# SPECIFICATIONS

## PART I – GENERAL

### 1.1. Description

.1 The following professional seals and signatures are provided as required by the Ontario Building Code, including amendments thereto, for above Project and apply only to those documents written by Architectural Landscape Consultants by design discipline symbols **LA** on the Project Manual Table of Contents.

**Landscaping Architecture**
Specifications (LA)

**End of Section**

## PART I – GENERAL

### 1.1. Scope of Work

.1 Complete all work as described in the general conditions, specifications, drawings and details. See Instructions to Tenderers.

### 1.2. Definitions

.1 Owner: See Instructions to Tenderers.

.2 The contract administrator on this contract is as outlined in Instructions to Tenderers. Do not take instructions from any other person than the identified contract administrator.

### 1.3. Work Schedule

.1 All work must be carried out in a continuous time period and be completed within the time stipulated in the Instructions to Tenderers.

.2 When requested by the Contract Administrator, submit a written work schedule showing the timing of all phases of the work.

### 1.4. Co-operation and Co-ordination

.1 Contractor and Sub-contractor shall be familiar with each other's work, wherein it affects their own.

.2 Co-operate with all parties doing work on this project to permit proper execution of the work.

.3 Co-ordinate work with other parties and give timely instructions and information, in writing, relating to the requirements for surfaces, materials and insets which affect the work of other trades.

### 1.5. Submittals

.1 Be prepared to submit samples of any or all specified materials if requested by the Contract Administrator, prior to starting construction.

### 1.6. Job Conditions

.1 Report in writing to the Contract Administrator, prior to commencing work, any conditions or defects encountered on the site upon which the work depends and which may adversely affect the performance of the work.

.2 Do not commence work until such conditions or defects have been investigated and corrected.

.3 Commencement of work implies acceptance of surfaces and conditions. No claim for damages or resulting extra work will be accepted except where such conditions cannot be determined prior to construction.

.4 Before starting work on neighbouring properties, where shown on drawings, obtain written permission from owners and install protective tree hoarding and snow/silt fencing. Maintain during construction period and remove upon completion of work.

.5 Be responsible for restoration of existing conditions of adjacent properties. In all cases, blend with existing conditions.

.6 Any item not specifically mentioned in the following descriptions or shown on the drawings but implied or any item required to complete the work, will be considered to be included in the total price.

## 1.7. Utilities

.1 Before commencing work, establish location and extent of all utility lines, including site lighting, in the area of any excavations.

.2 The contractor is responsible for the repair of all damage to underground utilities resulting from his operations where such utilities are able to be located by the appropriate authorities.

.3 Record locations of existing re-routed and abandoned utility lines and provide the Owner with drawings showing these locations at the completion of the work.

## 1.8. Permits, Inspection & Approval Certificates

.1 Be responsible for all permits, tests and certificates, as required by the local municipality.

.2 Copies of inspection/approval certificates must accompany any invoices.

.3 Where required by the Ministry of the Environment or the local municipality, have all fill, which is being removed from the site, tested for contaminants by a testing company acceptable to the Owner.

.4 Extra costs for removal of contaminated fill will be paid in accordance with the contract unit prices.

## 1.9. Site Access

.1 The Contractor shall understand and agree that the utmost co-operation with other Contractors must be provided. The Contractors shall not obstruct roadways, driveways and parking areas, thereby delaying or curtailing the work of others or the use by the Owner or Consultant or the right of access by the public. The Contractor shall enter the site only at the designated entrance point, and shall keep erosion control fencing up at all other points to prevent any more vehicular access. He shall prevent any additional damage to existing curb and sidewalk. The Contractor shall be responsible for any additional damage beyond the tendered length.

.2 Only those vehicles required for the carrying out of work shall have access to the site.

## 1.10. Temporary Roads and Walks

.1 Where required, provide, construct and maintain temporary surfaces to allow pedestrian and vehicular access to walkways, all adjacent roads, local residences and school buildings.

.2 Provide temporary culverts, if required.

.3 Provide and erect directional and warning signs, barriers and the like, where required.

.4 Upon completion of work, remove same and make good existing surfaces and structures.

.5 Do not use roads, walkways or road or walkway beds for the storing of topsoil or equipment.

**1.11. Temporary Sanitary Facilities**

.1 Provide sanitary facilities for the use of all engaged on the job site in accordance with the requirements of any Provincial and Municipal regulations controlling such installations.

**1.12. Temporary Utilities**

.1 Be fully responsible for the installation, maintenance and removal after completion, of all temporary utilities required for the execution of the work.

.2 Obtain permits and pay all costs relating to such services.

**1.13. Compound, Site Office and Storage Shed**

.1 If requested by the Owner or Consultant, provide a fenced-in Contractor's compound for an office and the storage of necessary materials for construction, in an area so designated by the Owner or Consultant.

.2 The Contractor and Sub-contractors shall provide their own work shops and storage shed for the entire length of construction.

**1.14. Construction Equipment**

.1 Assume complete responsibility for the construction, strength, placing and operation of any mechanical contrivance used for the work of this contract, to ensure that any load supported therein can be carried out safely and be free from accidents to all persons. The Contractor shall save harmless the Owner, his agent and the Consultant.

.2 Submit to the local authorities, information concerning the sequence of erections, details and the timing of permanent connections, shoring, temporary bracing and location of lifting equipment. Be responsible for all costs incurred.

**1.15. Lines and Levels**

.1 Existing grades and other known conditions of the site have been shown on the drawings.

.2 Be fully responsible for the complete layout of all lines and levels required for the execution of the work.

.3 Benchmarks and survey monuments established by an accredited surveyor shall be maintained. Replace any such monuments which have been disturbed or destroyed

.4 Contractor is to be responsible for obtaining and maintaining offsets of layout/grading stakes. Failure to maintain offsets during construction activity will not be grounds for additional survey costs.

.4 Verify all elevations, lines, levels and dimensions as indicated and report errors, any conflicts, or inconsistencies to the Consultant before commencing work or as soon as discovered.

.5 Accurately lay out work and establish lines and levels in accord with requirements of Contract Documents.

.6 Set up, maintain and protect permanent reference point stakes set at 30M and provide general dimension and elevations for all Sections of Work as per Grading Plans.

.7 All lay-out work by the Contractor will be subject to checking and the approval of the Owner or Consultant. The approval of layout work by the Owner or Consultant shall not relieve the contractor of his responsibility for the correctness of the work

**1.16. Dimensions**

.1 Check and verify dimensions wherever referring to work. Dimensions, when pertaining to work of another Section, shall be verified with section concerned. Details and measurements of work which is to fit or conform with work installed shall be taken at site.

**1.17. Protection**

.1 Grade around excavations to prevent surface water runoff into excavated area.

.2 Protect excavations and excavated material from freezing.

.3 Provide and operate as many pumps as required to keep excavations free of standing water at all times.

.4 Should bottoms of excavations be damaged by weather or should softening occur, remove softened material and replace with approved granular fill material at no extra cost.

.5 Protect all trees and planting areas that are to remain in accordance with the General Conditions. Make good all damage at no extra cost.

.6 Erect suitable safety barriers as required around all excavations to make the site safe for pedestrians.

.7 Protect existing road curbs and sidewalks. Make good all damage at no extra cost.

**1.18. Handling and Storage of Materials**

.1 Store packaged materials in original undamaged condition with manufacturer's labels and seals intact.

.2 Store packaged materials, sand, and manufactured items off the ground on approved supports. Cover each pile with weatherproof covering.

.3 Stack units to permit circulation of air and to prevent damage to units.

.4 Prevent damage to materials during handling, storage and erection. Damaged materials will be rejected for use. The Contractor will remove rejected materials from the site at his expense.

.5 Ensure that all Sub-contractors have included their tenders for the supply and payment of costs for all equipment, handling and cartage required for the complete installation of the work of their particular trade.

.6 Equipment shall include all hand and power tools and other items necessary for installation of work.

.7 Handling shall include all methods of moving the materials and equipment to and from the point of fabrication or supply and the job site.

.8 Cartage shall include all methods of conveyance required to deliver the materials and equipment to and from the point of fabrication or supply and the job site.

.9 If the Contractor permits the use of his facilities by Sub-contractors, he shall establish his terms of use directly with them.

**1.19. Substitutions**

.1 All substitutions of any material or manufactured item called for on the drawings, details or specifications must be approved in writing by the Owner or Consultant before use. See Instructions to Tenderers.

.2 Requests for substitutions of a manufactured item must be accompanied by sufficient technical data and testing information to substantiate the claim that the item is equal to that specified.

**1.20. Contract Documents**

.1 Consider the specifications for this project as an integral part of the plans which accompany them and neither the plans nor the specifications shall be considered alone. Consider any item, which, if omitted in the other, as properly and insufficiently specified. If the specifications and the plans should conflict, the Owner or Consultant is to determine whether the specifications or the plans apply for the point of conflict before work proceeds.

.2 Maintain on the site, at all times, during construction, one (1) complete set of drawings, specifications and approved shop drawings as well as approved change orders and any approved sketches and instructions issued during the construction period.

.3 Clearly mark on drawings all changes in red, revisions, and site conditions which affect the work and in such a manner that, upon completion of work, **one complete set of "as built" drawings is available**. This includes the accurate position of concealed and underground services. As built drawings are to be exact, accurate representation of actual as built structures, walkways, lighting pole locations, fencing and all other features. Planting locations are to be generally accurate.

.4 **Keep "as built" set in perfect order and submit to the Consultant upon completion of work. The "as built" drawings must be 'survey accurate' in terms of all hard landscaping, grades and features. Soft landscaping must be generally accurate.**

**1.21. Inspection**

.1 Give timely notice when any phase of the work is ready for inspection and notice in writing when the work is completed and ready for final inspection.

.2 All materials are subject to inspection by the Owner or Consultant upon arrival on the site. Any materials not meeting the specifications will be rejected and must be removed from the site immediately.

**1.22. Maintenance**

.1 Maintain all parts of the work from the time of installation until final take-over by the client.

.2 Report immediately, in writing to the Owner, all incidents of damage to the installation by vandals, prior to acceptance.

**1.23. Guarantee/Warranty**

.1 Guarantee/Warranty all work, Plant Material etc. for a period of one year, from the date of acceptance by the Municipality/Consultant/client unless otherwise stipulated on the bid sheet. During the guarantee/warranty period, repair, maintain/ need-free, replace or otherwise remedy all defects due to faulty materials or workmanship or dead plant material immediately.

.2 Each guarantee shall show the following:

a. Name and address of owner
b. Name of project and project number
c. Name and address of the Contractor, Sub-contractor
d. Dates of commencement and termination of guarantee period
e. A clear definition of what is being guaranteed and what remedial actions will be undertaken during the guarantee
f. The signature and seal of the company issuing the guarantee. When the guarantee affects a Sub-contractor and/or supplier, the guarantee shall be signed and sealed by the General Contractor, the Sub-contractor and/or supplier

.3 Submit sample form of guarantee for Owner or Consultant, approval.

**Note : The contractor is responsible to rectify all deficiencies within one month from Substantial Completion. The contractor is also required to rectify all deficiencies prior to Final Acceptance. Upon failure to due so will result in the use of the maintenance holdback monies to correct the deficiencies.**

**1.24. Failure to Achieve a Satisfactory Standard**

.1 If the Contractor fails to achieve an acceptable rate of progress and/or standard of workmanship, the Consultant reserves the right to have the work completed by other persons and to deduct the cost incurred from the agreed upon contract price.

**1.25. Safety**

.1 Keep the site clean and useable by the residents at all times.

.2 Where required, provide temporary safety fencing, walkways, stoops, steps and handrails to maintain safe access to the buildings.

**1.26. Clean-up**

.1 At the completion of the work each day, remove all debris, garbage and surplus material.

.2 Power sweep paved surfaces to remove earth contamination resulting from construction activities prior to final acceptance.

.3 Clean out all catch basins and manholes within the construction area immediately before final acceptance. Remove all debris.

## 1.27. Make Good

.1 Make good all damage resulting from work carried out under this contract. Restore and blend to match surrounding existing conditions.

## 1.28. Inspection / Takeover Procedures

.1 Prior to application for certificate of Substantial Performance Acceptance, carefully inspect the Work and ensure it is complete, that major and minor construction deficiencies are complete and/or corrected and the site is clean and in condition for use. Notify the consultant, in writing, of satisfactory completion of Work and request an inspection.

.2 During the Consultant's inspection, a list of deficiencies and defects will be tabulated. Correct same.

.3 When the Consultant considers deficiencies and defects have been corrected and it appears requirements of the Contract have been performed, make application for certificate of Substantial Performance.

.4 The contractor will undertake the first cut of all grassed/ sodded areas. The first cut will define the point of acceptance by the client of all grassed/ sodded areas. The contractor is responsible for all maintenance of sodded areas until that first cut.

**End of Section**

## 1. Related Instructions

1. Comply with requirements of the General Requirements – Section 01 00 00.

## 2. Authorization

1. Expenditures from allowances included in the contract price must be authorized in writing by the consultant.

## 3. Allowances

1. Include the following allowances in the Contract.

Testing Allowance to include geotechnical testing by the owner's preferred Geotechnical Consultant. Includes subgrade compaction testing, granular compaction testing, concrete testing, (including wiring, capping and breaking) asphalt testing and global stability analysis for any retaining walls.

## 4. Limitations

1. All work listed in Allowances may or may not be incorporated in the work. The owner has full right to delete any or all parts without claim.

END

## PART I - GENERAL

### 1.1. Pre-Construction Meeting

.1 Prior to construction, upon notification attend at location of Owner's choice, pre-construction meeting, along with authoritative representatives of certain key subcontractors as specifically indicated in the conference notice.

.2 Purpose of meeting is as follows:

.1 Review project communications procedures.

.2 Review contract administration requirements including submittals, payment and change order procedures.

.3 Identify all critical points on construction schedule for positive action.

.4 Identify any product availability problems and substitution requests.

.5 Establish site arrangements and temporary facilities.

.6 Identify Landscape Architect’s inspection requirements.

.7 Review any points which, in Owner's, Landscape Architect's and Contractor's opinion, require clarification.

.8 Contractor is to provide Insurance and Bonding documentation and Workers Compensation, prior to start of work.

### 1.2. Site Meetings

.1 Prior to the commencement of the Work, the Contractor together with the Landscape Architect shall mutually agree to a sequence for holding regular "on site meetings".

.2 Organize and chair all necessary site meetings. Ensure that persons, whose presence is required, are present and that relative information is available to allow meetings to be conducted efficiently.

.3 Landscape Architect will prepare minutes of each meeting and distribute copies to all parties.

.4 Once a month during or immediately after regular site meeting, Landscape Architect and Contractor shall review Contractor's application for payment and updated construction schedule.

### 1.3. Progress Record

.1 Maintain on site, permanent written record of progress of work. Record shall be open to inspection by Landscape Architect at all times and copy shall be furnished to Landscape Architect upon request.

.2 This record shall show weather conditions, dates of commencement, progress and completion of various trades and items of work. Particulars pertaining to erection and removal of forms, pouring of concrete, installation of services and other critical or major

components as well as number of employees of various trades and type and quantity of equipment employed daily, shall be noted.

.3 Display a copy of the Gantt Chart Construction Schedule in the site office from start of construction to completion. Superimpose actual progress of work on Gantt Chart schedule at least once each week.

**End of Section**

## PART 1 GENERAL

### 1.1. Schedule

.1 Within 15 days of Contract Award, submit, in format acceptable to Landscape Architect, four copies of construction schedule.

.2 Set up format to permit plotting of actual progress against scheduled progress.

.3 Schedule shall show:

.1 Commencement and completion dates of Contract

.2 Commencement and completion dates of stipulated stages if any.

.3 Commencement and completion dates of each trade.

.4 Order and delivery times for hard & soft materials and other equipment where possible.

.5 Any other information relating to the orderly progress of Contract, considered by Contractor to be pertinent.

### 1.2. Updating and Monitoring

.1 Landscape Architect together with Contractor shall review construction progress once a month during regular site meeting or more often as directed by Landscape Architect.

.2 Update construction schedule, whenever changes occur, in manner and at times acceptable to Landscape Architect.

.3 Plot actual progress on construction schedule at least once a week.

.4 Submit copy of updated schedule to Landscape Architect once a month concurrently with application for payment.

**End of Section**

## PART I - GENERAL

.1 Provide digital construction photographs in accordance with procedures and submission requirements specified in this Section.

## PART II - PROGRESS PHOTOGRAPHS

.1 Size: Max. 1.5MB each

.2 Number of photos required: Min. 10 per week

.3 Number of viewpoints: Locations of viewpoints determined by Landscape Architect.

.4 Frequency: At the completion of excavation, concrete forming, pouring, building construction, servicing, paving, planting, during issues such as Change Order items, and as directed by Landscape Architect.

## PART III - FINAL PICTURES

.1 Submit all CD's of digital photographs before final acceptance of park.

.2 CD's to be marked with Project Name and date range of photos.

**End of Section**

## PART 1 - GENERAL

### 1.1 Scope of Work

.1 Submissions are listed herein for convenience only and may not be complete. Examine all Contract Documents and provide all submissions required.

.2 Make submissions with reasonable promptness, in orderly sequence and so as not to cause any delay in the Work.

.3 Unless otherwise indicated herein or directed by Landscape Architect, make all submissions to Landscape Architect at his office.

### 1.2 Related Instructions

.1 General Instructions and Supplementary Conditions: Insurance certificates, bonds, Worker's Compensation Board certificates.

### 1.3 Submittals Prior to Start of Work

.1 Submit the following documents within time stipulated, or, if not stipulated, prior to first application for payment.

.1 Insurance certificates
.2 Bonds
.3 Workers' Compensation Board Certificates
.4 Construction and Planting Schedule
.5 Cash flow schedule
.6 Shop Drawings, stamped and signed by Professional Engineer
.7 Building Permit for Structures
.8 Plumbing Permits based on APPROVED shop drawings
.9 Electrical Permits based on APPROVED shop drawings
.10 Obtain all other Approvals

**End of Section**

## PART I - GENERAL

.1 This section specifies general requirements and procedures for contractors' submissions of shop drawings, product data, samples and mock-ups to Landscape Architect for review. Additional specific requirements for submissions are specified in individual sections of Divisions.

.2 Do not proceed with work until relevant submissions are reviewed by Landscape Architect.

.3 Present shop drawings, product data, samples and mock-ups to scale in SI Metric units.

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

.5 Contractor's responsibility for errors and omissions in submission if not relieved by Landscape Architect's review of submissions.

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

.7 Contractor's responsibility for deviations in submission from requirements of Contract Documents if not relieved by Landscape Architect's review of submission, unless Landscape Architect gives written acceptance of specific deviations.

.8 Make any changes in submissions which Landscape Architect may require consistent with Contract Documents and resubmit as directed by Landscape Architect.

.9 Notify Landscape Architect, in writing, when resubmitting, of any revisions other than those requested by Landscape Architect.

## PART II - SUBMISSION REQUIREMENTS

.1 Coordinate each submission with requirements of work and Contract Documents. Individual submissions will not be reviewed until all related information is available.

.2 Allow three (3) days for Landscape Architect's review of each submission.

.3 Accompany submissions with transmittal letter, in duplicate, 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.

.4 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 Contractors 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.

.5 After Landscape Architect's review, distribute copies.

**PART III - SHOP DRAWINGS**

.1 Shop drawings: original drawings, or modified standard drawings provided by Contractor, to illustrate details of portions of Work, which are specific to project requirements.

.2 Maximum sheet size: 600 x 900 mm.

.3 Submit shop drawings as follows:

.1 600 x 900 mm one reproducible digital P.D.F. / AutoCAD

.2 279 x 203 mm and smaller photocopy paper.

.4 Cross-reference shop drawing information to applicable portions of Contract Documents.

**PART IV - PRODUCT DATA**

.1 Product data: manufacturers catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products.

.2 Submit two (2) copies of product data.

.3 Sheet size: 215 x 280 mm, maximum of 3 modules.

.4 Delete information not applicable to project.

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

.6 Cross-reference product data information to applicable portions of Contract Documents.

**PART V - SAMPLES**

.1 Samples: examples of materials, equipment, quality, finishes, workmanship.

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

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

**PART VI - MOCK-UPS**

.1 Mock-ups: field-erected example of work complete with specified materials and workmanship.

.2 Erect mock-ups at locations acceptable to Landscape Architect.

.3 Reviewed and accepted mock-ups will become standards of workmanship and material against which installed work will be verified.

**End of Section**

## PART I - GENERAL

### 1.1. Description and Purpose

.1 This specification realtes to socially and environmentally sensitive areas such as ; creeks, wetlands, planted areas, adjacent sites, protection of existing planting, etc.

### 1.2. Disposal of Wastes

.1 Burying or burning of rubbish and waste materials on site is not permitted.

.2 Disposal of waste or volatile materials, such as mineral spirits, oil or paint thinner into ground, waterways, drainage courses, storm or sanitary sewers is prohibited.

.3 Collect all wastes and rubbish in suitable containers, remove from site and legally dispose.

### 1.3. Pollution Control

.1 Prevent extraneous materials from contaminating air beyond application areas, by providing temporary enclosures.

.2 Cover or wet down dry materials and rubbish to prevent blowing dust and debris, but prevent contaminated run-off.

### 1.4. Drainage

.1 Control drainage on site to prevent flooding, erosion and run-off onto adjacent properties as a result of construction operations.

2. Dispose of water containing silt in suspension in accordance with requirements of jurisdictional authorities.

### 1.5. Adhere to All Environmental Regulations

**End of Section**

## PART 1 - GENERAL

### 1.1. Security

.1 Be responsible for security of all areas affected by this Contract until taken over by the client. Take steps to prevent entry to the Work by unauthorized persons and guard against theft, fire and damage by any cause.

.2 A regular full-time watchman is generally not required on site, but, if in the opinion of the Landscape Architect, the work is not adequately protected, the Owner may demand that one be provided at no extra cost to the Contract.

### 1.2. Construction Safety Measures

.1 Observe and enforce construction safety measures required by latest edition of Canadian Construction Safety Code, Occupational Health and Safety Act, Worker's Compensation Board and other regulations by jurisdictional authorities.

.2 In the event of conflict between applicable regulations, follow the most stringent provisions.

### 1.3. Fire Safety Requirements

.1 Maintain fire protection for work. Store paints and volatile substances in a separate and controlled location and inspect frequently.

### 1.4. Visitors

.1 Provide hard hats for use by all visitors.

### 1.5. First and Facilities

.1 Provide and maintain, for duration of Contract, first aid facilities in accordance with applicable regulations.

### 1.6. Hazardous Materials

.1 Comply with provisions of the Occupational Health and Safety Act, as amended to include WHMIS (Workplace Hazardous Materials Information System).

**End of Section**

## 1. Permits, Licenses, Fees

1. Where permits, licenses and inspection fees are required by authorities having jurisdiction for specific trade functions, they shall be obtained and paid for by the particular subtrade responsible for that work.

## 2. Building Code By-laws, Regulations

1. Carry out work in accordance with requirements of the Ontario Building Code, latest issue, including all amendments and revisions.

2. Comply with requirements, regulations and ordinances of other authorities having jurisdiction.

3. Where it is necessary to carry out work outside property lines, such as sidewalks, paving or concrete curbs, comply with applicable requirements of municipal authorities having jurisdiction.

4. Promptly submit written notice to consultant of observed variance of Contract Documents from requirements of Building Code and authorities having jurisdiction. Assume responsibility for work known to be contrary to such requirements and performed without notifying consultant.

## 3. Safety Requirements

1. Be governed by pertinent safety requirements of Federal or Provincial Governments and of municipal bodies having authority, particularly the Ontario Construction Safety Act, and regulations of Ontario Ministry of Labour, and work in conjunction with proper safety associations operating under the authority of Ontario Workplace Safety and Insurance Act.

2. Do not, in the performance of the work, in any manner endanger the safety or unlawfully interfere with the convenience of the public.

## 4. Fire Protection Requirements

1. Refer to technical Sections of Specifications and Drawings for fire protection requirements.

2. Test methods used to determine fire hazard classification and fire endurance rating shall be as required by Ontario Building Code.

3. Upon request, furnish to consultant with evidence of compliance with project fire protection requirements.

## 5. Safety Regulations

1. The contractor shall ensure that all contract staff are trained under the provision of the W.H.M.I.S. (Workplace Hazardous Material Information System) regulations.

2. The contractor shall ensure that Material Safety Data Sheets are available for all chemicals used on site.

3. The contractor shall conform to and enforce strict compliance with the Construction Safety Act and regulations made under the act.

4. The contractor shall be aware of and conform to Municipal/client Health and Safety Policies made available through the Purchasing Department.

5. For purposes of the Occupational Health and Safety Act, the contractor will be designated as the constructor for this project and will assume all of the responsibility of the constructor set out in that Act and its regulations.

6. The contractor shall ensure that all necessary measures are taken to protect Municipal/client employees, general public and workers from injury.

END

## PART I - GENERAL

### 1.1. General

.1 Provide all temporary facilities and controls required for the proper execution of the work

.2 Provide and maintain temporary systems in accordance with applicable regulations and requirements. Arrange for, obtain and pay for any permits required.

.3 Location of temporary facilities shall be subject to Landscape Architect's approval.

### 1.2. Temporary Electricity, Lighting and Water

.1 Provide temporary electrical lighting and power system and water for use by all Sections.

.2 Arrange, obtain and pay for service including meter, if required, of sufficient size to allow use of required tools and equipment and to ensure adequate lighting levels for the proper execution of work

.3 Install and maintain temporary electrical systems in accordance with Construction Safety Association's "Temporary Wiring Standards on Construction Sites", the Ontario Electrical Code and other authorities having jurisdiction.

### 1.3. Temporary Heating

.1 Furnish equipment, labor and fuel to provide temporary heat as required for proper execution of work.

### 1.4. Temporary Telephone

.1 Provide telephone service for duration of Contract until completion. A mobile phone is acceptable.

.2 Make telephone available to all Section. Long distance calls shall be paid by party making call

### 1.5. Temporary Sanitary Facilities

.1 Provide toilet facilities for all personnel on site.

.2 Keep facilities clean and sanitary and provided with required supplies at all times.

.3 Except where temporary sanitary facilities are connected to municipal sewer system, periodically remove waste from site.

### 1.6. Temporary First-Aid Facilities

.1 Provide site equipment and medical facilities necessary to supply first-aid service to injured personnel in accordance with regulation of Worker's Compensation Act. Maintain facilities for duration of Contract.

### 1.7. Temporary Fire Protection

.1 Provide and maintain in proper working order, fire extinguishers, prominently placed, until completion of work

.2 Fire extinguishers shall be minimum. 3 kg 4A60BC type

.3 Remove fire extinguishers from site upon completion of work or when directed by Landscape Architect.

.4 Where gas welding or cutting is to be done within 3 m or above combustible material, or above space that may be occupied by persons, interpose shields of non combustible material. Tanks supplying gases for welding or cutting shall be placed at no greater distance from the work than is necessary and shall be securely fastened in an upright position. Such tanks shall be free from exposure to the sun or high temperature.

## 1.8. Construction Aids

.1 Provide temporary stairs, ladders, ramps required for movement and placing of materials, equipment and personnel

.2 Provide mechanical hoisting equipment and fully qualified operators as required during construction.

.3 Erect required scaffolding independent of walls, arranged to avoid interference with work of other Sections as much as possible.

.4 Provide and maintain required shoring and bracing in accordance with Construction Safety Act and other applicable regulations.

.5 Shoring and all false work over tier in height shall be designed and shall bear the stamp of a registered professional engineer having experience in this field.

.6 The use of explosive power tools must be approved in writing by the Landscape Architect. The use of explosive power tools will not be permitted under any circumstances unless equipped with a device which positively prevents free flight of the stud.

## 1.9. Barriers

.1 Protect public and workers from injury.

.2 Provide and maintain required barricades, warning signs, guardrails and lightguards in accordance with applicable regulations.

## 1.10. Temporary Controls

.1 Provide protective coverings to protect work against damage caused by weather including but no necessarily limited to rain, snow, ice, wind, frost and excessive heat.

.2 Provide wind breaks and sun shades to allow proper setting and curing of cementious materials.

.3 Protect excavations and building material from freezing.

.4 Provide and maintain adequate temporary pumping and drainage systems to keep excavation and structures free of water. Prevent flow of surface water into excavations. Locate sumps away from foundation elements. Prevent pumped water from carrying soil in suspension in sufficient quantity to cause settlement of adjacent earth. Provide sufficient standby equipment to ensure continuity of pumping system.

.5 Prevent sprayed materials from contaminating air beyond application area by providing temporary enclosures.

.6 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

## 1.11. Sign

.1 Except as specified here do not erect any sign unless approved by the Landscape Architect.

.2 Erect signs relating to safety on the work site or mandatory regulation notices.

.3 Erect the Landscape Architects' project sign by supplying and setting three steel T-bar stakes. Wire the sign securely to the stakes. Landscape Architect to provide the sign. Return the sign at the end of the job.

## 1.12. Field Office and Sheds

.1 Provide temporary covers, shed and platforms of weatherproof construction as may be required for protection and preservation of materials, small tools, equipment which may be susceptible to damage.

**End of Section**

## 1. General

1. This section outlines the acceptable products and installation of sediment control measures.

2. Comply with the requirements of Section 01 00 00 – General Requirements.

## 2. Products

Straw Bale Barrier

1. Straw bales: approx. 0.35m X 0.45m X 0.9m

2. Wood stakes: 1.2m X 2.5cm X 5cm

Light Duty Sedimentation Fence

1. Wood stakes: 1.2m X 5cm X 5cm

2. Filter Fabric: geotextile cover fabric 270 R, or equal.

3. Nylon cable ties.

Heavy Duty Sedimentation Fence

1. Steel "T" bars: 3mm X 40mm X 40mm X1.5m

2. Fence: Page wire fence.

3. Filter Fabric: geotextile cover fabric 270 R, or equal.

4. Wire ties.

## 3. Execution

1. Straw Bale Barrier Installation: Install straw bale barrier as detailed or install in a manner as to completely cross a swale or area of sheet flow. The intent is to intercept and slow storm flows to minimize siltation. Straw bales are to be recessed 0.05m (5cm) into the ground perpendicular to overland sheet flow. Two stakes are to be driven into each bale 0.6 m beyond the bottom of the bale. Gaps between bales are to be stuffed tightly with straw. Check dams along a swale should be installed every 15m to prevent water from reaching high velocity.

   Light Duty Sedimentation Fence Installation: Install temporary fence and filter fabric as detailed. Fence is to be aligned to contours when possible to maximize ponding

efficiency. Fabric is to be installed on upstream side of wood stakes with 300 mm buried in a trench of compacted native soil.

Heavy Duty Sedimentation Fence Installation: Install temporary fence and filter fabric as detailed. Fence is to be aligned to contours when possible to maximize ponding efficiency. Fabric is to be installed on upstream side of T-bars.

2. Timing: The barrier must be in place prior to commencement of any earthwork activity.

3. Maintenance: Inspect and repair barrier after each storm event (1:2 year storm and/or +40 mm rainfall over a 24 hour duration). Remove sediment when accumulated silt is over ½ the height of the barrier or 225 mm, whichever is lower. Material must be disposed of in an area that will not contribute to sedimentation off-site. Maintain this barrier as necessary until it is allowed to be removed.

4. Removal: Remove barrier from site only when permitted by the consultant and the Authority having jurisdiction. Area of barrier is to be repaired with topsoil and sod.

**End of Section**

## PART I - GENERAL

### 1.1. Product Quality

.1 Products supplied for work shall be new, and as far as possible and, unless otherwise specified, of Canadian manufacture.

.2 Materials used for temporary facilities are not required to be new, provided they are structurally sound and in suitable and safe operation condition.

### 1.2. Standards and Terminology

.1 Where a standard has been adopted by these Specifications, incorporate minimum requirements of such standards into the work. Where requirements of Specifications are more stringent than those of the standard, follow more stringent requirements.

.2 Reference to standards, specifications, handbooks and manufacturer's catalogues, refer to latest edition thereof and all amendments or revisions applicable at Tender Closing Date, unless data suffix is included with document number.

.3 Wherever words "acceptable", "approved", "satisfactory", "selected", "directed", "designated", "permitted", inspected", "instructed", "required", "submit", or similar words or phrases are used in standard or elsewhere in Contract Documents, it shall be understood that "by (to) the Landscape Architect" follow, unless context provides otherwise.

.4 Where the word "provide" is used in these Contract Documents, it shall be taken to mean "supply and install" unless specifically noted otherwise.

### 1.3. Availability and Substitution

.1 Products which are specified by their proprietary names or by part of catalogue number form the basis for Contract. No substitutes for these may be used without Landscape Architect's approval in writing.

.2 Where it is found that specified materials have become unavailable for incorporating into work, notify Landscape Architect immediately of proposed substitution.

.3 Proposed substitution shall be any top quality product considered by Landscape Architect to be suitable for purpose intended.

.4 Products proposed as substitutions, and which are considered by Landscape Architect to be suitable for purpose intended, but which are in his opinion of lesser value and quality than those specified shall only be accepted as substitution if reasonable credits are allowed for their use.

.5 In order to substantiate equivalency of proposed material, products or processes, submit samples, printed product description's test data, installation instructions, standards, certification, samples, guarantee /warranty forms, list of successful products incorporating such proposals, and similar information requested by the Landscape Architect.

.6 Whenever a substitute is proposed, any change to the contract price as a result of acceptance of proposed product shall include any adjustments to adjacent structure or space in order to accept minor differences in size or weight between proposed items and corresponding specified items.

.7 Prevent any substitution or request for substitution from delaying construction progress in any way.

.8 Requests for substitution resulting from failure to place orders in time will not be entertained. Be responsible for ordering products in time to ensure their required delivery; bear all costs for failure to comply with these requirements.

.9 Upon Landscape Architect's request, submit copies of material and equipment purchase orders.

## 1.4. Product and Delivery Handling and Storage

.1 Suitably pack, crate and protect products during transportation to site to preserve their quality and fitness for purpose intended.

.2 Store products in original, undamaged condition with manufacturer's labels with seals intact until they are being incorporated into completed work.

.3 Handle and store materials in accordance with manufacturer's and supplier's recommendation so as to ensure preservation of their quality, appearance and fitness for work.

.4 Arrange materials so as to facilitate prompt inspection, and remove faulty, damaged or rejected materials immediately from site.

## 1.5. Product Delivery Schedule

.1 It is the responsibility of the contractor to ensure that the supplier or distributor of materials specified or alternatives accepted, which he intends to use, has materials on the site when required. The Contractor shall obtain confirmed delivery dates from the supplier.

.2 The Contractor shall contact the Consultant immediately upon receipt of information indicating that any material or item will not be available on time, in accordance with the original schedule, and similarly it shall be the responsibility of all subcontractors and supplies to so inform the Contractor.

.3 The Landscape Architect reserves the right to receive from the Contractor at anytime, upon request, copies of actual purchase or work orders of any material or products to be supplied for the work.

## 1.6. Workmanship

.1 All work shall be carried out in accordance with the best trade practice, by tradesmen skilled in the type of work concerned.

.2 Products, materials, systems and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the applicable manufacturer's printed directions.

.3 Where specified requirements are in conflict with the manufacturer's written directions, follow manufacturer's directions. Where specified requirements are more stringent than manufacturers directions, comply with specified requirement.

**End of Section**

## PART 1 - GENERAL

### 1.1. Definition

An organized compilation of operating and maintenance data including detailed technical information, documents and records describing operation and maintenance of individual products or systems as specified in this tender document and the contract drawings.

### 1.2. Operating and Maintenance Manuals

.1 Provide operating and maintenance manual, prepared on 8 1/2x11" or folded 11”x17” sheets in printed or typewritten form, preferably double- sided, contained in D-ringbinders with soft vinyl covers.

.2 Manual contents shall be assembled in systematic order, generally following the specification format. Provide labelled, celluloid covered tabs fastened to hard paper dividers to identify different sections.

.3 Binders shall have clear plastic pocket at back of spine for identification. Insert label containing title "Operating and Maintenance Data", project name and volume number if applicable.

.4 Include the following material in each manual:

.1 Title sheet labelled "Operating and Maintenance Data" and listing project name, date, volume number , if applicable and names and addresses of Contractor, mechanical subcontractors, Landscape Architect and subconsultants.

.2 List of contents. If more than one volume is required, provide a cross-reference contents page at front of each volume. Organize data into same numerical order as per contract specifications.

.3 Complete list of subcontractors and suppliers.

.4 Copy of finished hardware list, complete with all amendments and revisions.

.5 List of special tools as specified.

.6 List of spare parts as specified or required.

.7 Schedule of paints and coatings. Include sufficient explanation to fully identify each surface with the applicable paint or coating used. Enclose copy of colour schedule.

.8 Maintenance instructions for all finished surfaces.

.9 Brochures, cuts of all equipment and fixtures.

.10 Operating and maintenance instructions for all equipment.

.11 Extended warranties.

.12 Maintenance contracts and proposed maintenance schedules.

.13 Copies of approvals, and certificates.

.14 Other data required elsewhere in Contract Documents or deemed necessary by Landscape Architect.

**1.2. Record Drawings**

.1 Refer to Section 01 78 39 - Project Record Documents.

.2 Quality of drafting and lettering shall match that of original drawings and shall be suitable for microfilming.

**1.3. Operating Instructions**

.1 At Substantial Performance, at a time acceptable to Owner and Landscape Architect, but not before operating and maintenance manuals have been reviewed and accepted by Landscape Architect, instruct Owner's representative in the operation of all systems and equipment.

**1.4. Substantial Performance**

.1 Prior to requesting a Substantial Performance deficiency inspection, submit the following:

.1 Three copies of operating and maintenance manuals.

.2 Two copies of inspection and acceptance certificates required from regulatory agencies.

.2 Advise the Landscape Architect, in writing , when the project has been substantially completed. If Landscape Architect agrees that this stage has been reached, prepare a complete list of deficiencies and submit one copy of this list to Landscape Architect.

.3 On receipt of the above deficiency list, in a satisfactory from, the Landscape Architect, accompanied by the subconsultants, the Contractor and his project superintendent, and the Owner if deemed desirable, will carry out an inspection of the project.

.4 Add to the deficiency list, in accordance with Landscape Architects directions, any additional deficiencies which are identified during inspection and re-issue updated deficiency list to all concerned.

**1.5. Total Performance**

.1 Prior to requesting a final inspection, do the following:

.1 Submit one complete set of “as built” drawings in Autocad format.

.2 Submit Photographic documentation as per section 01 32 33.

.3 Submit one complete set of reviewed shop drawings of mechanical and electrical items, folded to 8 1/2" by 11" size, contained in heavy manila envelopes, numbered and labelled. Follow specifications format with no more than one section per envelope.

.4 Submit a final request for payment incorporating all approved changes to the contract price.

.5 Upon completion of all items noted on the deficiency list, clean all areas, surfaces and components affected by corrections and completion of deficient items, as directed by Landscape Architect.

.6 Ensure that all services, equipment, apparatus are properly tested and adjusted.

.2 After all deficiencies have been corrected, submit a written request to the consultant for a final inspection. This inspection shall be carried out by the same parties involved in the Substantial Performance deficiency inspection.

.3 If all deficiencies have not been corrected, in the opinion of the Landscape Architect, a final deficiency list will be prepared in the same manner as specified herein for the Substantial Performance Deficiency Inspection and the inspection procedure repeated until all items have been completed to the satisfaction of the Landscape Architect.

.4 A final site inspection shall be held one month prior to completion of one year warranty to document deficiencies. **The contractor shall have one month to rectify deficiencies**. If deficiencies are not rectified, maintenance or bonding monies shall be used to rectify same.

## 1.6. Liquidated Damages

.1 Refer to Section A - Instructions to Bidders (Liquidated Damages).

**End of Section**

## PART I – GENERAL

### 1.1. Lines And Levels

.1 Site property line must be verfied and laid out on site by an Ontario Land Surveyor.

.2 Verify all elevations, lines, levels and dimensions as indicated and report errors, any conflicts, or inconsistencies to the Landscape Architect before commencing work or as soon as discovered.

.3 Accurately lay out work and establish lines and levels in accord with requirements of Contract Documents.

.4 Set up, maintain and protect permanent reference point stakes set at 30M and provide general dimension and elevations for all Sections of Work as per Grading Plans.

### 1.2. Dimensions

.1 Check and verify dimensions wherever referring to work. Dimensions, when pertaining to work of another Section, shall be verified with section concerned. Details and measurements of work which is to fit or conform with work installed shall be taken at site.

.2 Do not scale Drawing. If there is ambiguity, lack, of information or inconsistency, immediately consult Landscape Architect for direction. Be responsible for extra costs involved through the disregarding of this notice.

### 1.3. Location of Fixtures And Services

.1 Location of apparatus, play equipment , curbs outlets, conducts pipes and catch basins etc. shown or specified, but not dimensioned, shall be considered approximate.

.2 Consult with Landscape Architect to establish exact location. Any relocation caused by Contractor's failure to consult with Landscape Architect shall be carried out by Contractor at no extra cost to Contract. Where job conditions require reasonable changes in indicated locations and arrangements, make changes at no additional cost.

.3 Conserve space and coordinate with work of other Sections to ensure that drainage pipes and structure will fit into space.

### 1.4. Certified Site Plan as Built Drawing

.1 Upon completion of site work and prior to application for Total Performance acceptance, submit to Landscape Architect one copy of the as built plan showing outline of paved areas, final finished grades throughout site and location of buried services.

## 1. General

1. Be responsible for cleanliness of site and structures to satisfaction of Landscape Architect. Maintain work in neat and orderly condition at all times.

2. Periodically, or when directed by the Landscape Architect, remove from site and legally dispose of rubbish and waste materials.

3. Burning or burying of rubbish and waste materials on site is not permitted.

4. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

5. Use cleaning material only on surfaces recommended by cleaning material manufacturer.

6. While on the premises, all hazardous waste shall be properly identified and stored so as not to pose a safety hazard to employees, workers or the general public.

7. Utilize recycling programs and efforts for material disposal whenever and wherever possible. Guidance into various recycling efforts can be obtained by contacting the municipality.

## 2. Cleaning During Construction

1. Remove debris, packaging and waste materials frequently.

2. Keep dust and dirt to an acceptable level as directed.

3. Remove oily rags, waste and other hazardous substances from premises at close of each day, or more often if required.

## 3. Final Cleaning

1. Prior to substantial performance, thoroughly clean all surfaces and components. Provide professional cleaning of all areas and surfaces to allow owner to occupy without further cleaning.

2. Remove stains, dirt mud, and smudges from finished surfaces including asphalt surfaces.

**End of Section**

## PART I – GENERAL

### 1.1. Definition

1. Warranty = Guarantee

### 1.2. Submission Requirements

1. Submit extended warranties as part of "Operation and Maintenance Data" in accordance with requirements of Section 01 70 00 – Execution and Closeout Requirements.

2. Arrange extended warranties in systematic order matching specification format. Include a table of contents listing warranties in same order.

### 1.3. Each warranty must show:

a) Name and address of project
b) Name of owner
c) Section Number and Title

### 1.4. Warranties

1. All work shall be warrantied for 1 year from date of Final Completion. Plant materials shall be warrantied for 2 years from date of Final Completion pursuant to the following requirements, unless otherwise stated on the bid sheet.

   All dead woody plant materials will be replaced promptly by the contractor for the entire duration of the warranty period. All warranty replacements will be made at the expense of the contractor and at no additional cost to the Owner.

   Plants dying as a result of, but not limited to, handling by nurseries or the contractor, improper storage, improper planting, lack of water or rodent damage will be subject to replacement. Plants dying as a result of vandalism whether intentional or accidental are not subject to warranty replacement by the contractor.

**End of Section**

## PART I - RECORD DRAWINGS

.1 Landscape Architect will provide two (2) sets of white prints for record drawing purposes and a final Autocad .dwg file for as built purposes.

.2 Maintain project record drawings and record accurately significant deviations from Contract documents caused by site conditions and changes ordered by Landscape Architect.

.3 Mark changes in red.

.4 Record following information:

- .1 Depths of various elements of foundation in relation to final grades and benchmark.
- .2 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement.
- .3 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
- .4 Field changes of dimension and detail.
- .5 Changes made by Change Order or Field Order.

.5 At completion of project and prior to final inspection, neatly transfer notations to Autocad .dwg file supplied by Landscape Architect (pay for all costs of revisions to Autocad drawing).

**End of Section**

## PART I – GENERAL

### 1.1. Description

.1 The work covered by this section includes the furnishing of all labour, materials, equipment and incidentals for the inspection and construction of concrete paving and curbing as shown on the Construction Drawings and as described by the Contract Specifications.

.2 Comply with the requirements of the Tender Document and General Conditions.

### 1.3. Quality Assurance

.1 The contractor must have a minimum of 5 years experience in concrete work.

.2 All materials must conform to CSA A23.1-94. A copy must be kept on site at all times during construction.

.3 Furnish the Landscape Architect with a certificate prepared by the Ready-Mix concrete suppliers stating that all requirements regarding strength, slump, air entrainment, mix, materials and ratio have been met and maintained.

.4 Prior to pouring concrete, obtain the approval of the Landscape Architect of all form work, placement of reinforcing steel, consolidation of subgrade and placement and consolidated of granular base.

.5 When required by the Landscape Architect, have all concrete tested for compressive strength, slump and air content, in accordance with CSA A23.2-94. Submit test reports in duplicate and pay all costs incurred.

.6 Ensure work complies with the Ontario Building Code and all pertinent local by-laws and regulations. These shall govern in case of conflict with the specification. Obtain and pay for all necessary permits before starting work.

### 1.4. Product Delivery, Storage and Handling

.1 Store all materials in accordance with CSA A23.1-94 latest edition.

.2 Store reinforcing steel on racks or skids. Protect from contamination by dirt or other materials.

.3 Store forms off the ground and sufficiently supported to prevent warping or distortion. Protect from contaminations by oil, grease, water, earth, etc.

.4 All concrete is to be ready mixed at plant and transported to the site by truck in accordance with CSA A23.1-94. Hand mixed concrete is not allowed unless approved in writing by the Landscape Architect prior to the start of work.

.5 Convey concrete from the mixer to the place of final deposit as rapidly as possible, with as little rehandling as is practical. Avoid segregation and/or loss of material.

.6 Place concrete in final position and at such a rate that it remains plastic at all times and flows readily between reinforcement, into all corners and crevices and around all embedded fixtures. Pour in a continuous operation between expansion joints.

.7 Thoroughly clean all equipment, used for mixing or transporting of concrete, of all hardened concrete and foreign material prior to placing concrete.

.8 Do not allow concrete to be contaminated by foreign materials. Do not use retempered concrete unless approved in writing, by the Landscape Architect.

.9 Obtain the approval of the Landscape Architect of the type, number and method of use of mechanical vibrators. Do not operate a vibrator for longer than 10 seconds in any one location.

.10 Maintain constant control to ensure that finished concrete is dense, uniform, free of air holes or honeycombs and that no segregation of aggregates and cement paste occurs.

**1.5. Job Conditions**

.1 Protect all concrete surfaces from damage or harmful effects of weather, water, mechanical shock or trespassers until concrete is properly cured.

.2 If temperature is expected to drop below 5°C, place and protect concrete in accordance with AC1.605.

**1.5. Inspection**

.1 Obtain the approval of the Landscape Architect of the layout, compacted sub-grade, compacted granular base, formwork and reinforcing before proceeding with subsequent work.

## PART II – PRODUCTS

**2.1. Materials**

.1 Granular A and Granular B: granular material conforming in all respects to OPSS 1010, latest edition.

.2 Portland cement: standard grey portland cement, conforming to CAN/CSA-A5/A8/A362-93 type 10 normal.

.3 Aggregates: nominal size as specified and conforming to CSA A23.1-94.

.4 Water: clear and free of deleterious substances or efflorescing salts.

.5 Air entraining admixtures: conforming to ASTM C 260-94 and of approved manufacturer.

.6 Reinforcing steel: conforming to CSA G-30.12-M77 for bars, CSA G30.5-M83 for welded steel wire mesh and OPSS 1440.

.7 Expansion joint filler: premoulded bituminous impregnated fibre board conforming to ASTM D1751-73 of thickness and depth specified.

.8 Curing Compounds: clear liquid chlorinated rubber to ASTM C309 and OPSS 1315.

.9 Formwork: conforming to CSA A23.1-94 and AC1- 347 and of sound wood, in good condition and equal or better than No. 2 grade construction spruce and/or 19mm Douglas

Fir plywood, with the surface treated to produce a smooth concrete finish. Plywood to be CSA 0/2/.

## 2.2. Mixes

.1 Mix concrete materials in accordance with CSA CAN3-A23.1M-77, in the proper proportions and ratios to provide a finished product as specified. Concrete mix shall meet the following requirements: Compressive strength 25 MPa at 28 days; 100mm slump at point of deposit; air entrainment 6% (+ or - 1%). Unless noted otherwise on the drawings or details, all concrete is to be 25 MPa strength.

.2 With the exception of air entraining agents, other mixtures may only be used with the written approval of the Landscape Architect. The use of agents to lower the freezing point of the mix will not be permitted.

# PART III – EXECUTION

## 3.1. Preparation

.1 Excavate to the minimum specified depths, after compaction, as shown on the drawings. Maintain sub-grade parallel to finished grade in all cases.

.2 Fine grade subgrade eliminating uneven areas and filling low spots. Remove all debris. Excavate all soft and unstable areas in subgrade and backfill with Granular “B”.

.3 Compact subgrade uniformly to minimum ninety-eight percent (98%) Standard Proctor Density. Arrange for testing of fill materials and compaction. When required and as directed by the Landscape Architect, the Contractor shall, at his own expense, sprinkle water to assist in compaction.

.4 The Granular “B” base shall be applied in maximum 74mm (3 inches) layers, graded, rolled and compacted in accordance with OPSS Division 3.

.5 In the event of delay between completion of subgrade and commencement of application of stone base, the Contractor shall re-grade and re-compact subgrade at his own expense if so ordered.

.6 Keep materials clean and free of deleterious materials at all times.

.7 Maintain final grade of granular base course parallel to finished grade.

.8 Submit written test reports.

.9 Contractor to ensure that all concrete columns are vibrated to eliminated all voids.

## 3.2. Granular Base

.1 Spread the specified granular materials in horizontal layers not exceeding 100mm loose depth and compact to 95% Standard Proctor Dry Density. In areas where compaction by roller is not possible, compact with approved mechanical or hand tamping devices to the specified density.

.2 Build up thickness of each material to the minimum compacted thickness as specified on the drawings.

.3 Ensure that granular does not become contaminated by deleterious material.

.4 Correct all irregularities or depressions resulting from rolling and compact until the granular surface is smooth, uniform and true to line and grade.

.5 When required by the Landscape Architect, have the compaction of the granular materials tested by an approved, independent testing firm. Submit 2 copies of the test results to the Landscape Architect and obtain his approval prior to pouring concrete. Pay testing costs incurred.

## 3.3. Form Work

.1 Erect forms in such a manner as to facilitate dismantling and removal without damaging concrete.

.2 Erect forms true to line and level in accordance with the drawings, and sufficiently braced to maintain their form and alignment when concrete is placed.

.3 Prior to each pouring operation, coat affected form surfaces with an approved form separating material.

.4 Provide for all openings, sleeves, hangers, anchors and ties to be cast into the concrete.

.5 Do not use treated plywood for exposed surfaces more than 5 times. Do not use plywood if surface is damaged.

.6 Obtain the approval of the Landscape Architect of all form work before proceeding

## 3.4. Reinforcement

.1 Before placing reinforcement, clean all loose scale, dirt and any other coating that would destroy or reduce bonding to concrete.

.2 Place all reinforcement accurately in accordance with the drawings and/or approved shop drawings. Use approved chairs, spacers, hangers or ties to secure the reinforcing in position.

.3 Unless directed otherwise, provide the following minimum concrete cover over reinforcing:

a) 75mm where concrete is deposited against soil.

b) 50mm for bars larger than 10m and 40mm for bars smaller than 10m where concrete is exposed to weather.

.4 Obtain the approval of the Landscape Architect of all reinforcing before proceeding.

## 3.5. Joints

.1 Locate expansion joints as shown on the drawings or at max. intervals of 6.0m, between new concrete and all new or existing rigid structures, and either side of all driveway sections. Joints must be cast in place.

.2 Execute construction joints in accordance with AC1-301 and as detailed on the drawings. Thoroughly clean the joint surface of all laitance and wet thoroughly and slush with a coat of cement grout immediately before placing new concrete.

.3 Except for expansion joints, continue reinforcing uninterrupted through joints, unless shown otherwise on the drawings or directed by the Landscape Architect.

.4 Stop reinforcing on each side of expansion joints. Where dowels are indicated, cast one half into one side of the joints. The exposed half shall be machined smooth and heavily greased before placing adjoining sections.

.5 Locate control joints as shown on the drawings or at a max. spacing of 2.0m. Ensure joints are to a minimum depth of 1/4 the thickness of the concrete. Make joints by one of the following methods:

a) Sawed joints

b) Hand formed and hand tooled

c) Inset joints placed in plastic concrete

.6 No offsets will be allowed between adjacent sections of joint fillers and no plugs of concrete will be permitted anywhere within an expansion joint.

.7 Apply joint sealant in accordance with the manufacturer's directions. Ensure joints are clean and free of any foreign substances before sealing. Clean any sealant spilled on concrete surface immediately.

## 3.6. Placing of Concrete

.1 Place concrete by approved means and using approved equipment.

.2 Do not place concrete until formwork and grades have been inspected by the Owner or Landscape Architect.

.3 Transport concrete from mixer to point of deposit, and place in final position as quickly as possible to prevent separation and loss of materials.

.4 While placing concrete, compact thoroughly and uniformly by approved means to ensure a dense homogeneous structure free of air pockets, and honeycombs and closely bonded with reinforcement.

## 3.7. Finishing

.1 Treat and finish all surfaces as directed or specified and in accordance with CSA CAN3-A23-1-M77.

.2 Strike off and float all exposed paving surfaces as soon as possible after consolidation and in accordance with recommendations of the Portland Cement Association. Execute final finishing as specified on the drawings or as directed by the Landscape Architect.

.3 Ensure finished surface is true to line and level as shown on the drawings. Walks are to be sloped as per grading plans.

.4 All irregularities greater than 6mm under a 3000mm straight edge, operated parallel to the centre line, must be repaired.

.5 Obtain the approval of the Landscape Architect of finished surfaces before starting curing operations.

.6 Immediately after stripping formwork, obtain the approval of the Landscape Architect before commencing patching, finishing or curing operations.

.7 The extent, method and type of mix for patching shall have the approval of the Landscape Architect before commencing work. Ensure patching mix contains an approved bonding and waterproofing agent and that it is installed in accordance with the manufacturer's specifications.

## 3.8. Curing

.1 Keep concrete moist for at least 3 days after placement, in accordance with CSA CAN-A231-M77.

.2 Method of curing shall be as specified or by one of the following approved methods if not specified:

a) Moist curing

b) Waterproofing paper or white polyethylene sheeting

c) White liquid membrane compound

d) Combination of above methods

.3 Moist curing: use burlap or approved equal. Ensure it is thoroughly wet when applied and kept continuously wet and in full contact with the surface during the curing period.

.4 Waterproof paper or white polyethylene sheeting: ensure sheet is large enough to cover entire concrete surface. Secure to prevent displacement during curing period. Immediately repair any tears or holes.

.5 White liquid membrane compound: apply at the rate of 1 litre per 5 square meters after final finishing and all free water has disappeared. Keep membrane compound agitated to prevent settling of compound. Apply membrane compound to edges immediately after formwork is removed. Ensure a continuous and unbroken membrane cover is applied.

## 3.9. Clean-up

.1 Clean and remove all concrete spills from the site and make good any disturbance.

**End of Section**

## PART I – GENERAL

### 1.1. Description

.1 This section specifies site clearing, rough grading, excavation and backfilling, including all demolition and removal of work shown on the drawings.

.2 Comply with all requirements of the General Requirements – Section 01 00 00.

.3 Related work elsewhere: Section 32 92 23 – Sodding
Section 32 14 23 – Asphalt Unit Paving
Section 03 00 00 – Concrete

### 1.2. Quality Assurance

.1 Carry out compaction tests on compacted fill to ASTM D698-70 for Standard Proctor Dry Density on the basis of 1 test for every 50 m2 in hard landscaping, fill areas and 1 test in every 5 m in trenches. Pay all testing costs incurred.

.2 Carry out grain size analysis on samples of each of granular fill to ensure that proper material is being placed.

.3 Determine the quantity of water to be added to or removed from each type of fill to attain correct moisture content for compaction and maximum density.

.4 Determine the in-situ density and moisture content of compacted fills.

### 1.3. Product Delivery, Storage and Handling

.1 Stockpile existing topsoil or fill materials in locations designated by the Landscape Architect.

### 1.4. Shoring and Bracing

.1 Shore and brace all excavations sufficiently to prevent caving in and to support existing structures, road or services.

.2 Ensure shoring is in accordance with local municipal and provincial regulations and obtain all necessary permits.

.3 Erect warning signs and protective barriers in accordance with local municipal and provincial regulations.

.4 Make good any damage and be liable for any injury resulting from inadequate shoring or bracing.

## PART II – PRODUCTS

### 2.1. Materials

.1 General fill material: clean, free from debris, organic matter and other deleterious material.

.2 Granular fill material: as called for on the drawings and conforming in all respects with OPSS 1000 and 1010, latest edition.

.3 Farmyard manure will be well rotted, odour free manure. Quality to be approved by means of a sample load before bulk is delivered to site.

## PART III – EXECUTION

### 3.1. Demolition, Site Clearing and Removals

.1 Clear the site of all rubbish, rocks, boulders, tree stumps, and all other debris. Remove and dispose of debris off site. In areas that are to be lowered, or have the grade raised more than 100mm, remove all trees and shrub growth.

.2 Cut down dead trees and trees to be removed and remove stumps to a depth of 600mm below proposed finished grade. Remove and dispose of all wood and chips off site. Fill hole with compacted topsoil and place new sod.

.3 Excavate to remove all existing paving where shown on the drawings and dispose of material off the site. Pre-cast concrete pavers, which are not chipped, broken, cracked or painted, may be salvaged for re-use on site.

.4 Removal includes granular base course material to existing sub-grade unless approved by the Owner or Landscape Architect for re-use on the site.

.5 Remove material without damaging adjacent pavements which are to remain. Make clean, sharp saw cut before starting removal work. Be responsible for making good damaged surfaces.

.6 Remove other materials and surfaces as indicated on the drawings.

.7 Temporarily remove existing fences, as required, to facilitate new construction work. Re-install at the completion of construction to as-new condition.

### 3.2. Rough Grading

.1 Where necessary, strip topsoil and stockpile as directed.

.2 Establish and maintain line and grade stakes for duration of grading operations.

.3 Cut back areas that are to be lowered to the grades shown on the drawings, allowing for the placement of base materials. Obtain the approval of the Landscape Architect before using excavated material as fill.

.4 Conform to grades indicated on Drawings. Uniformly slope grade between elevations shown unless otherwise indicated.

.5 Where existing grade is to be raised, supply and place fill material, approved by the Landscape Architect, lifts as per details and compact each lift to the specified Standard Proctor Dry Density before placing subsequent layers.

.6 Smoothly slope top and toe of slope and banks.

.7 Provide finished rough grade parallel to finished grade, allowing for the placing of the specified surface material and base and to a tolerance of plus or minus 12mm, and

compacted to 95% Standard Proctor Dry Density under areas to be paved and 85% Standard Proctor Dry Density under areas to be sodded or planted.

.8 Do not place excavated granular materials in berms or as fill materials in soft landscaped areas.

## 3.3. General Excavation

.1 Stake out the locations of all items requiring excavation and obtain the approval of the Landscape Architect before commencing work.

.2 Dispose of excavated material off site unless it is approved for use as fill material or backfilling material by the Owner or Landscape Architect.

.3 Excavate to the elevations and dimensions indicated or required for construction work. All depths detailed are shown as depth after compaction.

.4 Obtain the approval of the Landscape Architect of all excavations before proceeding with construction activities.

.5 Where bearing capacity of the subsoil appears to be insufficient, obtain the written approval of the Landscape Architect to have soil investigations carried out. Costs for such testing, if required, will be paid by the Contractor at cost.

.6 Excavation exceeding that shown on the drawings, if authorized in writing by the Landscape Architect, will be paid as extra to the contract price in accordance with the General Conditions. Quantities will be calculated in place. Truckload measurement is not acceptable.

.7 Fill extra excavations with concrete or as directed.

.8 Correct unauthorized excavation at no extra cost.

.9 Do not disturb soil within the branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut all roots with a sharp handsaw or chain saw. Seal cuts with approved tree wound dressing in accordance with ISA standards. Where excavation results in the loss of more than 20% of the root system of any tree, have the plant material top pruned by a qualified arboriculturalist to compensate for root loss. Pay all costs incurred.

.10 Excavate post holes with a power auger or hand auger as required, to the depth and diameter indicated on drawings. Ensure adequate allowance is provided in the bid for hand digging of holes, as no extra to the contract will be allowed.

.11 Shape the bottom of excavations for areas that include subsurface drainage to drain to the pipe at 2% minimum slope.

## 3.4. Excavation – Planting Pits and Beds

.1 Excavate planting pits and beds to depth specified on drawings:

.2 For shrub beds, excavate to the depth noted on the details and drawings and excavate the entire bed to depth specified on the drawings. Provide 450mm depth of topsoil.

## 3.5. Backfilling

.1 Do not commence backfilling until work has been approved by the Landscape Architect.

.2 Ensure areas to be backfilled are free of debris, snow, ice water or frozen ground.

.3 Place specified fill materials in continuous horizontal layers not exceeding 225mm loose depth and compact to 95% Standard Proctor Dry Density. Take care not to damage damp proofing during backfilling operations.

.4 Backfill simultaneously on both sides of any walls to equalize soil pressure.

.5 Make good any settlement or subsequent damage to adjacent structures or to other work under this contract caused by improper or inadequate compaction.

**3.6. Clean-up**

.1 Upon completion, remove all surplus excavated and graded materials from the site, and leave site clean and tidy.

**End of Section**

**SECTION 32 11 23- AGGREGATE BASE COURSE**
**(Granular A, B and 3/4 Crusher Run Limestone Base)**

## PART I - GENERAL

### 1.1 Description

.1 This Section is intended for light vehicle use areas, driveways and pedestrian walks. It is not intended to cover roads.

.2 Comply with all requirements of the General Requirements – Section 01 00 00.

.3 Protection

.1 Prevent damage to landscaping, curbs, sidewalks, trees, fences, roads, and adjacent property. Make good any damage.

### 1.2 Quality Assurance

.1 Carry out compaction tests on compacted fill to ASTM D698-70 for Standard Proctor Dry Density on the basis of 1 test for every 50 m2 in hard landscaping, fill areas and 1 test in every 5m along walkways. Provide Unit Price in Bid Sheet.

.2 Carry out grain size analysis on samples of each of granular fill to ensure that proper material is being placed.

.3 Determine the quantity of water to be added to or removed from each type of fill to attain correct moisture content for compaction and maximum density.

### 1.3 Product Delivery, Storage, and Handling

.1 Stockpile existing topsoil or fill materials in locations designated by the Contract Administrator.

## PART II - PRODUCTS

### 2.1 Materials

.1 Terratrack 2411 geo-textile (woven geo-textile) as manufactured by Terrafix (Rexdale Ontario), or approved equivalent.

.2a Granular 'A' shall consist of a mixture of crushed gravel, sand and fines composed of hard, durable, uncoated particles produced from naturally formed deposits.

.2b Granular 'B' aggregates shall be composed of clean hard, durable uncoated particles from deposits of gravel and sand.

Graduation requirements for Granular 'A' and Granular 'B'.

% Passing by Mass

| MTO sieve designation | | Granular 'A' | Granular 'B' type I | Granular 'B' type II |
|---|---|---|---|---|
| 150 | mm | N/A | 100 % | 100 % |
| 37.5 | mm | N/A | N/A | N/A |
| 26.5 | mm | 100 % | 50-100 % | 50-100 % |
| 19.0 | mm | 85-100 % | N/A | N/A |
| 13.2 | mm | 65-90 % | N/A | N/A |
| 9.5 | mm | 50-73 % | N/A | N/A |
| 4.75 | mm | 35-55 % | 20-100 % | 20-55 % |
| 1.18 | mm | 15-40 % | 10-100 % | 10-40 % |
| 0.3 | mm | 5-22 % | 2-65 % | 5-22 % |
| 0.150 | mm | N/A | N/A | N/A |
| 0.175 | mm | 2-8 % | 0-8 % | 2-8 % |

Granular 'B' Type I does not require crushing. Granular 'B' Type II shall only be obtained from quarried rock.

.3 19 mm (3/4) Crusher Run Limestone. Sound, hard, durable, crushed aggregate limestone free from clay and organic matter, to meet the following gradation:

| Sieve Number | | Percent Passing |
|---|---|---|
| 22.4 | mm | 100 |
| 19 | mm | 95 - 100 |
| 16 | mm | 75 - 100 |
| 9.5 | mm | 57 - 83 |
| 4.75 | mm | 37 - 61 |
| 1.18 | mm | 12 - 32 |
| 0.425 | mm | 8 - 23 |
| 0.075 | mm | 3 - 8 |

.4 19 mm Crusher limestone fraction passing 4.75 mm sieve to have liquid limit of 25 maximum, and plasticity index of 6 maximum.

.5 Granular topping: crushed rock screenings (3/4 Crusher Run Limestone) or stone dust to meet the following gradation:

| Sieve Number | | Percent Passing |
|---|---|---|
| 9.5 | mm | 100 |
| 4.75 | mm | 50 - 100 |
| 1.18 | mm | 20 - 55 |
| 0.30 | mm | 10 - 30 |
| 0.075 | mm | 0 - 12 |

.6 Big ‘O’ 100mm diameter drainage pipe in filter sock.

## PART III - EXECUTION

### 3.1 Grading and Inspection of Underlying Sub-Grade

.1 Grade the sub-grade as necessary to conform with elevations and sections before placing granular material.

.2 Compact graded sub-grade with roller of approved mass and type, to 98% Standard Proctor Dry Density.

.3 Check for unstable areas and make good with granular material compared to 98% SPDD.

.4 Check for areas requiring additional compaction and make good. Pay particular attention to areas behind curbs and on slopes.

.5 Notify the Contract Administrator of unsatisfactory conditions. The Contract Administrator may order a compaction test by an independent testing company to be paid for from the testing allowance.

.6 Do not place granular base until finished sub-grade surface is inspected and approved by the Contract Administrator.

### 4.0 Placement

.1 Place granular material only on a clean, unfrozen surface, properly shaped and free from snow, ice, standing water or organic matter.

.2 Place granular material to minimum compacted thickness of 150 mm under all new paving surfaces, as shown on the drawings or as directed in the field by the Contract Administrator.

.3 Should additional granular layers be required to achieve the grades and profiles shown, place layers in maximum 150 mm uniform compacted lifts. Shape each layer to a smooth contour and compact to the specified density before the succeeding layer is placed.

### 5.0 Compacting

.1 Compact to a density not less than 98% Standard Proctor Dry Density in accordance with ASTM D698-70 or latest revision.

.2 Shape and roll alternately to obtain a smooth, even and uniformly compacted base.

.3 Apply water as necessary during compacting to obtaining specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.

.4 In areas not accessible to rolling equipment, compact to specified density with approved mechanical tampers.

### 6.0 Field Quality Control

.1 Inspection and testing of granular base will be carried out by designated testing laboratory as determined by the Contract Administrator. If testing proves faulty compaction or materials and re-testing is required, such re-testing will be paid for by the Contractor.

.2 Finished rolled surface of granular base to be free from humps and hollows, and maintain positive drainage. All edges to be smooth, straight and regular to leave a look of tidiness and minimize clean-up.

.3 Finished base surface shall be within +/- 12 mm of required grade but not uniformly high or low.

Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

.4 For all pavement surfaces, granular base to be parallel to finished grades to specified tolerance. Receive approval of granular base from the Contract Administrator prior to placement of surface materials.

**End of Section**

## PART I – GENERAL

### 1.1. Description

.1 This section specifies asphalt paving for playground areas and walkways.

.2 Comply with all requirements of the General Requirements – Section 01 00 00.

### 1.2. Quality Assurance

.1 The contractor or sub-contractor must have a minimum of 5 years experience in asphalt paving work.

.2 Plants providing asphalt paving mixture under this contract must conform to OPSS 310-04-02 to 04 inclusive.

.3 Spreading equipment must meet the requirements of OPSS 310-04-05 to 07 inclusive.

.4 All asphalt paving work must be carried out to the OPSS 310-05-01 to 07 inclusive.

.5 Provide a copy of all subsections, listed above, on site at all times.

.6 Testing of asphalt cement, when required by the Owner, will be carried out, at no extra cost, to the contract and will be executed in accordance with ASTM D-140, latest edition.

.7 Testing of asphalt emulsion, when required by the Landscape Architect, will be carried out, at no extra cost, to the contract and will be carried out in accordance with ASTM-D244. Sampling procedures will follow ASTM-D140.

.8 Engage an independent, approved testing firm to carry out compaction tests on the completed granular base, one test per 100$m^2$ of area. Submit 2 copies of the test results to the Landscape Architect and obtain his approval prior to commencing asphalting operations. Pay all testing costs.

.9 Ensure that asphalt cement, asphalt primer and asphalt emulsion conform to the standards set out in the drawings and specifications.

### 1.3. Product Delivery, Storage & Handling

.1 Store granular materials in areas designated by the Landscape Architect.

.2 Minimum temperature of asphalt is to be 130°C immediately after spreading and prior to rolling.

### 1.4. Job Conditions

.1 Do not commence paving operations unless the surface temperature is steady at, or rising above 2°C.

.2 Proceed with paving operations only during favourable weather conditions and on a dry base.

.3 Suspend all paving operations if the temperature drops below 2°C.

.4 Spread subsequent paving courses within 12 hours after spreading and compaction of the previous course.

.5 Where existing asphalt paving is to receive resurfacing, ensure that all areas of cracked or broken asphalt are removed and patched satisfactorily with new asphalt prior to proceeding with resurfacing operations.

.6 Protect all adjacent areas and structures, particularly planted areas, from contamination by asphalt materials. Make good all damage.

**1.5. Inspection**

.1 Stake out paving locations and obtain approval from the Landscape Architect before proceeding.

.2 Obtain approval from the Landscape Architect of the finished sub-grade before proceeding.

.3 Obtain approval from the Landscape Architect of the paving base before proceeding.

## PART II - PRODUCTS

**2.1. Materials**

.1 Granular A: granular material conforming in all respects with OPSS 1010.

.2 Granular B: granular material conforming in all respects with OPSS 1010.

.3 Coarse aggregates: a crushed rock, slag or gravel or combination thereof, free of clay, silt and other deleterious materials.

.4 Fine aggregates: composed of clean, hard, durable particles of natural sand, manufactured sand or screenings resulting from the crushing of rocks, stone or gravel and free of clay, silt or other deleterious materials. Fine aggregate for HL3 and HL4 must contain a minimum of 10% passing the 10mm screen and retained on the #4 sieve.

.5 Mineral filler: finely ground particles of limestone, hydrated lime or other mineral dust approved by the Landscape Architect, free of clay, silt and other deleterious material.

.6 Asphalt cement: conforming in all respects with OPSS 310-1150.

.7 Joint painting material: slow setting asphalt emulsion, type SS-1 conforming to OPSS 306.

.8 Line marking paint: an acrylic emulsion type “traffic” paint conforming to C.B.S.B. 1-GP-74, colour to be yellow or white as noted.

**2.2. Mixes**

.1 Paving mixture: a hot mix, hot laid asphaltic concrete, of the type specified, and installed to the minimum compacted thickness shown on the drawings and composed of coarse and fine aggregates, mineral filler, and asphalt cement uniformly mixed.

## PART III – EXECUTION

**3.1. Preparation**

.1 Excavate to the minimum specified depths, after compaction, as shown on the drawings. Maintain sub-grade parallel to finished grade in all cases.

.2 Fine grade subgrade eliminating uneven areas and filling low spots. Remove all debris. Excavate all soft and unstable areas in subgrade and backfill with Granular “B”.

.3 Compact subgrade uniformly to minimum ninety-eight percent (98%) Standard Proctor Density. Arrange for testing of fill materials and compaction. When required and as directed by the Landscape Architect, the Contractor shall, at his own expense, sprinkle water to assist in compaction.

.4 The Granular "B" base shall be applied in maximum 74mm (3 inches) layers, graded, rolled and compacted in accordance with OPSS Division 3.

.5 In the event of delay between completion of sub-grade and commencement of application of stone base, the Contractor shall re-grade and re-compact sub-grade at his own expense if so ordered.

.6 Keep materials clean and free of deleterious materials at all times.

.7 Maintain final grade of granular base course parallel to finished grade.

.8 Submit written test reports.

.9 Where existing asphalt is to be resurfaced, clean all surfaces of soil, dust, leaves or other debris prior to paving. Ensure surface is free of standing water.

**3.2. Installation**

.1 Spread the specified granular materials in horizontal layers not exceeding 100mm loose depth and compact to 98% Standard Proctor Dry Density. In areas where compaction by roller is not possible, compact with approved mechanical or hand tamping devices to the specified density.

.2 Ensure that granular does not become contaminated by deleterious material.

.3 Build up thickness of each material to the minimum compacted thickness as specified on the drawings.

.4 Correct all irregularities or depressions resulting from rolling and compact until the granular surface is smooth, uniform, and true to line and grade.

.5 Paint all curbs, gutter walls, vertical faces of existing pavement, and all structures in actual contact with the new asphalt with a sealing coat of SS-1 emulsion. Provide a closely bonded, water tight joint.

.6 Lay and spread all paving courses by means of approved equipment.

.7 Immediately after spreading and screeding, check the surface and correct all irregularities before compacting.

.8 Ensure all joints are straight, clean, vertical and free of broken or loose materials. Cut back existing asphalt to provide a clean vertical surface. Paint the vertical surfaces of all joints with a thin, continuous coating of type SS-1 emulsion.

.9 Compact each paving course, with approved rolling equipment, to 97% Standard Proctor Dry Density, or greater. Begin compaction operations as soon as possible after placement when asphalt will bare the weight without checking or undue displacement. Keep roller wheel moist so as not to pick up material. Keep all equipment clean and in good condition.

.10 Hand tamp with hot tampers in areas not accessible to rolling equipment.

.11 Where hand-spreading is necessary, this shall be done simultaneously with machine-spreading or immediately afterwards to ensure a good bond.

.12 Hand tamp all edges adjacent to grass or planting beds to a 45° angle. Establish straight edge by the use of a string line. Where edge is not straight, lay in a smooth curve to the radii indicated. Where finished edge is not satisfactory, at the option of the Landscape Architect, the edge may be repaired by sawcutting to a 45° edge to the required line. Cut edge must be painted with liquid asphalt.

.13 After final rolling, surfaces shall be smooth and true to the specified grade and crown with the thickness of the courses varying no more than 6mm from that shown on the drawing. At the option of the Landscape Architect, unsatisfactory surface roughness on the asphalt may be corrected by the application of a coat of hot liquid, at the contractor's expense.

.14 Ensure a minimum surface slope of 2% or as specified, away from edges and curbs and towards catch basins on all asphalt re-surfacing operations.

.15 Ensure the surface is free from depressions greater than 6mm under a 3000mm straight edge.

## 3.3. Joints

.1 All joints made during paving operations shall be straight, clean, vertical and free of broken or loose material. Where joints occur between new courses and existing previously laid down courses, the existing course shall be cut back sufficiently to provide a clean vertical surface.

.2 Vertical faces of all joints shall be painted with a thin continuous coating of SS-1, to provide a tight, waterproof bond.

.3 All locations where new asphalt meets existing structures and paving shall be considered a joint. Make all joints in accordance with OPSS Division 3 and paint with a thin, uniform, continuous coating of joint painting material SS-l Emulsion or approved equal.

.4 All joints shall be coated with tack coat before the adjacent asphalt is laid if the previous section has been in place for more than two hours.

.5 Transverse joints shall be cut back at least one foot and painted with tack coat before paving proceeds.

.6 Where tack coat has been applied, it shall be allowed to dry to a tacky texture before the asphalt is laid against it.

## 3.4. Edges

.1 New surfaces shall blend smoothly and flush with existing surfaces, steps, tops of curb, etc.

.2 Low or defective areas shall be cut out immediately and replaced with fresh hot mixture, placed and compacted to blend with surrounding areas and thoroughly bonded to it.

.3 Install temporary forms, where necessary, in order to maintain straight, continuous edges of asphalt where shown.

.4 Where surfaced area abuts seeded, sodded, earth or grass areas, and no step or curb occurs, edges of asphalt paving shall be finished with 45 degree angle edge neatly formed and tamped as detailed. Grass edges shall be restored with 200mm (8") of topsoil and appropriate sod or seeding mixtures to the satisfaction of the Landscape Architect. Extent of restoration shall be from edge of walkway to limit of area disturbed by construction or as directed in cut or all situations slopes meeting walkway shall not exceed 3:1.

## 3.5. Line Painting

.1 All lines to be painted 50mm thick with aluminum asphalt paint. Colour as specified on drawings.

.2 Avoid splashing or spattering paint on the surface.

## 3.6. Clean-up

.1 At the completion of asphalt operations and prior to final inspection, clean all curbs, catch basins, manhole covers, walls, and other structures to remove contamination by asphaltic or other materials resulting from the work.

**End of Section**

## PART 1 - GENERAL

### 1.1 Regulatory Requirements

.1 Do work of this Section in accordance with Chain Link Fence details within the provided drawings, except where requirements specified herein are more stringent, follow specified requirements

### 1.2 Reference Standards

.1 Install chain link fence in accordance with CAN2-138, 3M980 unless otherwise specified.

## PART 2 - PRODUCTS

### 2.1 Materials

.1 Concrete:

1. Meet requirements of Section 03300.

2. Concrete mix designed to produce 20 MPa minimum compressive strength at 28 days and containing 20 mm maximum size, 5 mm minimum size coarse aggregate, with water cement ratio to CAN3 -A23.1-M77 Table 7 for Class A exposure and 60 mm slump at time and point of deposit. Air entrainment to CAD3 -A23.1-M77 Table 8.

.2 Chain link fence fabric: to CAN2-138.1-M80., 50 mm mesh, 11 gauge diameter steel wire, overall 9 gauge.

.3 Posts and rails: ASTM A120 Standard butt-weld schedule 40 pipe:

.1 Line posts: 60 m diameter, 4.55 kg/m

.2 Terminal and corner poses: 90m diameter, 11.28 kg/m

.3 Top rail and braces: 43 mm diameter, 3.38 kg/m

.4 Bottom rail: 43 mm 0 outside diameter

.5 Tie wire fasteners: single strand, aluminum coated or galvanized steel wire, 5 mm diameter.

.6 Tension bar: 5 x 20 mm minimum galvanized steel.

.7 Tension bar bands: 3 x 20 mm minimum galvanized steel or 5 x 20 mm minimum aluminum.

.8 Fittings and hardware: cast aluminum alloy or galvanized steel. Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail. Turnbuckles to the drop forged.

.9 Zinc pigmented paint: to CGSB 1-GP-178 Ma.

.10 Gates: 43 mm O.D. pipe framework, electrically welded at all joints and hot dip galvanized after welding. Square corners, height full 3050 mm. Complete with galvanized malleable iron hinges, latch catch. Latch catch so designed that padlock can be attached and operated form either side of gate. Install gateposts.

## 2.2 Finishes

.1 Galvanizing:

1. Electrostatically paint all components to match fabric color.

2. Pipe: 600 g/m2 minimum to ASTM A90.

3. Fittings: to CSA G164-M1981.

## PART III - EXECUTION

## 3.1 Preparation and Examination

.1 Investigate location of underground services in area of fence to avoid interference and damage. Notify Landscape Architect prior to start of installation in case of conflict.

.2 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.

## 3.2 Erection of Fence

.1 Erect fence along lines indicated, plumb, level, free of kinks and buckles and with posts accurately aligned.

.2 Excavate post holes minimum 250 mm diameter and 1.2 m. deep for corner and end posts by methods approved by Landscape Architect. Bulb bottom of holes for corner, end and gateposts and for intermediate posts at every [60] m along fence line.

.

.3 Space line posts 3m apart, measured parallel to ground surface.

.4 Space straining posts at equal intervals not exceeding 150m. If distance is greater than 150m between end or corner posts on straight continuous lengths of fence over reasonably smooth grade.

.5 Install additional straining posts at sharp changes in grade and where directed.

.6 Install corner post where change in alignment exceeds 10°.

.7 Install end posts at end of fence.

.8 Place concrete in postholes than embed posts into concrete to minimum 1 m. depth. Extend concrete 50mm above ground level and slope to drain away from posts. Form top 105 mm of post foundation; rub smooth and round edges of exposed concrete. Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.

.9 Do not install fence fabric until concrete has cured a minimum of 5 days.

.10 Install horizontal brace between posts and nearest line post, placed in centre of panel. Install braces on both sides of corner and straining posts in similar manner.

.11 Install top rail between posts and fasten securely to terminal posts and secure waterproof caps and overhang tops.

.12 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands space at 300mm intervals. Knuckled selvage at bottom. Twisted selvage at top

.13 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 450mm intervals. Give tie wires minimum two twists.

.14 Restore grading, disturbed by fencing installation, to original condition.

## 3.4 Touch up

.1 Repair damaged galvanized surfaces. Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of approved zinc pigmented paint to damaged areas.

**End of Section**

## PART 1 - GENERAL

### 1.1 Description

.1 The work covered by this section includes the furnishing of all labor, materials, equipment and incidentals for the design, inspection and construction of a modular concrete retaining wall including drainage system as shown on the Construction Drawings and as described by the Contract Specifications. The work included in this section consists of, but is not limited, to the following:

a) Design, inspection and certification by the contractor's registered professional engineer.
b) Excavation and foundation soil preparation.
c) Furnishing and placement of the leveling base.
d) Furnishing and placement of the drainage system.
e) Furnishing and placement of geotextiles.
f) Furnishing and placement of segmental retaining wall facing units.
g) Furnishing and compaction of drainage and retained soils.

### 1.2 Reference Standards

.1 Engineering Design

a) NCMA Design Manual for Segmental Retaining Walls, Second Edition.
b) NCMA TEK 2-4 -Specifications for Segmental Retaining Wall Units.
c) NCMA SRWU-2 - Determination of Shear Strength between Segmental Concrete Units.

.2 Segmental Retaining Wall Units

a) ASTM C 140 - Sampling and Testing Concrete Masonry Units
b) ASTM C 1262 - Evaluating the Freeze - Thaw Durability of Manufactured Concrete Masonry Units and Related Concrete Units.
c) ASTM C 33 - Specification for Concrete Aggregates
d) ASTM C 90 - Standard Specification for Load-Bearing Concrete Masonry Units
e) ASTM C 150 - Specification for Portland Cement
f) ASTM C 595 - Specification for Blended Hydraulic Cements

.3 Geotextile Filter

ASTM D 4751 - Standard Test Method for Apparent Opening Size

.4 Soils

a) ASTM D 698 - Moisture Density Relationship for Soils, Standard Method
b) ASTM D 422 - Gradation of Soils
c) ASTM D 424 - Atterberg Limits of Soils d) ASTM D G51 - Soil pH

.5 Drainage Pipe

a) ASTM D 3034 - Specification for Polyvinyl Chloride (PVC) Plastic Pipe
b) ASTM D 1248 - Specification for Corrugated Plastic Pipe

.6 Where specifications and reference documents conflict, the Owner or Owner's Landscape Architect shall make the final determination of applicable document.

### 1.3 Approved Products

.1 Pisa II Segmental Retaining Wall System as supplied by Unilock Ltd.

.2 Colour to be (see drawing)

## 1.4 The Contractor

.1 The term Contractor shall refer to the individual or firm who will be installing the retaining wall.

.2 The Contractor must have the necessary experience for the project and provide proof he has successfully completed projects of similar scope and size.

## 1.5 Delivery, Material Handling and Storage

.1 The installing contractor shall check all materials delivered to the site to ensure that the correct materials have been received and are in good condition.

.2 The Contractor shall store and handle all materials in accordance with manufacturer's recommendations and in a manner to prevent deterioration or damage due to moisture, temperature changes, contaminants, breaking, chipping or other causes.

## 1.6 Engineering Design and Certification

.1 The term Engineer shall refer to the individual or firm who has been retained by the Contractor to provide design and inspection services for the retaining wall. The Engineer must be qualified in the area of segmental retaining wall design and construction and must be licensed to practice engineering in the Province or State that the wall is to be constructed.

.2 The Engineer will perform the following tasks:

a) Produce sealed construction drawings and detailed design calculations, completed in accordance with the design requirements outlined in Part 3 of these specifications.
b) Review the site soil and geometric conditions to ensure the designed wall is compatible with the site prior to construction.
c) Inspect the site conditions, materials incorporated into the retaining wall, and the construction practices used during the construction.
d) Provide the Contractor with a letter after completion, certifying the design meets the requirements of this specification, the design was compatible with the site and the wall was constructed according to design.

## 1.7 Submittals

.1 The Contractor shall submit the following information for approval thirty (30) days prior to the construction of the segmental retaining wall.

a) Design Submittal - Provide three (3) sets of stamped construction drawings and detailed design calculations, completed and sealed by the Engineer in accordance with the design requirements outlined in Part 3 of this specification.
b) Materials Submittal - Manufacturer's certifications, stating that the SRW units and imported aggregates and soils meet the requirements of this specification and the Engineer's design.
c) Installer Qualifications - The Contractor must be able to demonstrate that their field construction supervisor has the necessary experience for the project by providing documentation showing that they have successfully completed projects of similar scope and size.

## 1.8 Measurement for Payment

.1 Payment for earthworks to prepare the site for the retaining wall are to be fixed and included in the unit price of the wall.

.2 Payment for the retaining wall system will be based on the contract price per face square metre of vertical wall face area as shown on the construction drawings. The vertical wall face area shall be measured from the top of the base or footing to the top of the coping course multiplied by the length of the wall. The contract unit price shall include the cost of all engineering, labour, materials, and equipment used to install the leveling base or spread footing, wall modules, drainage materials, retained soil and site cleanup. Additional items as directed and approved in writing by the Owner, or Owner's Landscape Architect, shall be paid for under a separate pay item.

# PART 2 - MATERIALS

## 2.1 Definitions

.1 Modular concrete retaining wall units are dry-cast solid concrete units that form the external facia of a modular unit retaining wall system.

.2 Coping units are the last course of concrete units used to finish the top of the wall.

.3 Retained soil is an in-situ soil or a specified soil that is placed behind the wall drainage material.

.4 Foundation soil is the in-situ soil beneath the wall structure.

.5 Drainage aggregate is a free draining soil with natural soil filtering capabilities, or a free draining soil wrapped in a geotextile, placed directly behind the modular concrete units.

.6 Drainage pipe is a perforated polyethylene pipe used to carry water, collected at the base of the retaining wall, to outlets in order to prevent pore water pressures from building up behind the wall facing modules.

.7 Non-woven geotextiles are permeable synthetic fabrics formed from a random arrangement of fibers in a planar structure. They allow the passage of water from one soil medium to another while preventing the migration of fine particles that might clog a drainage medium.

.8 All values stated in metric units shall be considered as accurate. Values in parenthesis stated in imperial units are the nominal equivalents.

## 2.2 Products

.1 Concrete Segmental Retaining Wall Units

a) The concrete wall modules shall be 150 x 200 x 300 mm (6 x 8 x 12 inches) with a maximum tolerance of plus or minus 3 mm (1/8 in.) for each dimension.
b) The retaining wall modules shall be solid units and have a minimum weight of 20.4kg (45 lbs.) per unit.
c) The concrete wall modules shall have an integral shear key connection that shall be offset to permit a minimum wall batter of 1 H : 8V.
d) The concrete wall modules shall have a minimum 28-day compressive strength of 35 MPa (5000 psi) as tested in accordance with ASTM C 140. The concrete shall have a maximum moisture absorption rate of 5 percent to ensure adequate freeze-thaw protection.

.2 Retained Soil

a) The retained soil shall be on site soils unless specified otherwise in the Construction Specifications or as directed by the Owner or Owner's Landscape Architect. If imported fill is required, it shall be examined and approved by the Engineer.

.3 Foundation Soil

a) The foundation soil shall be the native undisturbed on site soils compacted to 95% S.P.D. The foundation soil shall be examined and approval by the Contractor's Engineer prior to the placement of the base material.

.4 Leveling Base Material

a) The footing material shall be non-frost susceptible, well graded compacted crushed stone (GWUnified Soil Classification System), or a concrete leveling base, or as shown on the Construction Drawings,

.5 Drainage Soil

a) The drainage soil shall be a free draining angular granular material of uniform particle size smaller than 25 mm (1 in.) separated from the retained soil by a geotextile filter. The drainage soil shall be installed.

.6 Drainage Pipe

a) The drainage pipe shall be perforated corrugated HDPE or PVC pipe, with a minimum diameter of 100 mm (4 inches), protected by a geotextile filter to prevent the migration of soil particles into the pipe, or as specified on the construction drawings.

.7 Geotextile Filter

a) The non-woven geotextile shall be installed as specified on the construction drawings. Although selection of the appropriate geotextile specifications is site soil specific, a commonly used geotextile for filtration will have an Apparent Opening Size ranging between 0.149 and 0.210 mm (U.S. Sieve Sizes 100 to 70) and a minimum unit weight of 170 grams per square meter (5.0 oz /square yard). The coefficient of permeability will typically range between 0.4 and 0.6 cm/second (0.16 to 0.24 in./second).

.8 Concrete Adhesive

a) The adhesive is used to permanently secure the coping stone to the top course of the wall. The adhesive must provide sufficient strength and remain flexible. Each course shall receive adhesive.

## PART 3 - WALL DESIGN

### 3. 1 Design Standard

.1 The Contractor's Engineer is responsible for providing a design detail that shall consider the external stability and internal stability, including global stability, total and differential settlement, of the SRW system. The design life of the structure shall be 75 years unless otherwise specified in the construction drawings.

.2 The segmental retaining wall shall be designed in accordance with recommendations of the NCMA Design Manual for Segmental Retaining Walls Second Edition. The following is a summary of the minimum factors of safety for the various modes of failure evaluated in the proposed design.

External Stability

| | |
|---|---|
| Overturning | 1.5 |
| Bearing Capacity | 2.0 |
| Global Stability | 1.3 |

Internal stability

| | |
|---|---|
| Shear Capacity | 1.5 |

**3.2 Soil**

.1 Design parameters: Soil parameters shall be based on soil report

**3.3 Design Geometry**

.1 The length, height, and overall elevations of the retaining wall must comply with the requirements of the proposed elevation detail, station information and site grading plan.

.2 The structures' design height, H, shall be measured from the top of the leveling pad to the top of the wall where ground surface intercepts the wall facing.

.3 Slopes above and below all sections of the segmental retaining wall are detailed in the site grading plan.

.4 The minimum wall embedment shall be the greater of 1) the height of a SRW unit, 2) 150 mm (0.5 ft) or 3) the minimum embedment required because of the slope below the wall:

| Slope Below Wall | Minimum Embedment |
|---|---|
| Level | H/10 |
| 3 : 1 (18.4 deg) | H/10 |
| 2 : 1 (26.5 deg) | H/7 |

.5 The following surcharges shall be applied to the top of each design cross section based on the following proposed uses above the wall.

| Use Above Wall | Minimum Surcharge |
|---|---|
| No Traffic | 0 kPa (0 lb/sq. ft) |
| Light Traffic | 4.8 kPa (100 lb/sq. ft) |
| Heavy Traffic | 12.0 kPa (250 lb/sq. ft) |

**3.4 State of Stress**

.1 The lateral earth pressure to be resisted by the self weight of the retaining wall shall be calculated using the Coulomb coefficient of earth pressure, Ka, times the vertical stress at the base of the wall. The coefficient of active earth pressure, Ka, shall be used from the top to the bottom of the wall. The coefficient of active earth pressure, Ka, shall be assumed independent of all external loads except sloping fills. For sloping fills, the coefficient of active earth pressure, Ka, appropriate for the sloping condition, using Coulomb earth pressure shall be used in the analysis.

**3. 5 Inclination of Failure Surface**

.1 A Coulomb failure surface passing through the base of the wall behind the facing units up to the ground surface at or above the top of wall shall be assumed in design of walls.

**3.6 Settlement Control**

.1 It is the responsibility of the Contractor's Engineer to determine if the foundation soils will require special treatment to control total and differential settlement.

**3.7 Global Stability**

.1 It is the responsibility of the Contractor's Engineer to determine if further design considerations must be implemented to ensure adequate global/overall slope stability.

**PART 4 – CONSTRUCTION**

**4.1 Inspection**

.1 The Contractor's Engineer is responsible for verifying that the contractor meets all the requirements of the specification. This includes the use of approved materials and their proper installation.

.2 The Contractor's field construction supervisor shall have demonstrated experience and be qualified to direct all work related to the retaining wall construction.

**4. 2 Construction Tolerances**

.1 The following tolerances are the maximum allowable deviation from the planned construction,
Vertical Control: +/ 1.25 inches over a 10 ft distance, +/ 3 inches total
Horizontal Control: +/ 1.25 inches over a 10 ft distance, +/ 3 inches total
Rotation: +/¬2 degrees from planned wall batter Bulging: 1.0 inch over a 10 ft distance

**4.3 Site Preparation**

.1 The foundation soil shall be excavated or filled as required to the grades and dimensions shown on the Construction Drawings or as directed by the Owner or Owner's Representative.

.2 The foundation soil shall be proof rolled and compacted to 95% S.P.D. and examined by the Engineer to ensure that it meets the minimum strength requirements according to the design assumptions. If unacceptable foundation soil is encountered, the contractor shall excavate the affected areas and replace with suitable quality material under the direction of the Landscape Architect.

.3 In cut situations, the native soil shall be excavated to the lines and grades shown on the Construction Drawings and removed from the site or stockpiled for reuse as retained soil.

**4.4 Installing Drainage System**

.1 The approved non-woven geotextile shall be set against the back of the first retaining wall unit, over the prepared foundation, and extend towards the back of the excavation, up the

excavation face and back over the top of the drainage material to the retaining wall, or as shown in the Construction Drawings.

.2 The drainage pipe shall be placed behind the leveling base, or lower course of facing units as shown in the Construction Drawings or as directed by the Engineer. The pipe shall be laid at a minimum gradient of 2% to ensure adequate drainage to free outlets.

.3 T - Sections and outlet pipes shall be installed on the drainage pipe at 15 m centers or as shown on the Construction Drawings.

.4 The remaining length of geotextile shall be pulled taut and pinned over the face of the retained soil. Geotextile overlaps shall be a minimum of 300 mm (1 ft.) and shall be shingled down the face of the excavation in order to prevent the infiltration of retained soil into the drainage layer.

## 4.5 Leveling Base or Spread Footing Placement

.1 The leveling base material shall be crushed stone compacted to 98% Standard Proctor Density, or vibrated concrete along the grades and dimensions shown on the Construction Drawings or as directed by the Engineer.

The minimum thickness of the leveling base shall be 150 mm (6 inches)

## 4.6 Installation of Modular Concrete Retaining Wall Units

.1 The bottom row of retaining wall modules shall be placed on the prepared leveling base as shown on the Construction Drawings. Care shall be taken to ensure that the wall modules are aligned properly, leveled from side to side and front to back and are in complete contact with the base material.

.2 The wall modules above the bottom course shall be placed such that the tongue and grove arrangement provides the design batter (i.e. setback) of the wall face. Successive courses shall be placed to create a running bond pattern with the edge of all units being approximately aligned with the middle of the unit in the course below it.

.3 The wall modules shall be swept clean before placing additional levels to ensure that no dirt, concrete or other foreign materials become lodged between successive lifts of the wall modules.

.4 A maximum of 4 courses of wall units can be placed above the level of the drainage material at any time.

.5 The contractor shall check the level of wall modules with each lift to ensure that no gaps are formed between successive lifts.

.6 Care shall be taken to ensure that the wall are not broken or damaged during handling and placement.

## 4.7 Drainage Soil

.1 The drainage soil will be placed behind the retaining wall modules with a minimum width of 300mm (1 ft.) and separated from other soils using the approved non-woven geotextile.

.2 Drainage soil shall be placed behind the wall facing in maximum lifts of 6 inches and compacted to a minimum density of 95% Standard Proctor.

.3 No heavy compaction equipment shall be allowed within 1 metre (3 ft.) of the back of the wall facia.

**4.8 Retained Soil**

.1 Retained soils shall be placed and compacted behind the drainage material in maximum lift thickness of 150 mm (6 inches). The retained soils shall be undisturbed native material or engineered fill compacted to a minimum density of 95% Standard Proctor.

.2 No heavy compaction equipment shall be allowed within 1 m (3 ft.) of the back of the wall modules.

**4.9 Finishing Wall**

.1 Items 4.05 to 4.08 shall be repeated until the grades indicated on the Construction Drawings are achieved.

.2 Coping units shall be secured to the top of the wall with two 10mm (3/8 inch) beads of the approved flexible concrete adhesive positioned 50mm (2 inches) in front and behind the tongue of the last course of retaining wall units.

.3 Finish grading above the wall to direct surface run off water away from the segmental retaining wall. Use a soil with a low permeability to restrict the rate of water infiltration into the retaining wall structure.

**End of Section**

## 0PART I - GENERAL

### 1.1. Description

.1 The work covered by this section includes the furnishing of all labour, materials, equipment and incidentals for inspection and placement of sod over topsoil as shown on the Construction Drawings and as described by the Contract Specifications.

.2 Comply with all requirements of the General Requirements – Section 01 00 00.

### 1.3. Quality Assurance

.1 The contractor must have 5 years experience in sodding work.

### 1.4. Product, Delivery, Storage and Handling

.1 Deliver sod to site within 24 hours of being harvested and lay sod within 48 hours thereafter, depending on suitable weather conditions and in accordance with good horticultural practice.

.2 Small irregular or broken pieces of sod will not be accepted.

.3 Prevent sod from drying out on site.

### 1.5. Sample

.1 Complete the installation of one sample panel of sod of a minimum 25 $m^2$ (one side minimum 2.0m) and have inspected and approved by the Contract Administrator prior to proceeding with the balance of sodding operations. All other work shall conform to this approved sample.

### 1.6. Soil Testing

.1 If required by the Contract Administrator, the soil shall be tested for N, P, K and minor element values, soluble salt contents, organic matter content, and pH value.

.2 If required by the Contract Administrator, in-situ soil shall be tested for compaction levels with a soil compaction meter (penetrometer) in pounds-per-square-inch (psi).

.3 Arrange for, and assume all costs for such testing. Testing shall be carried out by a reputable firm, approved by the Contract Administrator.

.4 The contractor shall submit the soil analysis report to the Contract Administrator prior to the commencement of the works. When the source of such topsoil is exhausted, topsoil from a new source shall not be used until it is tested, and approved by the Contract Administrator.

### 1.7. Inspection

.1 The Contractor shall verify that the final site grades are in accordance with the grading plan. Obtain the approval of the Contract Administrator of the finished topsoil surface before proceeding with sodding.

.2 The Contractor shall give timely notice, in writing, that all work has been completed and maintenance period is to begin.

## 1.8. Acceptance

.1 Maintain sod in good condition until acceptance.

.2 At the time of acceptance, the grass must not be more than 50mm high. Minimum acceptable cut height is 45mm. All sod must have a healthy and even stand of grass, free of thin, poor or burned-out patches.

.3 Acceptance will be given when the sod is properly rooted, free of bare and dead spots and reasonably free of weeds in the opinion of the Contract Administrator.

.4 Acceptance will not be given if the topsoil and/or sod layer are excessively compacted (compaction exceeding 200 PSI).

.5 Replace any deteriorated sod with new sod at the direction of the Contract Administrator.

.6 The Contractor is responsible for a minimum of one cut of grass or as many cuts as required until acceptance.

## 1.9. Guarantee

.1 Submit written guarantee that all sodding shall be guaranteed for a period of one (1) year commencing on the date of acceptance of substantial performance.

.2 During the guarantee period, the Contractor shall make monthly inspections and replace all sod which is dead, or is not in a healthy vigorous growing condition.

.3 Soil testing for N, P, K and minor element values, soluble salt contents, organic matter content, pH value and compaction shall be conducted if issues with sod growth and/or health are widespread or persistent. Arrange for, and assume all costs for such testing. Testing shall be carried out by a reputable firm, approved by the Contract Administrator. Perform remedial actions as recommended by the soil testing results and approved by the Contract Administrator.

# PART II - PRODUCTS

## 2.1. Materials

.1 Grass sod: Certified No.1 grade cultivated turf grass sod with a composition of 50% Kentucky Blue Grass and 50% Blue Cultivar either “Fylking” or “Baron” or as specified on the drawings, grown and sold in accordance with NSGA classifications. At the time of sale it must have a strong, fibrous root system and be free of stones and burned or bare spots. Damaged and broken pieces shall not be laid and shall be removed from the site immediately.

.2 Sod pegs: 25mm x 25mm x 230mm (minimum length). Ensure pegs are long enough to securely anchor sod.

.3 Topsoil: a fertile, friable, natural loam; containing not less than 4% organic matter for clay loams and not less than 2% organic matter for sandy loams to a maximum of 15%. Topsoil must be capable of sustaining vigorous plant growth, free of subsoil contamination, roots and stones over 25mm diameter, reasonably free of weeds (as determined by the Contract Administrator), and having a pH ranging from 6.0 to 7.5.

## PART III - EXECUTION

### 3.1. Preparation

.1 Rototill all areas that are to receive new sod. Cultivate to a minimum depth of 100mm. Remove all rocks, roots and grass or weed clumps from the surface.

.2 Compact surface to 85% Standard Proctor Dry Density.

.3 Scarify to a depth of 25mm before placing additional topsoil or sod.

### 3.2. Spreading of Topsoil

.1 Spread dry topsoil during dry weather over approved, dry, unfrozen subgrade where sod is to be installed.

.2 Keep topsoil 25mm below finished grade for sodded areas.

.3 Fine grade topsoil eliminating rough and low areas and to ensure positive drainage.

.4 Roll topsoil with a 50 kg roller to compact and retain surface. Finished depth of prepared, compacted topsoil to be minimum 150mm. Do not overcompact soil.

.4 Provide a finished topsoil surface that is smooth and firm against footprints with a fine, loose texture before sod is placed. Topsoil level shall not be compacted beyond 200 PSI.

### 3.3. Installation

.1 Lay sod with tight butt joints. Do not leave any open joints or overlap adjacent pieces of sod. Alternate joints on each row of sod.

.2 Ensure finished sod surface is flush with adjoining grass areas, pavement or top surface of curbs.

.3 On slopes steeper than 4:1, lay sod perpendicular to the slope and peg each row at intervals of not more than 600mm on each side of the sod strip. Drive pegs flush with surface of sod.

.4 Immediately after installation, water the sod with sufficient quantity of water to penetrate the sod and the top 50mm of the underlying topsoil.

.5 Apply 8-32-16 slow release commercial fertilizer at the rate of 22 kg per 1000 square metres.

.6 When sod has dried sufficiently to prevent damage, roll all sodded areas to ensure a good bond between sod and topsoil. Imperfections in the surface should be corrected prior to the laying of the sod and not by rolling with a heavy roller.

.7 Protect all newly sodded areas with warning signs or barricades.

### 3.4. Protection after Completion

.1 Assume full responsibility for protection of all sodded areas from all sources until performance acceptance.

.2 Erect protective barriers and post signs where necessary and maintain same until performance acceptance.

.3 Remedy all damages, wash-outs and eroded areas resulting from weather, improper protection, excessive compaction, or other causes.

**3.5. Clean Up**

.1 The Contractor must leave the site in a neat and orderly condition upon completion of work on a daily basis, all to the satisfaction of the Contract Administrator.

**End of Section**

## PART I - GENERAL

**1.0.**

This sections specifies requirements for constructing new, adjusting and sealing over existing outfall structures manholes and catch basins as indicated or as directed.

Some related sections are Excavating Trenching and Backfilling; Storm Sewers; Sub-drains' Sanitary Sewers. Coordinate and, if required, insert appropriate sections in 1.1 Related Work below.

### 1.2. Material Certification

*SPEC NOTE*: Delete 1.2 if Engineer's / Landscape Architect's inspection is deemed sufficient quality control.

.1 At least [4] weeks prior to commencing work, submit manufacturer's test data and certification that materials meet requirements of this section. Include manufacturer's drawings, information and shop drawings where pertinent.

### 1.3. Measurement for Payment

*SPEC NOTE* Coordinate payment clauses with Section 31 20 00 Earthwork, Site Excavation, Backfilling, Grading

.1 Outfall Structures will be measured in units.

.2 Adjusting tops of existing manholes or catch basins will be measured by count.

.3 Grating will be measured in units supplied [and installed].

## PART II - PRODUCTS

### 2.1. Materials

.1 Concrete:

.1 To selection [02614 Concrete]

.2 Concrete mix design to product [21] MPa minimum compressive strength at 28d and containing [25] mm maximum size course aggregate, with water/cement ratio to CAN3-A23.1-M77, table 7 for class [A] exposure and [_____] mm slump at time and point of deposit. Air entrainment to CAN3-A23.1-M77, table [8] for class [A] exposure.

.3 Precast manhole sections; to MSTM C478M-84, circular or oval. Top sections eccentric cone or flat slab top type with opening offset for vertical ladder installations. [Monolithic bases to be approved and set on concrete slabs cast in place].

.4 Precast catch basin sections: to [ASTM C139-73 (1979)], [ASTM C478-84].
Re 2.1.5. Check local requirements.

.5 Mortar:

.1 Aggregate: to CSA A82.56-M1976.

.2 Cement: to CAN3-A8-N83

.6 Ladder rungs: to CSA G30.12-M1977, No 23M billet steel deformed bars, hit dipped galvanized to CSA G164-M1981. Rungs to be safety pattern (drop step type).

.7 Adjusting rings: to ASTM C478M-84

.8 Concrete Brick: to [CSA A165.2-1972].

.9 Drop manhole pipe: to be same as sewer pipe.

.10 Galvanized iron sheet: to be approximately 2mm thick.

.11 Steel gratings, I-beams and fasteners: as indicted.

*SPEC NOTE*: Delete or modify 2.1.14 to suit project.

.12 Frames, gratings, covers to plan dimensions and following requirements:

.1 Metal gratings and covers to bear evenly on frames. A frame with grating or cover to constitute one unit. Assemble and mark unit components before shipment.

.2 Gray iron castings to ASTM A48-83, strength class [30B]

.3 Castings to be [coated with two applications of asphalt varnish] sand blasted or cleaned and ground to eliminate surface imperfections.

.4 Manhole frames and covers: in accordance with the Town/City Standard.

## PART III - EXECUTION

### 3.1. Excavation and Backfill

.1 Excavate and backfill in accordance with Section [31 20 00 Earthwork, Site Excavation, Excavating Trenching and Backfilling].

.2 Obtain approval of [Landscape Architect] before installing outfall structures, manholes or catch basins.

### 3.2. Concrete Work

.1 Do concrete work in accordance with Section 03 00 00 - Concrete

.2 Position metal inserts in accordance with dimensions and details indicated.

### 3.3. Installation

.1 Construct units in accordance with details indicated, plumb and true to alignment and grade.

.2 Complete units as pipe laying progresses. Maximum of [three] units behind point of pipe laying will be allowed.

.3 Pump excavation free of standing water and remove soft and foreign material before placing concrete base.

.4 Cast bottom slabs directly on undisturbed ground, set precast concrete base on 150 mm minimum of well compacted granular material].

.5 For precast units:

.1 Set bottom section of precast unit in bed of cement motar and bond to concrete slab or base. Make each successive joint watertight with approved, cement motar.

.2 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.

.3 Plug lifting holes with [precast] concrete plugs set in cement mortar.

.6 For sewers:

.1 Place stub outlets and bulkheads at elevations and in positions indicated.

.2 Bench to provide a smooth U-shaped channel. Side height of channel to be [0.75 times] [full] diameter of sewer. Slope adjacent floor at [1 on 10]. Curve channels smoothly. Slope invert to establish sewer grade.

.7 Installing units in existing systems:

.1 Where a new unit is to be installed in an existing run of pipe, ensure full support of existing pipe during installation, [and carefully remove that portion of existing pipe to dimensions required] and install new unit as specified.

.2 Make joints watertight between new unit and existing pipe.

.3 Where deemed expedient to maintain service around existing pipes and when systems constructed under this project are ready to be put in operation, complete installation with appropriate break-outs removals, redirection of flows, blocking unused pipes or other necessary work.

.8 Set frame and cover to required elevation on no more that [4] courses of brick. Make brick joints and join brick to frame with cement mortar, parge and make smooth and watertight.

.9 Clean units of debris and foreign materials. Remove fins and sharp projections. Prevent debris from entering system.

.10 Install safety platforms in manholes of depth of [5]m or greater, as indicated.

## 3.3. Leakage Test

.1 Install watertight plugs or seals on inlets and outlets of each new [sanitary sewer] manhole and fill manhole with water. Leakage not to exceed 0.3% per hour of volume of manhole.

.2 If permissable leakage is exceeded, correct defects. Repeat until acceptable.

.3 Landscape Architect will issue Test. Certificate for each manhole passing test.

**End of Section**

## PART I – GENERAL

### 1.1. Scope of Work

.1 This section specifies requirements for sub-drains including perforated and non-perforated flexible P.V.C., and manhole/catch basin connections.

### 1.2. Materials

.1 Granular Backfill as required except under sand play areas, concrete curbing and pavement:

Clean, hard, durable uncoated particles, free from clay lumps, cementation, organic and other objectionable material, meeting the following gradation limits:

| ASTM Designation | | % Passing |
|---|---|---|
| 50.0 | mm | 100 |
| 31.5 | mm | 60 - 100 |
| 16.0 | mm | 40 - 100 |
| 4.75 | mm | 25 - 60 |
| 2.0 | mm | 20 - 45 |
| 0.425 | mm | 10 - 25 |
| 0.075 | mm | 0 - 10 |

.2 Common Backfill

Approved material selected from trench excavation or other source, unfrozen and free from cinders, ashes, sod, refuse or other deleterious materials, and with the natural water content within 90% of the optimum value for the Proctor compaction specified, based on the native soil which is being used for backfill.

.3 PVC Pipe

Drainage pipe shall be 100 mm to 150 mm diameter flexible, Poly Vinyl Chloride (PVC), C.S.A. approved as per drawings. All fittings, and connections shall be PVC. Material density shall be minimum accordance to ASTM method D1505 / D1928. When the above PVC is to be perforated, it shall be installed with holes facing down, with Filter Cloth tubing as manufactured by National Sewer Pipe or approved equal.

.4 Filter Bedding Material under sand play areas and in trench with perforated PVC to be hard, durable particles of clear, natural, aggregate limestone of 10 mm diameter size and no fines.

.5 Filter Sock:

.1 Synthetic filter: rot proof, unaffected by action of oil or salt water and not subject to attack by insects or rodents. Terrafix Type 370R or approved equal.

.2 Fabric: woven construction supplied as continuous tube of 100 mm diameter.

.3 Seams: sewn in accordance with manufacturer's recommendations.

### 1.3. Trenching

.1 Select shortest distance for sub-drains to existing sewer systems as shown on the drawings, avoiding all existing features such as trees, fences and other structures.

.2 Do not place bedding filter material prior to approval of excavation by the Landscape Architect.

.3 Excavate to achieve minimum percent slope of pipe as shown on the drawings.

.4 Notify Landscape Architect if soil at proposed elevation of trench bottom appears unsuitable for foundation of installation. Remove unsuitable material from trench bottom as directed by Landscape Architect.

.5 Unless otherwise authorized by Landscape Architect in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation. Fence off any open excavations to protect public.

.6 Stockpile suitable excavated materials required for trench backfill in approved location within site limits.

.7 Dispose of unsuitable or surplus material off site.

## 1.4. Backfilling

.1 Do not proceed with trench backfilling operations until Landscape Architect has inspected and approved installations.

.2 Use approved common or granular backfill material as indicated on the drawings.

.3 Backfilling around installations:

a) Place bedding and surround material as noted on drawings;

b) Place layers simultaneously on both sides of installed work to equalize loading;

c) Place material by hand under, around and over installations until required cover is provided. Dumping material directly on installations will not be permitted.

.4 Do not place backfill in freezing weather without prior approval of Landscape Architect.

.5 Place backfill material in uniform layers not exceeding 300 mm in thickness up to sub-grade elevation or top of trench. Compact each layer before placing succeeding layer.

.6 Compact trench bottom and backfill materials:

a) In pavement areas, to a density at least equal to density of adjacent, undisturbed soil;

b) Under sand in play areas to 85% Standard Proctor Density;

c) In pavement areas, compact to a minimum of 98% Standard Proctor Density.

.7 Compact using approved mechanical tamping devices, or by hand tamping to achieve specified compaction.

## 1.5. Pipe Installation

.1 Excavations require inspection and approval prior to commencement of installation operations.

.2 Lay drains on prepared bed, true to line and grade with inverts smooth and free of sags or high points. Ensure barrel or each pipe is in contact with bed throughout full length.

.3 Commence laying at outlet and proceed in upstream direction.

.4 Lay perforated pipes with perforations downwards.

.5 Lay bell and spigot pipe with bell ends facing upstream.

.6 Weld joints of PVC pipe according to manufacturer's instructions.

.7 Make joints tight in accordance with manufacturer's instructions.

.8 Do not allow water to flow through pipes during construction.

.9 Make watertight connections to existing drains or catch basins where indicated and arrange for inspection by the Landscape Architect prior to backfilling.

.10 Plug open upstream ends of pipes with watertight concrete, steel or P.V.C. bulkheads.

.11 Surround pipe with filter sock and granular / filter material and compact as specified.

.12 Protect sub-drain against flotation during installation.

## 1.6. Connections to Municipal Facilities

.1 Connect sub-drains and catch basins to Municipal storm sewer system where indicated on the drawings. Arrange for inspection by Municipal Public Works Department and receive approval prior to backfilling.

## 1.7. Restoration

.1 Reinstate pavements and sodded areas to condition and elevation which existed before trenching to satisfaction of the Landscape Architect.

**End of Section**