece of fencing fabric and/or a 0.6 m (2'-0") long piece of any other fencing material requested. The Consultant will use these samples for testing purposes.

.3 All material used which does not conform to these Specifications shall be removed from the work site and replaced with the proper material at no additional cost to the Contract.

.4 Any material found to be defective in manufacture, or damaged before or after acceptance from the carrier, will be rejected by the Consultant and the Contractor shall promptly remove such defective material from the site.

.5 Stake out fence locations and obtain approval from the Consultant before proceeding. Obtain approval from the Consultant

2 PRODUCTS

2.1 MATERIALS

.1 All mesh to be new and hot dipped galvanized before fabrication in accordance with CAN/CGSB-138 and CSA-162. Top and bottom selvage to have a knuckled finish. Galvanized fabric to have a minimum of 488 g/m2 of zinc on surface area. Fabric shall be installed to the full width indicated on drawings without overlap.

.2 Fabric with galvanized burrs will not be acceptable and will be rejected by Consultant.

.3 Galvanizing: all metal except aluminium shapes and wire mesh shall be hot dip galvanized, after fabrication, in accordance with CSA-G164.

.4 Terminal posts unless otherwise shown on the drawings shall be galvanized 89 mm outside diameter, new standard butt weld schedule 40 pipe complete with terminal post caps as per ASTM F1043-04. Minimum weight to be 11.29 kg/m. No tubing, conduit or open seam material will be permitted.

.5 Pipe: butt weld, Schedule 40 galvanized pipe as per ASTM F1083-04.

.6 Couplings, Fittings and Accessories: galvanized steel or aluminum.

.7 Terminal post tops to be hot dipped galvanized with no sharp edges or burrs.

.8 All rails unless otherwise shown on the drawings shall be 43 mm outside diameter, hot dipped galvanized steel, new standard butt weld schedule 40 pipe with plain ends. Minimum weight to be 3.39 kg/m. No tubing, conduit or open seam material will be permitted. Galvanized sleeves to join the top rails.

.9 Top rails to pass through line post loop caps and form a continuous brace for each stretch of fence. The top rail is to be secured to each terminal post with hot dipped galvanized steel or aluminium rail ends cups or welded construction. (Refer to Contract Drawings).

.10 Line posts, unless otherwise shown on the drawings, to be 60.0 mm outside diameter, hot dipped galvanized steel, new standard butt weld schedule 40 pipe. Minimum weight to be 8.63 kg/m. No tubing conduit or open seam material will be permitted; no welded section pipe will be accepted.

.11 Line post caps to be hot dipped galvanized steel or aluminium. Line post loop cap sized to accommodate 42.2 mm OD top rail.

.12 The mesh size shall be 50 mm with top and bottom knuckled finish: tensile strength: 390,600 kg/m2 (80,000 lbs./l.f). Gauge shall be #6 behind pitcher and catcher, and #9 gauge elsewhere as indicated on the detail drawing and to the requirements of ASTM F1043-04.

.13 Where applicable bottom, mid and intermediate rails shall be provided complete with r ail end cups or all welded construction. (Refer to Contract Drawings).

.14 Concrete footings shall conform to the Contract Drawings.

.15 Top of mesh shall have Mar-Co Clay Poly Cap (D15), Colour: Yellow

.16 Fencing in front of dugout to be 1200mm height black vinyl chainlink with 6gauge 50x50mm mesh.

3 EXECUTION

3.1 GENERAL

.1 Fence locations will be staked and reviewed by the Consultant prior to commencement of any work.

.2 All chain link fences shall be installed rigid, plumb, straight and true to line as shown on the Contract Drawings or directed on the site.

.3 Terminal Posts: vary as per drawings and specific details - standard 89 mm O.D. or as detailed otherwise. Length of all posts shall be height of fencing fabric and cap extension plus the buried depth in the concrete footing – Refer to detail drawings. Terminal posts shall be used at ends of runs, corners or other changes in direction and as intermediate straining posts at each end of a change in grade.

.4 Line Posts: 73 mm O.D. line posts shall be spaced at maximum 3000 mm (10'-0") on center.

.5 Top and Bottom Rails: 43 mm O.D. unless otherwise indicated (Refer to detail drawings for fencing conditions with bottom rails).

.6 Post and rails (top, mid, intermediate and bottom) to be all welded construction in accordance with the drawings and CSA W59-03.

.7 Braces: 43 mm (1 11/16") O.D. Use braces on all fences 1.8 m (6'-0") high and over. Locate braces horizontally, centre between top and bottom rail, running between the terminal or gate post and the first adjacent line post. End and gate posts shall have one brace; corner and straining posts shall have two braces, one on each side of the post.

.8 Fittings: All line posts shall be finished with line post loop cap fittings. Terminal posts shall be finished with securely fastened terminal post dome caps; no arm top fittings will be permitted.

.9 Couplings: Top rails shall be joined with galvanized sleeves. Space couplings so that they are supported by a line post loop cap fitting. Top rails, bottom rails and braces shall be attached to posts with properly sized rail end cups (or welded construction as per detail drawings).

.10 Fencing fabric shall be on the exterior side of the facility.

.11 Tie Wires: No.9 gauge aluminium tie wire. Attach fabric to rails and braces with wires at 450 mm (18") spacing. Attach fabric to line posts at 305 mm (12") on centre.

.12 Tension Bar: Fencing fabric shall be attached to terminal post with galvanized tension bars and attachment fittings.

.13 All posts (terminal, intermediate straining, corner, line and gate) unless otherwise shown on the drawings shall be set in the centre of the concrete turf anchor (where applicable) with footings as per the footing schedules on the drawings. Posts without a specified footing shall be core drilled in the concrete turf anchor and grouted as per the contract drawings.

3.2 GATE MATERIALS AND INSTALLATION

.1 Gate Posts: Length of post shall be height of gate. Diameter and weight of gate posts shall be as follows:

.1 Posts for single gates to 3.05 m (10'-0") or double gate to 6.10 m (20'-0"): 89mm (3 1/2") O.D. pipe.

.2 Gate Frames:

.1 Gate frames shall be 43 mm O.D complete with frame collars. All joints shall be electrically welded, and galvanized after fabrication.

.2 Gates shall include a 43 mm O.D. horizontal midrail and welded brace running diagonally from the upper hinge side to the lower leading edge of the frame.

.3 Gate Fabric: No.6 gauge galvanized steel wire, 50 mm mesh with a knuckled finish top and bottom as specified for fencing fabric. Fasten gate fabric to frame and brace using No.9 gauge aluminium wire at maximum 300 mm (12") on center.

.4 Gate Hardware: All gates shall be complete with galvanized collars, bolt hinges, drop latches and latch catches. Hinges shall permit gate to swing back 180 degrees against the adjacent fence. Gate latches shall be designed to accept a padlock or chain which can be fully operated from either side of the gate. Provide a gate hold open assembly for each gate – chain, eyebolt and eyebolt bracket.

.5 Rolling Gate Hardware: Include cantilevered galvanized wheels with bearing and drop latch and latch catch. Gate latches shall be designed to accept a padlock or chain which can be fully operated from either side of the gate.

3.3 INSTALLATION

.1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts. Provide clearance between bottom of fence and ground surface neither less than 30 mm nor more than 50 mm

.2 Erect fence along lines indicated on drawings and in accordance with CAN/CGSB 138.3-96 latest edition and the detail drawings.

.3 Excavate post holes to dimensions indicated on the drawings. Dispose of all subsoil excavations not suitable for re-use or not dispensable into the new work to an off-site location arranged and paid for by the Contractor.

.4 Place concrete in post holes with sono-tube footings (where specified on Contract Drawings) then embed posts into concrete to depths indicated. Set concrete level as indicated on the Contract Drawings and slope to drain away from posts. Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.

.5 Check and verify post alignments until cured. Immediately make corrections to any post found not to be plumb in all directions.

.6 For posts installed in concrete curb, core hole no more than 50mm greater than the diameter of the post or as recommended by product manufacturer. Centre the post in the hole. Set with Quik-Rok grout by Ameristar or approved equivalent.

.7 Do not install fence fabric until concrete/grout has cured.

.8 Install brace rail at vertical midpoint of posts at all corners and changes in direction, between fencing panels either side of corner post. Fasten securely using hot dipped galvanized steel rail ends.

.9 Install top rail and bottom rail between posts and fasten securely to terminal posts and secure waterproof caps. Install mid rail and intermediate rails as per detail drawings.

.10 Install bottom tension wire (where bottom rails is not specified or detailed), stretch tightly and fasten securely to end, corner, and straining posts with tension bar bands.

.11 Lay out fence fabric in the locations as defined in the specifications for the particular sports application. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals.

.12 Secure fabric to top rails, line posts and bottom tension wire with tie wires at specified intervals. Give the wires minimum two twists.

.13 Install Poly Cap per manufacturer's requirements.

.14 All welding shall be Canadian Welding Bureau approved to CSA Standards Standard W59-03 and W59.2. Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

3.4 FINISHING

.1 Repair damaged galvanized surfaces. Clean damaged surfaces with wire brush removing loose and cracked coatings. Pre-treat damaged surfaces according to manufacturers' instructions for zinc-rich paint. Apply two coats of organic zinc-rich paint to damaged areas.

.2 All field welds to be cleaned with a steel brush removing all shavings, filings, dirt, dust, splatters and other debris prior to field touch up.

.1 Field Metal primer: Provide two coats of Galvaprime #52 or approved equivalent organic zinc-rich paint to field welding, burned, compromised or damaged hot dipped galvanized surfaces.

.2 Follow with Zinc-Rich Primer: Ready mixed organic type CAN/CGSB 1.181-99.

3.5 CLEANUP

.1 Review the place of work, rake, remove and dispose of all cut pieces of wire, ties or discarded materials from the work.

.2 Promptly as the work proceeds and upon completion, clean up and remove from the site rubbish and surplus material resulting from the work in this section.

.3 Concrete spills and discards shall be cleaned and removed without delay from work areas and any other surfaces around the work site. Do not bury concrete spills on site.

.4 Clean and reinstate all areas disturbed by operations of the Contractor, subtrades or Supplier related to the work in this section, replacing damaged subgrade, surfacing, topsoil and/or sod to original finished condition to the approval of the Consultant.

.5 Any sodded areas which have been rutted, damaged or disturbed are to be repaired. The method of repair will be to the discretion of Consultant

END OF SECTION

1 GENERAL

1.1 RELATED SECTIONS

.1 Section 03 30 00 - Cast-in-Place Concrete

.2 Section 31 23 33.01 – Excavating Trenching and Backfilliing

.3 Section 31 18 23 – Artificial Turf

1.2 PRODUCT DATA

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

1.3 SHOP DRAWINGS

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

.2 Indicate dimensions, sizes, assembly, anchorage and installation details for each furnishing specified.

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for care and cleaning of site furnishings for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 QUALITY ASSURANCE

.1 The contractor shall supervise all work in this section until total performance.

.2 When requested, the contractor and supplier shall make arrangements for inspection of the material at the source by the Owner’s representative.

.3 Documentation from the course as to the material sold, quantity, destination, etc. shall be made available to the Owner’s representative within 72 hours of request.

.4 Samples of the material from the source shall be made available at the contractor’s expense, to the Owner’s representative within 24 hours of request.

1.6 TESTING AND QUALITY CONTROL

.1 Comply with manufacturer’s standards.

1.7 PRODUCT DELIVERY, STORAGE, HANDLING

.2 The contractor will co-ordinate all truck and equipment traffic so as not to impede the daily use of park, walkway or street.

.3 The contractor will be responsible for any damage to public or private property.

2 PRODUCTS

2.1 PITCHING RUBBER

.1 Mar-Co Clay or approved equivalent Model R5, QTY: (3) Three

2.2 HOME PLATE

.1 Mar-Co Clay or approved equivalent Model B9, QTY: (1) One

3 EXECUTION

3.1 INSTALLATION

.1 Assemble furnishings in accordance with manufacturer's instructions.

.2 Install furnishing true, plumb, anchored firmly as indicated by the manufacturer and as directed by Consultant.

.3 Touch-up damaged finishes to approval of Consultant.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

1.1.1. Includes But Not Limited To
.1 Furnish and install underground sprinkler system as described in Contract Documents complete with accessories necessary for proper function.

1.2 SYSTEMS DESCRIPTION

1.2.1 Design Requirements
.1 Layouts of Irrigation Heads -
.1 Locations of heads shown on Drawings is approximate. Actual placement may vary slightly as is required to achieve full, even coverage without spraying onto buildings, sidewalks, fences, etc.
.2 During layout consult with Consultant to verify proper placement and make recommendations, where revisions are advisable.
.3 Arrange valve stations to operate in an easy-to-view progressive sequence around building. Record sequence on controller lid.

1.2.2 Performance requirements - Minor adjustments in system will be permitted to avoid existing fixed obstructions.

1.3 SUBMITTALS

1.3.1 Product Data
.1 Manufacturer's cut sheets for each element of system.
.2 Parts lists for operating elements of system.
.3 Manufacturer's printed literature on operation and maintenance of operating elements of system.

1.3.2 Quality Assurance / Control - Results of service pressure test before beginning work on system.

1.3.3 Closeout

.1 As installation occurs, prepare accurate record drawing to be submitted before final inspection, including -
(1) Detail and dimension changes made during construction.
(2) Significant details and dimensions not shown in original Contract Documents.
(3) Field dimensioned locations of valve boxes, quick-coupler valves, control wire runs not in mainline ditch, and both ends of sleeves.
(4) Take dimensions from permanent constructed surfaces or edges located at or above finish grade.

1.3.4 Operations and Maintenance Manual Data -

.

(1) Instruction manual which lists complete instructions for system operation and maintenance, including winterizing.
(2) Complete instructions on how to drain entire backflow preventer to prevent freezing.

1.4 QUALITY ASSURANCE

1.4.1 Qualifications

.1 Sprinkler Installation Company -

.1 Produce certification of following requirements prior to beginning work of this Section -

(1) In sprinkler installation business for five years minimum providing quality of labor and materials described in Contract Documents.

(2) Evidence of completing ten projects minimum of scope and quality equal to this project and in timely manner.

(3) Certifiable list of suppliers from whom it will be obtaining materials used on this project.(AUTHORIZED IRRIGATION DISTRIBTOR)

(4) Is a Certified Irrigation Contractor by Irrigation Association.

.2 Workers -

.1 Use only trained personnel familiar with required sprinkling system installation procedures.

.2 Perform installation under direction of foreman or supervisor with five years minimum experience in sprinkling system installations.

1.4.2 Regulatory Requirements - Work and materials shall be in accordance with latest rules and regulations, and other applicable Provincial or local laws. Nothing in Contract Documents is to be construed to permit work not conforming to these codes.

1.4.3 Pre-Installation Conference - After Flagging is done a site visit with the irrigation Consultant to go over layout and specifications. It is the Irrigation Contractors responsibility to contact the irrigation consultant and set up the meeting prior to the start of the installation.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 During delivery, installation and storage protect materials from damage and prolonged exposure to sunlight.

1.6 SEQUENCING

1.6.1 Install sleeves before installation of concrete and paving.

1.7 WARRANTY

1.7.1 Standard one-year guarantee on workmanship as well as Product Warranty -

.1 Filling and repairing depressions and replacing plantings due to settlement of irrigation trenches for one year following acceptance of Project.

.2 System can be adequately blown out to protect from freeze damage.

.3 System has been adjusted to supply proper coverage of areas to receive water.

1.8 OWNER'S INSTRUCTIONS

1.8.1 After system is installed and approved, instruct Owner's designated personnel in complete operation and maintenance procedures.

1.9 AS-BUILT DRAWINGS AND MAINTENANCE

1.9.1 As-Build

Upon completion of the work, the Irrigation Contractor shall prepare an as-built drawing of the system indicating:

1) Sprinkler model and location
2) Pipe size and location
3) Automatic valve model and location
4) Winterizing adapter location
5) Wire or control tube location
6) Controller location
7) Main shut-off valve and any isolation valve locations
8) Rain device location
9) Dimensioned location of buried sleeves

The as-built drawing need not be drawn to scale but must be proportionally and diagrammatically correct. The Irrigation Contractor shall retain the original Irrigation Plan on file and submit two copies to the Project Manager

1.9.2 Maintenance Service
1.9.3 Blow out entire system at end of first watering season following installation.

1.10 Electrical Supply and Controller Location

.1 The irrigation controller location will be designated on the irrigation drawing.
.2 The client is responsible for providing a 110-volt power supply within three feet of the controller location.
.3 The client is responsible for providing an Ethernet connection with a static IP address within three feet of the controller location.

1.11 Point of Connection

.1 The irrigation contractor will be supplied a point of connection of the size shown on the irrigation drawings.

PART 2 PRODUCTS

2.1 Pipe

.1 Identification

.1 All pipe will be continuously and permanently marked with the manufacturer's name or trademark, size, schedule and type of pipe, and working pressure at 21 degrees Celsius.

.2 **Delivery**

.1 Plastic pipe will be delivered to the site and stored in such a manner to provide adequate protection for the pipe ends either threaded or plain.

.3 **P.V.C. Pipe and Fittings**

.1 P.V.C. pipe will be class 160 (SDR26) direct burial pipe conforming to CS-256-63 and will be homogeneous throughout and free from visible cracks, dents, holes or foreign materials.

.2 All plastic pipe fittings to be installed shall be schedule 40 molded fittings manufactured of the same material as the pipe and shall be suitable for solvent weld, slip joint ring tight seal, or screwed connections.

.3 All threaded connections under pressure should be teflon taped.

2.2 Sprinklers

.1 **Spray Head Sprinklers – Toro Spray Heads**

.1 The spray heads shall be Toro's 570Z-XF Series, with Precision nozzles and Toro's pressure-compensating insert disc. The head shall feature a 4" pop-up (except groundcover and flower-bed areas where 12" high-pops shall be used, with bottom inlets), and shall have the X-Flow shutout device installed in the riser to prevent excessive water loss in case a nozzle is removed intentionally, or by accident. The body of the sprinkler shall be constructed of heavy duty Cycolac, and the head shall have a working pressure of 25 - 70 p.s.i., with optimum pressure at the base of the head being 30 p.s.i.

.2 The spray head nozzles shall be Toro PSN nozzles with no more than 1" per hour precipitation rate. They shall come in standard arc settings and not be adjustable other than radius reduction.

2. Sprinklers

.1 **Sprinklers – Toro Rotor**

1 The sprinkler shall have an in-riser pressure regulator that maintains constant 30 PSI (2.5 Bar) outlet pressure to eliminate misting and fogging caused by pressures above 30 PSI (2.5 Bar). The sprinkler shall have a high-flow shut-off device built into the riser that restricts water loss if the nozzle is removed or damaged, eliminating potential erosion or safety issues. The shut-off device shall allow for nozzle and filter replacement or maintenance while the system is running. The body of the sprinkler shall be injection molded from ABS, a non-corrosive, impact-resistant, UV-resistant, heavy-duty plastic material

.2 The sprinkler shall be of the fixed-spray type designed for in-ground installation. The sprinkler shall be capable of accepting all 570 series spray, stream, flood, and microspray nozzles and male-threaded risers and extenders. The sprinkler shall operate within a 20-75 PSI (1.4-5.2 Bar) pressure range

2.3 Valves

.1 Toro P220 Series Valve

.1 The P-220 Series remote control valve body and bonnet shall be constructed of 33% glass-filled nylon (GFN) and stainless steel and have a maximum pressure rating of 220 PSI (15 Bar). The diaphragm shall be made of double-beaded, fabric-reinforced rubber to retain flexibility and provide maximum sealing throughout its area. The diaphragm assembly shall be fully serviceable, held together with stainless-steel and plastic components. All parts shall be serviceable from the top of the valve without removing the valve from the line. The valve may be installed at any angle without affecting valve operation. All other internal parts shall be made of plastic, brass and stainless steel to ensure corrosion resistance.

.2 The valve shall have an internal manual downstream bleed to prevent flooding of the valve box and be capable of operation by hand. The valve shall have an external bleed for system flushing. The valve shall have a self-cleaning, stainless-steel metering (externally removable) system. The valve shall have a manual flow control with a hand-operated, rising-type flow-control stem with a control wheel/handle. The flow control shall be adjustable down to zero flow.

.3 For 1" (25mm) models, friction loss at 40 GPM (15.2 LPM) shall not exceed 7.2 PSI (0.5 Bar) on electric valves. For 1-1/2" (40mm) models, friction loss at 100 GPM (379 LPM) shall not exceed 14.4 PSI (0.9 Bar) on electric valves. For 2" (50mm) models, friction loss at 180 GPM (682 LPM) shall not exceed 8.05 PSI (0,5 Bar) on electric valves. For 3" (75mm) models, friction loss at 300 GPM (1135 LPM) shall not exceed 10.1 PSI (0.7 Bar) on electric valves. The burst pressure safety rating shall be 750 PSI (50 Bar). The valve must open or close in less than one minute at 220 PSI (15 Bar) without water hammer.

.4 The valve shall have a plastic solenoid, which is fully encapsulated and have a captured hex plunger and spring. The solenoid will have a removable retainer for servicing of the spring and plunger. The 24V a.c. solenoid shall open with a 22.5 V a.c. minimum at 220 PSI (15 Bar). At 24V a.c. average inrush, current shall not exceed 0.40 amps. Average holding current shall not exceed 0.20 amps. Line Pressure - Voltage 220 PSI - 22.5 200 PSI - 21.1 175 PSI - 20.2 150 PSI - 19.1 125 PSI - 18.2 100 PSI - 17.1 75 PSI - 16.1 50 PSI - 16.0 The valve shall have a built-in, Schrader-type valve for attaching a pressure gauge to verify downstream pressure. The valve shall be able to field retrofit with an optional pressure-regulating module, EZReg(TM), which can be factory or field installed. The regulator shall be able to be field-installed or serviced under pressure. The valve shall have a forward-flow design to ensure more precise regulation when used with a pressure regulator.

.5 Pressure Regulating Electric Models: The pressure regulator, EZReg(TM), shall be of dial design to permit visual setting of pressure with or without the valve being operated or the use of a pressure gauge. The regulator shall be of a screw-in type and shall regulate precisely over a 5-100 PSI (0.3-7.0 Bar) range with maximum inlet pressure of 220 PSI (15 Bar). The regulator shall maintain the set pressure within ± 3 PSI (0.2 Bar) (with a 10 PSI differential between inlet and outlet). The [1" / 1-1/2" / 2" / 3"] [25mm, 40mm, 50mm, 75mm) P-220 Series valve shall be of [electric, electric pressure regulating] configuration with female-threaded inlet and outlet connections. The 1"-3" (25mm-75mm) valves shall be a globe/angle configuration with an O-ring sealed end plug. The valve shall be developed, manufactured, qualified and released in the USA. The valve shall come with a 5-year trade warranty. The valve shall be manufactured, qualified and released in the USA.

2.4 Quick Coupling Valve

.1 Toro 470 Series Quick Coupling Valve

.1 The quick coupling valve will be a one-piece type constructed of heavy cast brass. The cover shall be a durable, protective self-closing rubber cover. When so specified, the cover shall be a locking rubber cover (LRC).

.2 The valve will be opened and closed by a brass key of the same manufacturer having a 1” (MNPT) and 1" (FNPT) outlet. The valve throat shall have a keyway with detent positions for regulating water flow.

.3 The quick coupling valves will be installed in a 10” round valve box, with the top of the valve box flush to the ground. The quick coupling valves shall be installed on unitized swing joints with side pressure stabilizers on the valve body.

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2.6 Wiring

.1 All 115 volt wiring shall conform to the local electrical codes.

.2 All 24 volt control wire between the solenoid valves and the controllers shall be #14 gauge TWU-10 solid conductor, white jacket for the common wire, and coloured for the power wire. For runs less than 500 feet, and single valve operation, 18-gauge multi-coloured conductor wire may be used. If two or more controllers are used, each unit must have their own common wire.

2.7 Manual Control And Isolation Valves

.1 All manual valves shall be bronze gate valve construction, featuring a non-rising stem and minimum operating pressure of 125 psi. Bronze full-port ball valves are also acceptable.

2.8 Valve Boxes

.1 All manual and automatic valves shall be enclosed in proper irrigation thermo-plastic Carson Brooks valve boxes, of size as required to permit ‘ease of access’ for servicing purposes. The boxes shall feature locking or hinged covers, with an impregnated green colour.

.2 The term “ease of access” means that every solenoid and manual valve should have adequate access for all types of maintenance.

.3 All valve access boxes shall be installed on a suitable base of gravel for proper foundation of box and easy leveling of box to proper grade, and also to provide proper drainage of the access boxes. All valve access boxes shall be provided with proper length and size extensions, wherever required, to bring the valve box level with the finish grade, unless specified to be buried below grade.
.4 Valve boxes shall be located in planting areas whenever possible.
.5 Locking bolts shall be installed in valve boxes.

2.9 Sleeves

.1 All sleeving material shall be Class 160 PVC.
.2 Separate sleeves must be provided for all electrical wiring.

PART 3 EXECUTION

3.1 EXAMINATION

3.1.1 Site Verification of Conditions - Perform pressure test at stub-out on main water line provided for irrigation system, or at near-by fire hydrant. Notify Consultant if pressures over 480 kPA (70 psi) or under 379 kPA (55 psi) are found to determine if some re-design of system is necessary before beginning work on system.

3.2 PREPARATION

3.2.1 Protection
.1 Repair or replace work of this Section damaged during course of the Work at no additional cost to Owner. If damaged work is new, repair or replacement shall be performed by installer of original work.
.2 Do not cut existing tree roots measuring over 50 mm (2 inches) in diameter in order to install sprinkler lines.

3.2.2 Layout of Irrigation Heads -
.1 Location of heads and piping shown on Drawings is approximate. Actual placement may vary slightly as is required to achieve full, even coverage without spraying onto buildings, sidewalks, fences, etc.
.2 During layout, consult with Consultant to verify proper placement and make recommendations, where revisions are advisable.
.3 Minor adjustments in system layout will be permitted to avoid existing fixed obstructions.
.4 Make certain changes are documented on record drawings.

3.3 INSTALLATION

3.3.1 Trenching

.1 Trenches for sprinkler lines and wiring will be of sufficient width (minimum of six inches (6”) to permit proper handling and installation of the pipe and fittings.
.2 The first four inches (4”) of backfill material over the pipe will be free of stone or any foreign objects greater than ¾ inch diameter. The top six inches (6”) of backfill shall be free of rocks over one inch, or trash. Piping less than 1 ½ inches in diameter shall have a minimum cover of ten inches. Piping greater than 1-½ inches in

diameter shall have a minimum cover of fifteen inches. Any road crossings shall have a minimum eighteen inches of cover.

.3 The backfill will be thoroughly compacted in six-inch lifts, and evened off with a minimum one inch of topsoil.

.4 In rocky areas, the trenching depth will be two inches below normal trench depth, to allow for placement of selected fill.

.5 All trenches that are opened during any particular working day will be closed and backfilled the same day.

3.3.2 Pulling

.1 Where soil conditions allow the pipe depths of cover described above to be met; the irrigation piping 2" or smaller may be directly installed without trenching by use of a vibratory plow. The feed blade must be equipped with a minimum bullet diameter of 1 ½ times the outside diameter of the pipe to be installed.

.2 In each of the above operations, all pipe interiors are to be (the Irrigation Contractor is responsible for) kept free from dirt, and debris. The site is to be restored to its original condition, including any damage to existing trees, shrubs, and structures, along with settlement of trenches within the warranty period.

.3 Generally, piping under concrete or asphalt will be installed by jacking, boring or hydraulic driving. Where any cutting or breaking of sidewalks, concrete work and/or asphalt is necessary, it shall be removed and replaced by the Irrigation Contractor. Permission to cut or break sidewalks, concrete and/or asphalt will be obtained from those having proper jurisdiction. Where piping on the drawings is shown under paved areas but running parallel and adjacent of planted areas or turf areas, the intent of the drawings is that the pipe be installed in the planted or turf areas.

3.3.3 Sleeving

.1 Sleeve water lines and control wires under walks and paving. Extend sleeves 150 mm (6 inches) minimum beyond walk or pavement edge. Cap sleeves until pipes and wires are installed to keep sleeve clean and free of dirt and debris.

.2 Use one water pipe maximum per sleeve. Sleeve control wiring in separate sleeve.

.3 Position sleeves with respect to buildings and other obstructions so pipe can be easily removed.

3.3.4 Installation of Pipe

.1 Install pipe in manner to provide for expansion and contraction as recommended by Manufacturer.

.2 Unless otherwise indicated on Drawings, install main lines and lateral lines connecting pop-up rotor and impact sprinklers with minimum cover of 450 mm (18 inches) based on finished grade. Install remaining lateral lines with minimum of 300 mm (12 inches) of cover based on finish grade.

.3 Install pipe and wires under driveways or parking areas in specified sleeves 450 mm (18 inches) below finish grade or as shown on Drawings.

.4 Locate no sprinkler head closer than 300 mm (12 inches) from building foundation. Heads immediately adjacent to mow strips, walks, or curbs shall be 25 mm (one inch) below top of mow strip, walk, or curb and have one to (3 inches) clearance between head and mow strip, walk, or curb.

.5 Cut plastic pipe square. Remove burrs at cut ends before installation so unobstructed flow will result.

.6 Make solvent weld joints as follows -

.1 Do not make solvent weld joints if ambient temperature is below 6 deg C (40 deg F).
.2 Clean mating pipe and fitting with clean, dry cloth and apply one coat of P-70 primer to each.
.3 Apply uniform coat of 711 solvent to outside of pipe.
.4 Apply solvent to fitting in similar manner.
.5 Re-apply light coat of solvent to pipe and quickly insert into fitting.
.6 Give pipe or fitting a quarter turn to insure even distribution of solvent and make sure pipe is inserted to full depth of fitting socket.
.7 Hold in position for 15 seconds minimum or long enough to secure joint.
.8 Wipe off solvent appearing at outer shoulder of fitting.
.9 Do not use excessive amount of solvent thereby causing obstruction to form on inside of pipe.
.10 Allow joints to set at least 24 hours before applying pressure to PVC pipe.

.7 Tape threaded connections with teflon tape.
.8 If pipe is larger than 50 mm (2 inches), install concrete thrust blocks wherever change of direction occurs on PVC main pressure lines, unless otherwise detailed on Drawings.

3.3.5 Sprinkler Heads
.1 Before installation of sprinkler heads, open control valves and use full head of water to flush out system.
.2 Set sprinkler heads and quick-coupling valves perpendicular to finish grade.
.3 Set sprinkler heads at a consistent distance from existing walks, curbs, and other paved areas and to grade.

3.3.6 Arrange valve stations to operate in an easy-to-view progressive sequence around building. Tag valves with waterproof labels showing final sequence station assignments.

3.4 ADJUSTING

3.4.1 Adjust heads to proper grade when turf is sufficiently established to allow walking on it without appreciable harm. Such lowering or raising of heads shall be part of original contract with no additional cost to Owner.

3.4.2 Adjust sprinkler heads for proper distribution and trim so spray does not fall on building.

3.4.3 Adjust watering time of valves to provide proper amounts of water to all plants.

PART 4 – TESTING, OPERATION AND INSPECTION

4.1 Testing

.1 Flush all lines and ensure that all air is expelled from the system.
.2 Inspect all visible piping, and walk all buried lines for any leakage.
.3 If a pump is included, verify direction of rotation (if applicable), operating pressure, and any leakage.
.4 Any repairs necessary to render the system in good working order will be completed at this time.

4.2 Operation

.1 Verify all sprinkler settings, overlap, nozzle sizes, and operating pressures.
.2 Adjust the flow control on automatic valves where necessary.
.3 Program the controller into a logical sequence to comply with local watering bylaws or endeavor to accomplish heavy infrequent water cycles.
.4 Program each station to satisfy the watering requirements of the relevant plant material.
.5 Supply two copies of the operation manual to the Owner including As-built drawings and specifications of all materials used.
.6 Provide training to the Owner's personnel for operation and maintenance of the system.

4.3 Inspection

.1 The contractor shall contact the Landscape Architect or Irrigation Consultant prior commencing the project to arrange a meeting at the start of the installation.
.2 The system will not be considered complete and in compliance with the intent of these specifications and design until inspected by the Landscape Architect and or Irrigation Consultant.

END OF SECTION

1 GENERAL

1.1 RELATED SECTIONS

.1 Section 31 23 33.01- Excavating Trenching and Backfilling

.2 Section 31 32 21- Geotextiles

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C 136-96a, Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTM D 698-91(1998), Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m).

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Canadian Standards Association (CSA)

.1 CAN/CSA-B182.1-96, Plastic Drain and Sewer Pipe and Pipe Fittings.

1.3 SAMPLES

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

.2 Inform Consultant of proposed source of bedding and filter materials and provide sample and sieve analysis at least 2 weeks prior to commencing work.

1.4 MATERIAL CERTIFICATION

.1 Submit manufacturer's test data and certification that drain pipe materials meet requirements of this section at least 4 weeks prior to commencing work.

.2 Certification to be marked on pipe.

2 PRODUCTS

2.1 MATERIALS

.1 All drain tiles shall be 100mm diameter perforated PVC.

.2 Infield header pipes to be 200mm diameter HDPE perforated N-12.

.3 Geotextile fabric to be as per Section 31 32 21 – Geotextiles.

.4 Cleanout cap shall be Zurn Z-1400 as per the contract drawings or approved equivalent.

3 EXECUTION

3.1 TRENCHING

.1 Do excavating and trenching in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling.

.2 Place bedding material after approval of excavation and trenches by Consultant.

3.2 BEDDING

.1 Place 100mm layer of bedding and filter material to full trench width as indicated and compact to minimum 95% of maximum density to ASTM D 698.

3.3 INSTALLATION OF PIPE SUB-DRAINS

.1 For header pipe, prepare trench 50% wider than outside diameter of pipe.

.2 Ensure that the laterals subgrade slopes minimum 0.5% to drain.

.3 Ensure that the header subgrade slopes minimum 0.5% to drain.

.4 Lay pipe drains on prepared bed, true to line and grade with inverts smooth and free of sags or high points. Ensure barrel of each pipe is in contact with bed throughout full length.

.5 Do not use concrete, masonry, stones, wood or any type of shim to establish pipe slope.

.6 Commence laying at outlet and proceed in upstream direction.

.7 Lay perforated pipes with perforations downwards at 8 o'clock and 4 o'clock positions.

.8 Lay bell and spigot pipe with bell ends facing upstream. Do not mortar joints.

.9 Cover joints of bell and spigot pipe with two-ply tar paper strips not less than 150 mm wide. Use strips of sufficient length to permit ends to be laid flat on bedding and turned outward on either side of pipe for a minimum distance of 75 mm.

.10 Make joints tight in accordance with manufacturer's instructions.

.11 Make watertight connections to existing drains, new or existing manholes and catch basins where indicated or as directed by Consultant.

.12 Plug open upstream ends of pipes with watertight concrete, steel or wood bulkheads.

.13 Surround pipe with bedding gravel and compact as directed by Consultant.

.14 Surround and cover drain with filter material in uniform 150 mm layers as indicated and compact to at least 95% maximum density to ASTM D 698.

.15 Wrap or sleeve perforated pipe with geotextile filter as indicated.

.16 Backfill remainder of trench as indicated.

.17 Do not place bedding surround and backfill materials in frozen condition.

.18 Protect sub-drains against flotation during installation.

.19 Install "Y" connections to surface as indicated and cap with specified cover for flushing.

3.4 CONNECTIONS TO MUNICIPAL FACILITIES

.1 Connect pipe sub-drains to municipal storm sewer system where indicated.

3.5 PROTECTION

.1 Protect trenches from compaction and pipes from displacement by moving construction traffic away from installed drainage pipe and using earth moving equipment exerting minimal ground pressure.

.2 Care must be taken during construction work not to crush or damage the drain pipe in place. Any damaged pipe must be removed and replaced, taking care to maintain proper elevations and continuity of grade

END OF SECTION