

GORES LANDING WHARF REHABILITATION

Landscape Construction Specifications

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EXCAVATION, BACKFILL & SITE GRADING SPECIFICATION

PART ONE GENERAL

1.01 GENERAL REQUIREMENTS:

- A. The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.
- B. All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting.

1.02 SCOPE OF WORK:

- A. Excavation, backfill and site grading for this Work includes but is not necessarily limited to the following:
 - 1. Stripping and disposal off-site of native topsoil that is surplus or has been indicated by the Owner to be undesirable.
 - 2. All required excavation.
 - 3. Stockpiling and reuse of on-site fill material approved by the Owner.
 - 4. Disposal off-site of cut material that is surplus or has been indicated by the Owner to be undesirable.
 - 5. Supplying imported topsoil and granular materials as well as trucking them to the site.
 - 6. Filling, backfilling and compacting granular materials, amended native topsoil or imported topsoil to attain indicated final grades.

1.03 SOURCE OF FILL:

- A. The Owner must approve the soils and granular materials for use. If testing is required, it is to be paid for by the Contractor.

1.04 DISPOSAL OF EXCAVATED MATERIALS:

- A. All excavated sub-grade material generated by construction, may be used as fill on-site unless otherwise rejected by the Owner, in which case it is to be disposed of legally off-site at a location determined and paid for by the Contractor.
- B. All surplus sub-grade material generated by construction and not required to attain indicated final grades is to be disposed of legally off-site at a location determined and paid for by the Contractor.

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- C. Any required testing of excavated material to be disposed of off-site shall be arranged and paid for by the Contractor.

1.05 INSPECTIONS AND TESTING:

- A. The Contractor shall carry out inspection and testing of the Work of this Section, and provide documentation of such testing to the Owner in accordance with the General Conditions.
- B. The Contractor shall provide washed sieve gradation analysis for all aggregates and granular materials to be used in accordance with MTO Laboratory Testing Manual Section LS-602 and related standards.
- C. The Contractor shall carry out field inspections and compaction testing of all compacted sub-grade and base materials in accordance with MTO Laboratory Testing Manual Section LS-623 and related standards.
- D. The Contractor shall maintain a record showing the location and result of inspections and testing conducted. These records shall be submitted to the Owner when requested, or prior to proceeding with work that depends upon the work of this Section.

PART TWO PRODUCTS

2.01 SOIL, GRANULAR & BACKFILL MATERIALS:

- A. Granular 'A' and 'B': All structural backfill material shall be manufactured granular crushed from reclaimed concrete material (RCM) or limestone rock, described as Granular 'A' and Granular 'B', conforming to the requirements of Ontario Provincial Standard Specification OPSS-MUNI 1010, "Material Specifications for Aggregates - Granular A, B, M and Select Subgrade Material".
- B. Fill Material: Selected material from excavation or other sources, approved by the Owner for use intended, unfrozen and free from rocks larger than 75mm, cinders, ashes, sods, refuse, contaminants or other deleterious materials.
- C. 19mm (or 20mm) **crushed stone ("crusher run")** shall be clean, durable, angular crushed gravel or stone conforming to the following limits:

<u>Sieve Designation</u>	<u>% Passing</u>
19.0mm	100%
4.75mm	40-80%
2.36mm	27-65%
600µm	12-35%

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- D. 19mm (or 20mm) **clear stone** shall be clean, durable, angular crushed gravel or stone conforming to the following limits:

<u>Sieve Designation</u>	<u>% Passing</u>
19.0mm	100%
4.75mm	2%

OTHER MATERIALS:

- A. All other materials not specifically described but required for a complete installation, shall be selected by the Contractor, subject to the Owner's review.
- B. Geotextile: Terrafix 270R or equal.
- C. **Biaxial geogrid shall be TBX1500 by Terrafix, or equal.**

PART THREE EXECUTION

3.01 REMOVAL OF TOPSOIL:

- A. Remove all topsoil from areas to be excavated or regraded. Strip topsoil when it is dry enough to prevent contamination with sub-grade material.
- B. Do not handle topsoil in wet or frozen condition.
- C. Stockpile any available topsoil on-site where directed. Piles shall not exceed 2000mm in height.

3.02 EXCAVATION:

- A. Provide, install and maintain adequate fences and barricades.
- B. Excavate to lines, grades, elevations and dimensions indicated on the Drawings.
- C. Remove concrete, masonry, rubble and other obstructions encountered during excavation and dispose of legally off-site.
- D. Excavation required within proximity of underground utility lines or within the dripline of trees designated to remain are to be made by hand.
- E. Excavation must not interfere with normal 45° plane of bearing from the bottom of any footing.

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- F. Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic material.

3.03 DEWATERING:

- A. Keep excavations free of water while Work is in progress.
- B. Avoid excavation below groundwater table if quick condition or heave is likely to occur. Prevent piping or bottom heave of excavations by groundwater lowering, or other means.
- C. Protect open excavations against flooding and damage due to surface run-off.
- D. Dispose of accumulated water in a manner not detrimental to public and private property, or any portion of Work completed or under construction.
- E. Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers.

3.04 OVER-EXCAVATION:

- A. Where excavations are made below the indicated intended elevations, backfill with lean concrete, unshrinkable fill, crushed stone or granular material as directed by the Owner. Compact to provide a firm, unyielding sub-grade at no additional cost to the Owner.

3.05 BACKFILL:

- A. Do not place, spread or compact any backfill materials during unfavourable weather. Unfavourable weather includes temperatures below 0°C and/or precipitation.
- B. Do not commence any backfill operation without adequate compaction equipment.
- C. Protect the site of the backfilling and storage of backfill materials from freezing.
- D. Prior to placing backfill, scarify the sub-grade surface to a depth of 50mm.

3.06 COMPACTION:

- A. Conform to OPSS-MUNI 501 "Construction Specification for Compaction."

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- B. All layers of backfill material shall be compacted to not less than the minimum density specified. The Contractor is not to proceed until approval of compaction has been granted.
 - 1. Granular 'B' backfill and native material shall be compacted to 98% standard proctor dry density in layers not exceeding 225 mm thickness.
 - 2. Granular 'A' backfill shall be compacted to 98% standard proctor dry density in layers not exceeding 150 mm thickness.
- C. For all backfill material, bring to the moisture content that will permit proper compaction.
- D. For all granular material, bring to the moisture content of plus or minus 2% of optimum moisture content.
- E. Optimum moisture content shall be determined for each type of material to be compacted in accordance with ASTM Designation D-1557, latest revision.
- F. Compaction equipment selected by Contractor is subject to Owner's review.

3.07 STORAGE AND STOCKPILING OF MATERIALS:

- A. Stockpiled and imported materials to be stored away from existing trees, drainage areas and access points.

3.08 SITE GRADING:

- A. Conform to OPSS-MUNI 206 "Construction Specification for Grading."
- B. Perform all rough and finish grading and backfilling required to achieve the finished elevations indicated on the Drawings.
- C. Ensure that the finished ground slopes are as indicated on the Drawings.
- D. Re-grade all areas that retain or pond water.
- E. All areas shall be rough graded within a tolerance of plus or minus 50mm.

END OF SECTION

FINE GRADING & TOPSOIL SPECIFICATION

PART ONE GENERAL

1.01 GENERAL REQUIREMENTS:

- A. The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.
- B. All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting, rolling or settling.

1.02 SCOPE OF WORK:

- A. Perform topsoil installation and finish grading work as shown and specified, including supply of all materials, labour and equipment required, and disposal of all surplus or unsatisfactory materials.

1.03 SOURCE QUALITY CONTROL:

- A. The Contractor, at his own discretion, may use either imported or amended on-site topsoil, providing that all requirements of this specification are met.
- B. Inform Owner of proposed source of topsoil to be supplied arrange for inspection and testing. Acceptance of topsoil is subject to inspection and/or soil analysis test results. Do not commence Work until topsoil is accepted by the Owner.
- C. Test topsoil from the source prior to stripping and stockpiling, for nitrogen, phosphorous, potassium, and magnesium levels, soluble salt content, pH value, growth inhibitors and soil sterilants. Test results shall include clear recommendations for any required amendments or fertilizers.
- D. Inspection and testing of topsoil will be carried out by testing laboratory approved by Owner and paid for by the Contractor.
- E. The Contractor shall provide delivery slips on which the following shall be recorded: supplier, serial number of slip, date, truck number, Contractor, project, topsoil composition and volume of topsoil delivered to site.

FINE GRADING & TOPSOIL SPECIFICATION

PART TWO PRODUCTS

2.01 TOPSOIL:

A. Imported Topsoil:

- 1. Loam soil such as “triple mix” with a friable texture, and consisting of neither a heavy clay nor a very light sand.**
- 2. Soil pH values between 6 and 7.5 are preferred; however pH values up to 8.0 will be accepted.**
- 3. Topsoil is to be free of subsoil, roots, debris, toxic materials and stones over 50 mm in diameter.**
- 4. Topsoil containing seeds or roots of noxious weeds are unacceptable.**

B. Amended, On-Site Topsoil:

1. Amended on-site topsoil may be used provided it meets the requirements outlined above for imported topsoil, as verified by agronomic testing.

PART THREE EXECUTION

3.01 PREPARATION OF EXISTING GRADES:

- A. Grade native or sub-grade soils, eliminating uneven areas and low spots, ensuring positive drainage. Dispose of removed materials as directed by the Owner.
- B. After rough grading, scarify and cultivate entire area that is to receive topsoil to a depth of 50mm. Repeat cultivation in those areas where equipment used for hauling and spreading has compacted soil.
- C. Remove surface debris, roots, vegetation branches and stones in excess of 50mm in diameter.

3.02 SPREADING OF TOPSOIL MIX:

- A. Spread topsoil after Owner has approved sub-grade and topsoil mix.
- B. Spread topsoil with adequate moisture in uniform layers over approved, unfrozen sub-grade, where seeding or sodding are indicated. Refer to Section 02950 Planting Specification for soil requirements in other planting areas.

FINE GRADING & TOPSOIL SPECIFICATION

C. The Contractor shall uniformly spread topsoil to the following settled depths in such a manner that the final level shall conform to the required grades:

1. All turf areas: 150mm

3.03 WEED CONTROL:

- A. Allow weed seeds in spread soil to germinate.
- B. Eradicate first growth of weeds by hand or through mechanical methods only.

3.04 FINISH GRADING:

- A. Fine grade and loosen topsoil. Eliminate rough spots and low areas to ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.
- B. Roll to consolidate topsoil for areas to be sodded leaving surface smooth, uniform, and firm against deep foot printing and with a fine loose texture to approval of the Owner.

3.05 SURPLUS MATERIAL:

- A. Dispose of all surplus materials legally off-site.

END OF SECTION

UNIT PAVING SPECIFICATION

PART ONE GENERAL

1.01 GENERAL REQUIREMENTS:

- A. The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.
- B. All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting.

1.02 SCOPE OF WORK:

- A. The Work under this item shall include furnishing all equipment, labour, materials and services to supply and install precast concrete unit pavers on granular base, as shown on the drawings and specified herein.

1.03 INSPECTIONS AND TESTING:

- A. The Contractor shall provide washed sieve gradation analysis for all aggregates and granular materials to be used in accordance with MTO Laboratory Testing Manual Section LS-602 and related standards.
- B. Retain an independent testing agency to carry out inspection and testing of the Work of this Section, and provide documentation of such testing to the Owner in accordance with the General Conditions.
- C. Testing will include field inspections and compaction testing of all compacted sub-grade and base materials in accordance with MTO Laboratory Testing Manual Section LS-623 and related standards.
- D. The Contractor shall maintain a record showing the location and result of inspections and testing conducted.
- E. Passing test results must be obtained prior to proceeding with work that depends upon the work of this Section.

1.04 PAYMENT:

- A. Payment for concrete unit pavers shall include, but is not limited to, supply and installation of the concrete unit pavers, including all materials and labour required for a complete installation, and any guarantees.

UNIT PAVING SPECIFICATION

PART TWO PRODUCTS

2.01 BASE MATERIALS:

- A. Granular base material for shall be Granular 'A' in accordance with the requirements of Section 02200, Excavation, Backfill & Site Grading. Granular base material shall installed to the depth and compaction indicated on the drawings.
- B. Do not re-use existing granular base materials unless directed by the Owner.

2.02 BEDDING & JOINTING SAND:

- A. The bedding and jointing sands shall be natural or manufactured materials, clean, non-plastic, and free from deleterious or foreign matter.
- B. Bedding Sand: "concrete sand" meeting ASTM C-33, conforming to the following gradation:

Sieve Size	Percent Passing
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (600 µm)	25 to 60
No. 50 (300 µm)	10 to 30
No. 100 (150 µm)	2 to 10

- C. Jointing Sand: meeting ASTM C-144, conforming to the following gradation:

	Natural Sand	Manufactured Sand
Sieve Size	Percent Passing	Percent Passing
No. 4 (4.75 mm)	100	100
No. 8 (2.36 mm)	95 - 100	95 to 100
No. 16 (1.18 mm)	70 - 100	70 to 100
No. 30 (600 µm)	40 - 75	40 to 75
No. 50 (300 µm)	10 - 35	20 to 40
No. 100 (150 µm)	2 - 15	10 to 25
No. 200 (75 µm)	0	0 to 10

- D. Polymeric sand shall not be used.
- E. **Biaxial geogrid shall be TBX1500 by Terrafix, or equal.**

UNIT PAVING SPECIFICATION

2.03 UNIT PAVERS:

A. General requirements:

1. **Physical Properties:** The units shall comply with A.S.T.M. Specification C-936-01 and C.S.A. Standard CAN3-A231.3-M.
2. **Texture and Size:** All concrete unit pavers to be of uniform in size and texture, unless otherwise noted. Units having imperfections, chipped edges or cracks beyond the accepted weathered finish range shall be rejected.
3. **Tolerances and Dimensions:** Dimensions of pavers shall not differ from the size requirements by more than +/- 1.6 mm in length and width and +/- 3.2 mm in height.
4. **Compressive Strength:** The average compressive strength of the paving units shall not be less than 55 MPa with no individual unit less than 50 MPa when tested in accordance with A.S.T.M. Method C-140 and C.S.A. Standard CAN3-A231.3-M.
5. **Water Absorption:** The average absorption of the units shall not be greater than 5% with no individual unit greater than 7% as required by the A.S.T.M. Method C-140.
6. **Resistance to Freezing and Thawing:** When tested in accordance with C.S.A. Standard CAN3-A 231.3-M, the average weight loss of three full size pavers, subjected to 50 freeze/thaw cycles, while immersed in a 3% sodium chloride solution, shall not exceed 1% of initial dry weight.

B. Pavers to be the following:

1. **Re-use salvaged existing pavers found to be in suitable condition.**
2. **Any new pavers required shall be selected to match the existing pavers as closely as possible.**

C. Any proposed substitution of pavers must be approved by the Owner.

2.04 PAVER EDGE RESTRAINT:

- A. Unit pavers in lawn or garden areas shall be installed complete with edge restraint.
- B. Edge restraint shall be aluminum "Snap-Edge" as manufactured by Snap-Edge Canada Inc., 1-800-720-SNAP(7627), <http://www.snapedge.ca>.

UNIT PAVING SPECIFICATION

PART THREE EXECUTION

3.01 INSTALLATION OF UNIT PAVERS:

- A. The Contractor is to ensure that the sub-grade has been approved by the Owner prior to placing base materials.
- B. The bedding sand shall be placed on a sub-base, as specified in the details. The sand bedding shall be spread loose in a uniform layer. The thickness of sand bedding following compaction shall be as required to meet the dimensioned elevations indicated on the drawings. The spread sand shall be carefully maintained in a loose condition and protected against pre-compaction.
- C. Pavers shall be placed on a screened sand bed in the designated laying pattern. Paving units shall be laid hand-tight such that all joints are correctly aligned. Then, the pavers shall be tamped down and made level with a mechanical vibrator to true grade and free of any movement. As soon as possible after compaction, all joints between pavers shall be filled by sweeping in dry, sharp sand and sprinkling with water to ensure compaction of sand in joints.
- D. The edges and ends of the pavement shall have pavers with straight edges. Where paving units require trimming, they shall be cut with a sharp masonry saw to give a clean, straight edge.
- E. Where required, edge restraints shall be installed as specified, in accordance with the manufacturer's instructions.
- F. Any units structurally damaged during compaction shall be immediately removed and replaced.

3.02 CROSSFALL:

- A. The crossfall on concrete unit paving shall be minimum 2 percent, unless otherwise specified.

3.03 TESTING GRADE:

- A. After installation, grades shall be checked with straight edge and any unevenness shall be taken out and made true to the grade, level and cross-section. Any imperfection exceeding 3mm per 3m shall be corrected.

END OF SECTION

ROUGH CARPENTRY SPECIFICATION

PART ONE GENERAL

1.01 GENERAL REQUIREMENTS:

- A. The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.02 SCOPE OF WORK:

- A. This specification covers the requirements for the construction of wooden bench tops, and the repair of an existing wooden gazebo.

1.03 QUALITY ASSURANCE:

- A. Single-source assurance: obtain each type of wood product from one source and by a single producer.

1.04 1.4 DELIVERY, STORAGE & HANDLING:

- A. Materials shall not be delivered before they are required for proper conduct of the work.
- B. Deliver wood products bundled or crated to provide adequate protection during transit and job storage, with required grade marks clearly identifiable. Inspect wood products for damage upon delivery. Remove and replace damaged materials.
- C. Keep materials under cover and dry, both in transit and on the site. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks, and under temporary coverings. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.
- D. Protect work from damage during storage, handling, installation and until the work is turned over to the Owner. Make good damage and loss without additional expense to the Owner.

PART TWO PRODUCTS

2.01 LUMBER: GENERAL

- A. **FOR WOODEN BENCH TOPS: All visible lumber shall be White or Red Cedar. No mixing of species will be accepted.**

ROUGH CARPENTRY SPECIFICATION

- B. **FOR WOODEN BENCH TOPS: All hidden structural lumber shall be pressure-treated SPF lumber.**
- C. **FOR Gazebo Repairs: All lumber for gazebo repairs shall conform to the grade and species present on the existing gazebo.**
- D. Lumber Grading shall conform to the National Lumber Grades Authority (NLGA) Standard for Grading Rules for Canadian Lumber.
 - i. **All lumber shall be "SELECT STRUCTURAL" grade except as noted below.**
 - ii. **All cedar for seating shall be "SELECT PATIO."**
 - iii. **All lumber for gazebo repairs shall conform to the grade and species present on the existing gazebo.**
- E. Grade Stamps: Provide lumber with each piece factory-marked with grade stamp(s) of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing and mill.
- F. Where nominal sizes are indicated, provide actual sizes as required by NLGA for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
- G. Provide dressed lumber, surfaced four sides (S4S), unless otherwise indicated.
- H. Provide dry lumber with 19% maximum moisture content at time of dressing for 50mm-or-less nominal size, unless otherwise indicated.

2.02 HARDWARE AND ACCESSORIES:

- A. Nails, screws, anchors and specialized fastening devices required for the erection of rough carpentry shall be galvanized and conform to CSA Standards B111 and B34.
- B. Metal components shall be fabricated in accordance with section 05720.

2.03 FINISHES:

- A. Wooden bench tops shall not be provided with any stain, oil, or other coating.
- B. The repaired gazebo, including all existing exposed lumber shall be cleaned and stained with 2 even coats of clear, environmentally-friendly wood stain from Penofin Verde or approved equal.

ROUGH CARPENTRY SPECIFICATION

PART THREE EXECUTION

3.01 GENERAL:

- A. Execute work using skilled workers according to best practice, as specified herein and indicated on drawings.
- B. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.
- D. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated.

3.02 HARDWARE AND ACCESSORIES:

- A. Work shall include hardware such as nails, bolts, nuts, washers, screws, hangers, connectors, hinges, operating hardware, or any other hardware required for a complete and functioning installation.
- B. All connections and fastenings shall be made in accordance with reviewed shop drawings.

3.03 SURFACE-APPLIED PRESERVATIVES:

- A. Treat surfaces of material with wood preservative before installation. Apply preservative after materials have been cut and fit to size. To cut end two coats of preservative shall be applied.
- B. Apply preservative by dipping, or by brush or spray to completely saturate and maintain wet film on surface for a minimum 3 minute soak on lumber.
- C. Retreat surfaces exposed by cutting, trimming or boring with 2 coats of brush application of preservative before installation.

ROUGH CARPENTRY SPECIFICATION

3.04 ADJUSTING & CLEANING:

- A. Damaged surfaces shall be repaired to the Owner's satisfaction prior to final acceptance of the work.
- B. Any damages to galvanized metal shall be touched-up immediately following installation and shall be done using brush-on, zinc-based coatings.
- C. The Contractor shall provide the labour, supplies and equipment as necessary for final cleaning of surface and installed items;
- D. Continuously clear the site of all extraneous materials, rubbish, or debris and leave the site in a clean, safe, well draining, neat condition.

END OF SECTION

SITE FURNISHINGS SPECIFICATION

PART ONE GENERAL

1.01 GENERAL REQUIREMENTS:

- A. The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.02 SCOPE OF WORK:

- A. Supply and install all labour and materials for the installation of site furnishings and associated work, as shown on the Drawings and as specified herein, including:
- NEW ACCESSIBLE PARK PICNIC TABLES AND NEW PERMANENT WASTE BINS
 - GRANITE BOULDERS
 - TACTILE WALKING SURFACE INDICATORS

1.03 SUBMITTALS:

- A. Submit manufacturer's data sheets in accordance with Division 1, prior to delivery to the site of any furnishings or associated equipment or materials.

1.04 PAYMENT:

- A. Payment for the site furnishings will be lump sum at the bid price including all accessories required for a complete installation. Payment will be full compensation for all labour, material and equipment to complete the work, including the supply and installation of concrete works for mounting of site furnishings.
- where pricing for benches and tables notes inclusion of a concrete sleepers or pad, it shall also be included in the price full price paid for the item.

PART TWO PRODUCTS:

2.01 NEW ACCESSIBLE PARK PICNIC TABLES AND NEW PERMANENT WASTE BINS

- A. ACCESSIBLE PARK PICNIC TABLES shall be 'MLPT-201-S-PC-WCA' as manufactured by Maglin.
- Slats shall be 100% recycled plastic in "Brown" colour.
 - Metal components shall be standard gloss finish in "titanium" colour.
 - All hardware shall be stainless steel.

SITE FURNISHINGS SPECIFICATION

- B. NEW PAERMANENT WASTE BINS shall be 'MLWR 600-32' as manufactured by Maglin.
- Lid shall be "standard"
 - standard gloss finish in "titanium" colour.
 - All hardware shall be stainless steel.
- C. SUPPLIER CONTACT INFO:
- i. Maglin, 27 Bysham Drive, Woodstock, ON N4T 1P1, Phone: 1.800.716.5506, www.maglin.com,

2.02 GRANITE BOULDERS MATERIALS:

- A. Landscape Boulders shall consist of existing boulders found on-site and new boulders approximately matching.
- B. Boulders shall be rounded granite stones; free of sharp edges and of a consistent light to medium-grey, speckled colour.
- C. Provide boulders in the quantities as shown on the drawings and in sizes approximately 500 mm to 1,000 mm width, and 300mm to 500 mm height. Refer to drawings for approximate size distribution desired.
- D. The Contractor shall submit photos showing typical examples of the selected stones prior to delivering to the site.

2.03 TACTILE WALKING SURFACE INDICATORS - MATERIALS:

- A. **Tactile walking surface indicators** shall be "Detectable Warning Plates" Manufactured by Neenah Foundry Company, or equal. Contact Crozier Enterprises, tel: 416.662.8151; brian.bekkers@crozier.ca. The Contractor is responsible for calculating the number and shapes of plates required to execute the design as shown on the drawings. Any fasteners or accessories required shall be provided in accordance with the manufacturer's recommendations.
- B. Concrete beds for tactile walking surface indicators shall conform to section 03300.

SITE FURNISHINGS SPECIFICATION

PART THREE EXECUTION

3.01 NEW ACCESSIBLE PARK PICNIC TABLES AND NEW PERMANENT WASTE BINS INSTALLATION:

- A. Tables and waste bins shall be assembled as instructed by the manufacturer.
- B. Tables and waste bins shall be installed on concrete pavement or sleepers as shown on the drawings, then levelled and fastened in accordance with the drawings and Specification Section 03300-Concrete Works Specification.
- C. Use only stainless steel anchoring hardware, as provided by the manufacturer and non-shrink grout per Section 03300 where required, or stainless steel, self-tapping bolts, all to the satisfaction of the Owner.

3.02 GRANITE BOULDERS - INSTALLATION:

- A. The granite boulders will be installed in approximate locations and arrangements indicated on the drawings. Contact the Owner to verify location and position for all boulders prior to or during installation.
- B. Boulders will be set on or within existing sub-soils used to shape the required grades; they shall be placed during the grading works.
- C. Boulders shall be founded on level bottoms and positioned for aesthetic effect.

3.03 TACTILE WALKING SURFACE INDICATORS - INSTALLATION:

- A. Install all exterior stair accessibility features to comply with AODA requirements, and according to manufacturer's instructions and the drawings.
- B. Prepare concrete bases for tactile walking surfaces contiguously with concrete pavement, and in accordance with section 03300 and the drawings.

3.04 TOUCH-UP

- A. Touch up and repair any damaged materials or finishes in accordance with manufacturers printed instructions or to the Owner's satisfaction.

END OF SECTION

SODDING SPECIFICATION

PART ONE GENERAL

1.01 GENERAL REQUIREMENTS:

- A. The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.
- B. Conform to the City of Toronto Specifications for Sodding TS 5.00.
- C. Comply with *Canada Fertilizers Act* R.S.,c. F-9 s.1 and *Canada Fertilizers Regulations*.
- D. Comply with the *City of Toronto Pesticide By-law* (Chapter 612).
- E. All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting.

1.02 SCOPE OF WORK:

- A. Supply, lay and maintain turf grass nursery sod as shown.

1.03 ACCEPTANCE:

- A. The Contractor is to be responsible for the protection and care of all completed sodding for a period of up to the time of acceptance by the Owner.
- B. Acceptance is conditional upon the establishment of sodded areas; weed free without bare or dead spots, with no surface soil visible when grass is cut to a height of 50mm. Lawns sodded in the fall may not be accepted until the following spring, one month after the start of the growing season.

1.04 DELIVERY, STORAGE AND HANDLING:

- A. Schedule deliveries in order to keep storage at Site to minimum without causing delays.
- B. Deliver, unload and store sod on pallets.
- C. Deliver sod to Site within 24 hours of being lifted and lay sod within 36 hours of being lifted.
- D. Prevent sod from drying out during dry weather.

SODDING SPECIFICATION

1.05 SCHEDULING:

- A. Schedule placing of topsoil, finish grading and sodding to suit Site conditions and requirements of this Section.

PART TWO PRODUCTS

2.01 SOD:

- A. Sod for general lawn reinstatement and sod plugs to be No. 1 Kentucky bluegrass sod grown predominantly from seed of a minimum of three cultivars of Kentucky bluegrass. At time of sale, the sod should contain not less than 50% Kentucky bluegrass cultivars licensed for sale in Canada by the Canadian Department of Agriculture. The sod should contain 20-30% perennial rye and 20-30% fescue. Mosses and clovers shall not be apparent in the turf and no more than 2 broadleaf weeds or 10 other weeds per 40 square metres shall be present. Sod is to be of sufficient density that no surface soil will be visible if mowed to a height of 30mm.
- B. The mowing height limit is to be 60mm and not more than one half of the blade is to be cut at any one mowing. The sod is to be in a good, healthy, weed-free condition with no sign of decay, and contain sufficient moisture to maintain its vitality during transportation and placing. Sod may be rolled to facilitate handling and transportation and is to be in width not less than 300mm nor more than 450mm, in length not less than 350mm nor more than 1800mm, in thickness not less than 25mm. Sod is to be of such a size and condition that each may be lifted and handled without breaking or tearing and without loss of soil.

2.01 TOPSOIL:

- A. Refer to Section 02212 - Fine Grading & Topsoil

PART THREE EXECUTION

3.01 PREPARATION:

- A. Refer to Section 02212 - Fine Grading & Topsoil

3.02 FERTILIZING:

- A. Refer to Section 02212 - Fine Grading & Topsoil for fertilizer requirements.
- B. Apply approved fertilizer before sodding.

SODDING SPECIFICATION

3.04 WEED CONTROL:

- A. Allow weed seeds in spread topsoil to germinate.
- B. Eradicate first growth of weeds by hand or through mechanical methods only.

3.05 SODDING:

- A. Obtain review of finish grading and sod before sodding.
- B. Lay sod during growing season.
- C. Lay sod in rows, perpendicular to slope, smooth and even with adjoining areas, and with joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp knife.
- D. Provide close contact between sod and soil with 50kg roller of minimum 900mm width. Ensure finished surface is even and without bumps or low spots. Heavy rolling to correct irregularities in grade is not permitted.
- E. Use spade to provide sharp clean edge at depth of 100mm between sodded areas and planting beds and/or individual trees.
- F. Water thoroughly immediately after sodding. Moisture penetration through sod shall be uniform, to a minimum depth of 100mm throughout.
- G. Provide adequate protection of sodded areas against erosion and mechanical damage. Remove protection after lawn areas have been accepted.

3.06 MAINTENANCE:

- A. Maintenance period for sodded areas shall be from date of installation for a minimum of 30 days or until acceptance of the Work. Sod will be accepted only when all sodded areas are fully established.
- B. Water sodded areas in sufficient quantities to produce healthy growth and at required frequency to maintain topsoil continuously moist to a depth of 100mm until acceptance.
- C. Mow grass when it reaches a height of 75mm and cut to 50mm. Remove clippings. Repeat as necessary and as specified herein until acceptance.
- D. Trim grass edges around planting beds, building walls, light standards, signs and trees in neat lines conforming to original layout.

SODDING SPECIFICATION

- E. Pickup debris, papers, excess construction materials and / or other materials from sodded areas and remove from Site.
- F. Remove weeds in sodded areas by hand or through mechanical methods only. Apply approved herbicide to control weeds only with written permission of the Owner. Apply in accordance with manufacturer's printed directions.
- G. Make good grass not properly established or washed out by repairing soil and re-sodding at no extra cost.
- H. Sodded areas shall have uniform, close, dense grass with no more than 2 broadleaf weeds and 10 other weeds per 40m².

END OF SECTION

PLANTING SPECIFICATION

PART ONE GENERAL

1.01 GENERAL REQUIREMENTS:

- A. The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.
- B. All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting.

1.02 RELATED WORK:

- A. Section 02200 - Excavation, Backfill and Site Grading.

1.03 SCOPE OF WORK:

- A. Supply, planting and care of specified trees, shrubs, grasses, and perennials.

1.04 QUALITY ASSURANCE:

- A. The Work of this Section to be executed only by a subcontractor who has adequate facilities, equipment, and skilled supervisors and tradesmen to perform the work expeditiously, and is known to have been responsible for satisfactory installations similar to that specified during a period of at least 5 years.
- B. Plant material:
 - 1. Make arrangements for approval of plant material at source by the Owner at a time mutually agreed upon.
 - 2. Prior approval shall not invalidate rejection of stock at later inspection at site should it prove defective, damaged or substandard.
- C. All plants shall conform to the varieties specified in the plant list and be legibly tagged with their proper name and size. No substitutions will be accepted without written approval by the Owner.

1.05 SUBMITTALS:

- A. Affidavits: Submit affidavits to certify that manufactured or processed materials supplied in bulk meet specified requirements.
- B. Maintenance Instructions: Submit instructions on maintenance procedures to be followed after end of specified maintenance period.
- C. Submit samples of mulch to Owner for approval before installation.

PLANTING SPECIFICATION

1.06 DELIVERY, STORAGE AND HANDLING:

- A. Co-ordinate shipping of plants and excavation of planting pits to ensure minimum time lapse between digging and planting.
- B. All materials shall be inspected by the Contractor for damage in transit. No defective material shall be delivered to the site. Material subsequently damaged shall be removed from the site immediately
- C. Wrap or tie branches of trees securely and protect plant material against abrasion, exposure and extreme temperatures during transit. Avoid binding of planting stock with rope or wire that would damage bark, break branches or destroy the natural shape of plant. Give full support to root ball of large trees during lifting. No plant will be accepted when the ball of earth surrounding its roots has been severely cracked or broken prior to or during planting.
- D. Keep root systems moist and protected from sun and wind at all times prior to planting. If storage longer than 48 hours is necessary, plant material shall be heeled-in immediately using sandy loam soil. Contractor shall be responsible for all necessary watering and maintenance to preserve the stock in good condition.
- E. Cover plant foliage with tarpaulin, and protect bare roots by means of dampened peat moss, or other acceptable material, to prevent loss of moisture during transit and storage.
- F. Remove broken and damaged roots with sharp pruning secateurs following accepted horticultural practices. Make clean cuts.
- G. Label manufactured, processed or otherwise prepared materials that are packaged to indicate manufacturer, contents, weight, and a detailed description of the material. If delivered in bulk, submit affidavits giving information required as specified for labels and certifying that materials meet specified requirements. Store and protect fertilizer, limestone, bone meal, mulching materials and similar products to prevent damage from moisture.

1.07 JOB CONDITIONS:

- A. Installation of Work of this Section shall be done under weather conditions and in suitable growth season for each specified material, and as approved by Owner.
- B. Do not install plant materials when ambient temperatures may drop below 2-degrees Celsius or rise above 32-degrees Celsius.

PLANTING SPECIFICATION

1.08 WARRANTY:

- A. The Contractor shall agree to guarantee to replace and replant any plant material found dead or in poor condition within 1 year of the date of Substantial Performance of the Contract, without cost to the Owner. "Poor condition" shall be interpreted as meaning plant material on which the branches are dead or dying, or which have not shown satisfactory growth of leaves in the judgement of the Owner. Plant material shall be alive and exhibit vigorous growth at the end of the guarantee period.
- B. The Contractor shall not be held responsible for plant material destroyed by vandalism after acceptance by the Owner.
- C. All required replacements shall be made at the next planting season and replacements of all unsatisfactory trees, shrubs and perennials are to continue, with all costs borne by the Contractor, until the specified numbers planted are satisfactory and complete.
- D. All replacements shall be plants of the same size and variety as specified, unless otherwise directed by the Owner. The Owner shall be the sole judge in case of dispute regarding responsibility for replacement of plant material

PART TWO PRODUCTS

2.01 PLANTING MATERIALS:

- A. Water: Potable and free of minerals or impurities that may be detrimental to plant growth.
- B. Mulch: Shredded pine bark mulch, natural colour, available from Gro-Bark Organics, or approved equal.
- C. Bone Meal: Raw, commercial, finely ground and with a minimum content of 4% nitrogen and 20% phosphoric acid.
- D. Fertilizer: Supply complete, commercial fertilizers from approved manufacturer, in accordance with the results of the attached soil analysis.

PLANTING SPECIFICATION

2.02 PLANTING SOIL:

- A. Inform Owner of proposed source of planting soil to be supplied and allow sufficient lead time to arrange for inspection and testing. Acceptance of topsoil is subject to inspection and soil analysis test results. Do not commence Work until planting soil is accepted by the Owner.
- B. Test planting soil from the source, prior to stripping and stockpiling, for soil texture, nitrogen, phosphorous, potassium, and magnesium levels, soluble salt content, pH value, growth inhibitors and soil sterilants. Test results shall include clear recommendations for any required amendments or fertilizers.
- C. Inspection and testing of planting soil will be carried out by testing laboratory approved by Owner and paid for by the Owner. If multiple tests are required to meet soil specification, they will be carried out at the discretion of the Owner, who will be responsible for the cost of those tests.
- D. The Contractor shall provide delivery slips on which the following shall be recorded: supplier, serial number of slip, date, truck number, Contractor, project, topsoil composition and volume of planting soil delivered to site.
- E. **PLANTING SOIL COMPONENTS:**
 1. Imported Planting Soil: Sandy loam with a friable texture consisting of neither heavy clay nor very light sand, to consist of approximately 50-60% sand, 20-40% silt, 6-10% clay, and 2-4% organic material, with pH value less than 7.5.
 2. Sandy loam to be free of subsoil, roots, debris, toxic materials and stones over 50 mm in diameter. Sandy loam containing seeds or roots of noxious weeds is unacceptable.
 3. Amended, On-Site Topsoil may be used as an alternative to imported planting soil:
 - The Owner shall arrange and pay for sampling and testing of topsoil, as indicated above.
 - Amendment of on-site topsoil in accordance with recommendations of the testing agency is the responsibility of the Contractor. The cost of such amendment shall be borne by the Contractor, to the satisfaction of the Owner.
 4. Manure: Cattle (cow or sheep), composted / aged minimum three years and free of weeds or other living vegetation.

PLANTING SPECIFICATION

5. Compost: to consist of equal amounts carbon-rich and nitrogen-rich organic material. Compost to be free of subsoil, roots, debris, toxic materials and stones over 50 mm in diameter. Compost containing seeds or roots of noxious weeds is unacceptable.

F. SOIL FOR TREE PLANTING IN SOD AREAS:

1. Where "continuous planting trench" is specified, adhere to the requirements for "imported planting soil," above.
2. Where no "continuous planting trench" is required, backfill with amended native soil.

2.03 PLANT MATERIAL:

- A. Quality and Source: Comply with Canadian Standards for Nursery Stock, Latest Edition of Canadian Nursery Trades Association referring to size and development of plant material and root ball. Measure plants when branches are in their natural position, finish grade to top of main body of plant. Height and spread dimensions refer to main body of plant and not from branch tip to branch tip. Use trees of No.1 grade.
- B. All plants shall have been grown in Canada or in the north eastern United States and be hardy within the Canadian Plant Hardiness Zone 5a. Plant materials obtained from areas with milder climatic conditions from those of the site are not acceptable.
- C. Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system and densely foliated. Plant material shall have been root pruned regularly, but not later than one growing season prior to arrival on site
- D. Trees: with straight trunks, well and characteristically branched for species. Trees of each species are to be of a consistent form.
- E. Large trees shall have been half root pruned during each of two successive growing seasons, the latter at least one growing season prior to arrival on-site.
- F. Container-grown stock: Trees must have been grown in a container for a minimum of one growing season but not longer than two seasons. Root system must be able to "hold" soil when removed from container. Plants that have become root-bound are not acceptable. Container stock shall have been fertilized with slow release fertilizer.

PLANTING SPECIFICATION

- G. Measurement: For standard shade trees, the relationship between caliper, overall height, branching height, minimum number of branches in the head, and minimum root spread are indicated in Table 1. For each caliper size specified, the allowed variation in height is indicated in Table 1 beside the caliper size. Caliper takes precedence over height. Caliper is measured not less than 150mm above the ground or bud union (graft) for trees up to 100mm and 300 mm above ground level for trees larger than 100mm caliper. Trees shall meet or exceed the minimum size indicated on the Plant List.

TABLE NO.1
MINIMUM SIZES FOR STANDARD SHADE TREES

Specified Caliper (mm)	Overall Min. Height (m)	No. Min. Branches in Head	Min. Ball Branching Height (m)	*Min. Ball Diameter (cm)	Depth (cm)
40	3.00-3.50	8	1.75	60	45
45	3.25-3.75	9	1.75	65	45
50	3.50-4.00	10	1.75	70	50
60	3.75-4.25	11	2.00	75	50
70	4.00-4.50	13	2.00	80	50
80	4.25-5.00	14	2.00	90	55
90	4.50-5.00	15	2.00	95	55
100	5.00-6.00	15	2.00	100	60

* Root ball sizes must be increased if necessary in order that at least 75% of the fibrous root system can be contained within the root ball.

- H. Plants larger than specified will be accepted without liability to extra charges if approved by the Owner, and they meet all specified requirements for their size.
- I. "Collected plants", those dug from native stands, wood lots, orchards or neglected nurseries, and having received no cultural maintenance, will not be accepted unless approved by the Owner.
- J. Plant varieties required for Project are specified in plant schedules on the drawings. In case of discrepancy in quantity between the plant schedule and the drawing, the drawing shall take precedence.

PART THREE EXECUTION

3.01 GENERAL:

- A. Co-ordinate operations. Keep site clean and planting pits drained. Immediately remove soil or debris spilled into planting pits.

PLANTING SPECIFICATION

3.02 PLANTING TIME:

- A. All stock shall be dug while dormant.
- B. Plant deciduous bare root plant material during dormant periods, before leaf emergence and after leaf drop (typically April to mid-May, mid-September to late November), unless otherwise directed by the Owner.
- C. Plants noted on the Plant List for spring planting only must be moved while dormant and must be planted between April 1 and May 15 only.

3.03 EXCAVATION AND PREPARATION OF PLANTING BEDS:

- A. Establishment of sub-grade for planting beds: as specified in Section 02200 - Excavation, Backfill and Site Grading.
- B. The Contractor is responsible for verifying the locations of all utilities and for taking adequate precautions against any damage to them. In the event of damaging any utilities, the Contractor shall make or pay for any required repairs to the satisfaction of the utility company, at no extra cost to the Owner.
- C. For individual planting holes:
 - 1. Stake locations and obtain approval from Owner prior to excavating. Final placement of trees, shrubs and perennials to be approved by Owner prior to pit or planting bed excavation.
 - 2. Excavate to depth and extent as indicated on drawings.
 - 3. Scarify sides of planting hole.
 - 4. Crack soil beyond the planting pit with a spade inserted to the depth of the blade in a pattern radiating from the centre of the pit to 3 times the diameter of the root ball to allow trees roots easy access beyond the root ball.
 - 5. Remove water which enters excavations prior to planting. Notify Owner if water source is ground water.
- D. Apply bone meal to planting beds, tree pits and planters at manufacturer's rate and specifications. Mix bone meal into soil just before planting, but not when frozen or muddy. Do not stockpile more than two days
- E. When planting in late fall or early spring, prevent freezing of bottom of plant pits.
- F. Fertilizer, in accordance with soil analysis, shall be applied during the final operation of fine grading, but not earlier than one week prior to planting.

PLANTING SPECIFICATION

- G. Provide drainage for planting pits in heavy soil if natural drainage does not exist. Have method approved by Owner.

3.04 PREPARATION OF TREE PLANTING AREAS (SEE PREVIOUS):

- A. Grade native or sub-grade soils, eliminating uneven areas and low spots, ensuring positive drainage. Dispose of removed materials as directed by Owner.
- B. After rough grading, scarify and cultivate area for continuous tree pit planting as indicated on the Drawings. Repeat cultivation in those areas where equipment used for hauling and spreading has compacted soil.
- C. Remove surface debris, roots, vegetation, branches and stones in excess of 50mm in diameter.
- D. Shrub planting areas indicated on the Drawings to be planted in lawn areas may be prepared in accordance with these requirements.

3.05 PLANTING OF SHRUBS, PERENNIALS, GRASSES AND VINES IN GARDEN BEDS:

- A. Plant only under conditions that are conducive to the good health and physical condition of the plants.
- B. Grade sub-grade soils, eliminating uneven areas and low spots, ensuring positive drainage. Remove soil contaminated with toxic materials. Dispose of removed materials as directed by Owner.
- C. Spread planting soil after Owner has approved sub-grade and soil mix.
- D. Spread soil with adequate moisture in uniform layers over approved, unfrozen sub-grade, where planting is indicated.
- E. The Contractor shall uniformly spread soil mix in the planting beds to a minimum of 450mm settled depth.
- F. Ensure that plants are moist before removing from containers. Dried out root balls are unacceptable.
- G. Remove plants from containers and loosen sides and bottoms of root balls.
- H. Remove dead and broken stems, leaves and flowers.

PLANTING SPECIFICATION

- I. Fill planting holes with water. After water has completely penetrated into soil, complete planting and backfilling.
- J. Plant perennials and grasses vertically. Set plants with the top of root ball at level with the top of soil in garden beds.
- K. Tamp soil lightly around root system to eliminate air voids.
- L. Water until garden beds are fully saturated.
- M. Apply mulch as specified and as indicated on the Drawings.

3.06 PLANTING OF TREES:

- A. Plant only under conditions that are conducive to the good health and physical condition of the plants.
- B. After planting pit is dug, break up the smooth finish on the sides of the hole with a pick or shovel. Provide vertical fissures approximately 50mm deep, spaced 200 to 300mm around entire circumference of planting pit.
- C. Loosen bottom of planting pit to depth of 150 to 200mm.
- D. Plant trees vertically with roots placed straight out in planting pit. Flush cut broken or frayed root ends with clean, sharp pruning secateurs. Orient plant material to give best appearance in relation to roads, walks and views by site users.
- E. Balled and burlapped root balls: Loosen burlap and cut away at a minimum the top one half without disturbing root ball. Do not remove burlap from under the root ball.
- F. Container stock: Remove entire container without disturbing root ball. All wrapping must be removed.
- G. Frozen root ball material is not acceptable.
- H. Tamp native soil or sandy loam around root system in layers of 150mm to eliminate air voids. Frozen or saturated planting soil is unacceptable. When two thirds of planting soil has been placed, fill hole with water. After water has completely penetrated into soil, complete backfilling.
- I. Apply mulch as specified and as indicated on the Drawings.

PLANTING SPECIFICATION

- J. Shrub material indicated on the Drawings to be planted in lawn areas may be planted in accordance with these requirements.

3.07 WEED CONTROL:

- A. Allow weed seeds in spread soil to germinate.
- B. Eradicate first growth of annual weeds by hand or through mechanical methods only.
- C. Eradicate first growth of biennial weeds (in second growing season) by hand or through mechanical methods only.

3.08 TREE SUPPORT:

- A. Staking: Do not stake unless directed by the Owner.

3.09 PRUNING:

- A. Postpone pruning of those trees where heavy bleeding may occur until in full leaf. Employ clean sharp tools and make cuts flush with main branch, smooth and sloping as to prevent accumulation of water. Remove projecting stumps on trunks or main branches. Remove dead and injured branches and branches that rub causing damage to bark. Trim out crown of trees without changing their natural shape.
- B. Do not damage lead branches or remove smaller twigs along main branches.
- C. Pruning is to be carried out by an individual knowledgeable and experienced in accepted horticultural practices.

3.10 MULCHING:

- A. Provide a uniform layer of specified mulch 100mm deep around all new trees (formed in a saucer) and 75mm in all other garden beds.
- B. Ensure soil settlement has been corrected prior to mulching, and that ground is not frozen prior to mulching.

3.11 SURPLUS MATERIAL:

- A. Legally dispose of surplus plant and plant materials off-site, as directed by Owner.

PLANTING SPECIFICATION

3.12 MAINTENANCE DURING ESTABLISHMENT PERIOD:

- A. The Contractor is responsible for maintaining all plant material in a healthy, viable condition from the time each plant is planted up to the time written acceptance is issued for substantial performance.
- B. Maintenance by Contractor during the construction period will include all necessary measures to establish and maintain plants in a healthy, vigorous growing condition and to keep planting areas neat and free of weeds.
- C. The Contractor is to perform regular inspections of the plant material for the length of the warranty period. A site inspection report is to be provided to the Owner outlining any issues that exist impacting the health/quality/warranty of the plant material.
- D. All plants will be free of diseases and insect infestations and in a healthy, vigorous growing condition. Planting areas shall be free of weeds and freshly cultivated, at time of substantial performance.
- E. Maintenance of trees and shrubs in a healthy, viable condition consists of:
 - 1. Regular inspections.
 - 2. Watering of plant material: to be completed by hand or by use of the installed irrigation system, where applicable.
 - 3. Keep planting beds and tree saucer areas free of garbage, weeds and any debris that may adversely affect plant growth.
 - 4. Any pruning necessary, in accordance with accepted arboricultural standards.
 - 5. Replacement of mulch as required to maintain 100mm depth.
 - 6. Application of necessary approved pesticides for disease and insect control as necessary. Any use of chemicals for the control of weeds, insects and disease must be approved by the Owner/Owner and meet jurisdictional laws.
- F. Maintenance of perennials and grasses in a healthy, viable condition consists of:
 - 1. Regular inspections.
 - 2. Watering of plant material: to be completed by hand or by use of the installed irrigation system, where applicable.
 - 3. Keep planting beds free of garbage, weeds and any debris that may adversely affect plant growth.
 - 4. Removal of dead or broken stems, leaves and flowers as necessary.
 - 5. Replacement of mulch as required to maintain 75mm depth.

PLANTING SPECIFICATION

6. Application of necessary approved pesticides for disease and insect control as necessary. Any use of chemicals for the control of weeds, insects and disease must be approved by the Owner/Owner and meet jurisdictional laws.

3.13 ACCEPTANCE, ADJUSTMENT AND REPLACEMENT:

- A. Plant material will be accepted by Owner after planting operation is completed provided that plant material exhibits healthy growing condition and is free from disease, insects and fungal organisms.
- B. Plant material installed less than 30 days prior to frost and / or when leaves are not present, will be accepted in following spring, after at least 30 days after start of growing season provided that acceptance conditions are fulfilled.
- C. Plant material will be inspected at the time of final, and again at termination of warranty period.
- D. Commencement of 1 YEAR guarantee period is predicated on written acceptance by the Owner of work of this Section.
- E. Adjustment and replacement work shall be performed as specified in this Section with materials of same size, variety and quality of material replaced.
- F. Replacement work shall be done under an additional guarantee of the same length and conditions as described in this Specification. It shall date from time of Owner's approval of replacement work.
- G. Replace plant stock that in the opinion of the Owner is dead, or not in satisfactory growing state, or does not meet specification requirements. Remove dead stock immediately. Replace stock at proper time during planting season. At the discretion of the Owner unacceptable plant material may be left, its guarantee period extended, and again inspected next planting season. At this time, Owner will decide if replacement will be made and the guarantee extended accordingly.
- H. If settlement occurs after acceptance, the Contractor may be responsible for re-grading and re-planting.

END OF SECTION

CONCRETE WORKS SPECIFICATION

PART ONE GENERAL

1.01 GENERAL REQUIREMENTS:

- A. The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.
- B. All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting.

1.02 SCOPE OF WORK:

- A. Furnish Portland cement poured-in-place concrete pavement and footings as required and/or as indicated on Drawings and specified herein.

1.03 QUALITY ASSURANCE:

- A. Subcontractor Qualifications: Subcontractor performing this Work shall have adequate equipment for project, and skilled trades people so that Work is performed expeditiously; and is known to have been responsible for satisfactory installations similar to that specified during a period of at least the previous 2 years.
- B. Reference Standards: The following reference standards shall govern Work of this Section, except where they are in conflict with requirements imposed herein, in which case the latter shall govern. Standards referenced in CAN3-A23.1 are not repeated in the following list:
 - 1. CSA Standard CAN3-A23.1, Concrete Materials and Methods of Concrete Construction.
 - 2. CSA Standard CAN3-A23.2, Methods of Testing for Concrete.
 - 3. Contractor shall obtain a copy of CSA Standards CAN3-A23.1 and CAN3-A23.2 and maintain on-site.
- C. The Contractor is to retain an independent testing agency to provide quality assurance testing of concrete materials and to verify that the concrete has been installed in conformance with the specifications. The testing agency must be approved by the Owner prior to being retained. Laboratory facilities and field technicians are to be certified by the Canadian Standards Association (CSA).
- D. Allowable Tolerances:
 - 1. Grade base courses with surfaces within 13mm of established elevations and within a tolerance of 13mm under a 3000mm long straight edge.

CONCRETE WORKS SPECIFICATION

2. Install all concrete features to within +/-5mm of indicated finished elevations or as approved by the Owner.

E. Design of Falsework / Formwork:

1. Assume full responsibility for complete structural design and construction of falsework / formwork in accordance with CSA Standards S269.1 / S269.3-M
2. Requirements of Regulatory Agencies: Conform to local regulations, including construction safety regulations.

1.04 SITE CONDITIONS:

- A. Environmental Requirements: Commence placing and perform compaction of granular base courses when sub-grade temperature is at least 2° Celsius and rising.
- B. Provide protection to maintain concrete continuously moist during curing period.
- C. Provide same specified protection for storage of each concrete compression specimen as for concrete from which it was taken, until it is sent to testing laboratory.
- D. Concrete shall be placed in the dry.

1.05 PROTECTION:

- A. Prevent damage to adjacent buildings, wall surfaces, and pavements scheduled to remain.
- B. Keep all traffic off this Work until materials have cured and reached design strength. Because of the public nature of this Work, a 24-hour guard following critical pours may be required.
- C. Protect concrete surfaces exposed to view from grease, oil and other soil that will affect appearance of concrete.
- D. Protect formwork to prevent functional damage and damage to faces affecting appearance of concrete surfaces exposed to view.
- E. Protect concrete from cold temperatures. Provide insulation and/or heat as required.

CONCRETE WORKS SPECIFICATION

1.06 BARRIERS AND LIGHTS:

- A. The Contractor shall erect and maintain such barriers and lights as will effectively prevent any accident on the site. The Contractor shall be liable for all damages occasioned in any way by their acts or neglect or that of his agents, employees or workers.

1.07 SUBMITTALS:

- A. Concrete Mix Designs: Submit concrete mix designs for review.
- B. Shop Drawings: The Contractor shall submit shop drawings of all concrete reinforcing, in accordance the General Conditions.
- C. Delivery Records: File duplicate copies of concrete delivery slips on which shall be recorded: supplier, serial number of slip, date, truck number, contractor, project, concrete exposure class, cementing materials content, air content, volume in load and time of first mixing of aggregate, cementing materials and water.
- D. Concrete Pour Records: Record time, date, delivery slip serial number and location of each concrete pour and identify related test cylinders. Keep these records on-site until project is completed.

1.08 INSPECTIONS AND TESTING:

- A. The Contractor shall carry out inspection and testing of the Work of this Section, and provide documentation of such testing to the Owner in accordance with the General Conditions.
- B. The Contractor shall provide washed sieve gradation analysis for all aggregates and granular materials to be used in accordance with MTO Laboratory Testing Manual Section LS-602 and related standards.
- C. The Contractor shall carry out field inspections and compaction testing of all compacted sub-grade and base materials in accordance with MTO Laboratory Testing Manual Section LS-623 and related standards.
- D. Inspection Reports: Submit written reports of any inspection and/or tests.
 - 1. Distribute reports as follows: One (1) copy to the Owner, One (1) copy to the Owner.

CONCRETE WORKS SPECIFICATION

2. Concrete cylinder test reports shall include:
 - Specific location of concrete represented by sample
 - Design strength
 - Unit weight of sample
 - Exposure class
 - Aggregate size and admixtures incorporated
 - Date, hour and temperature at time sample was taken
 - Percentage air content
 - Test strength of cylinder
 - Type of failure if test fails to meet specification

- E. Testing and Replacement of Deficient Concrete in Place:
 1. Contractor shall pay for additional testing and related expenses if concrete has proved to be deficient.
 2. Contractor shall replace or strengthen deficient concrete Work as directed by the Owner and pay for all testing and related expenses for replaced Work until approved by the Owner.

- F. The Contractor shall maintain a record showing the location and result of inspections and testing conducted. These records shall be submitted to the Owner when requested, or prior to proceeding with work that depends upon the work of this Section.

PART TWO PRODUCTS

2.01 GRANULAR SUB-BASE COURSE:

- A. Compacted granular materials as indicated on the Drawings and in accordance with the requirements of Specification Section 02200.

2.02 FORMWORK MATERIALS:

- A. Formwork materials brought on-site shall be new.
- B. Plywood:
 1. Generally: Douglas Fir, minimum thickness of 17mm, to CSA 0121, finished one side, fabricated specially for use as concrete form panels, with sealed edges, free of warp and of sufficient strength to resist displacement during the placing and consolidation of the concrete. Curved forms shall be of 25mm nominal thickness.

CONCRETE WORKS SPECIFICATION

2. For concrete surfaces exposed to view, provide panels smooth and free of defects which would be reproduced as concrete blemishes.
3. Chamfers: cut from smooth, single pieces of wood, with no open defects and of sufficient dimension to construct specified chamfers.
4. Mechanical curb machine is subject to the approval of the Owner.
5. All form work shall be clean and treated with a non-staining mineral oil before concrete is placed, and so constructed as to prevent honeycombing.

2.03 REINFORCING STEEL:

- A. Reinforcing steel shall be epoxy-coated Grade 400 and supplied and placed in accordance with OPSS 905, and as indicated on the Drawings. Reinforcing steel shall not be welded.
- B. Welded steel wire fabric: CSA G30.5-M; resistance welded in size and spacing shown for smooth wire fabric and CSA G30.15-M for deformed wire fabric, in flat sheets only.

2.04 REINFORCING STEEL FABRICATION:

- A. Fabricate reinforcing steel only in a permanent fabricating shop unless otherwise approved by the Owner.
- B. Fabricate reinforcing steel in accordance with Drawings, where applicable. Tag reinforcing bars to indicate placement as designated on shop drawings.
- C. Splices: Provide splices where required. Laps to be Class B Tension Lap Splices in accordance with CSA A23.3 unless otherwise shown.

2.05 EXPANSION JOINTS:

- A. Rigid Expansion Joint Filler shall be non-bituminous pre-moulded joint filler (polyethylene) in 13mm thickness, to OPSS 1308, Type A, except as otherwise shown. Joint filler shall be cut to full cross-section shape as detailed.
- B. Expansion Joint Sealant shall be a fast-setting, 2-part polyurethane material intended for sealing expansion joints in new exterior concrete applications. Tigerthane 340, by GARON Products, or equal. Colour to match adjacent concrete surfaces.

CONCRETE WORKS SPECIFICATION

2.06 CONCRETE MIXES:

- A. Concrete for all concrete works shall be ready-mixed.
- B. Design concrete mix in conformance with CAN3-A23.1, Clause 14 and 15, Class F-1 exposure. Submit evidence and material samples if requested, acceptable to testing laboratory to verify that proposed concrete mix design will produce specified quality of concrete.
- C. Cementing Materials: Portland Cement to CAN3-A5.
- D. 32MPa minimum, and 40MPa maximum compressive strength at 28 days unless indicated otherwise on Drawings. Minimum aggregate size to be 20mm.
- E. Concrete Weight: Air dry unit weight shall be: minimum 2320 kg/m³ adjusted proportionally for maximum air content as per CAN3-A23.1, Clause 15, Table 8.
- F. Air content: Provide air content in accordance with Clause 15, Table 8 of CAN3-A23.1.
- G. Air-entrainment for the Portland cement concrete shall meet the requirements of A.S.T.M. C-94, Standard Specifications for Ready-Mixed Concrete, or C.S.A. A23-1, Concrete Materials and Methods of Concrete Construction. The cement factor shall not be less than 335kg per cubic metre and the water-cement volume ratio shall not exceed 0.45.
- H. Concrete to have a uniform consistency and slump. The slump shall be between 25mm and 75mm for hand-vibrated concrete, between 50mm and 100mm for hand-tamped or spaded concrete.
- I. Admixtures:
 - 1. Chemical Admixture: Incorporate water-reducing admixture, type WN, in all concrete.
 - 2. Air-Entraining Agent: Incorporate air-entraining agent in addition to chemical admixture in concrete in accordance with CAN3-A23.1, Clause 15, Table 10.
 - 3. The use of admixtures to prevent freezing or to accelerate setting of the concrete is prohibited.
- J. Calcium Chloride: Do not use calcium chloride or admixtures containing chloride in concrete. Conform to Reference Standards for chemical and air-entraining admixtures.

CONCRETE WORKS SPECIFICATION

2.07 CURING COMPOUND:

- A. White-pigmented, chlorinated, rubber-based curing compound, ASTM C309 Type 2, suitable for exterior use, **may** be used on any exposed concrete surfaces, unless specifically indicated on the Drawings or herein, or approved by the Owner.

2.08 STRUCTURAL GROUT:

- A. Structural grout shall be non-shrink, non-metallic, chloride free grout, capable of providing continuous support. M-bed standard premix by Sternson Ltd. or approved equal. The minimum compressive strength of the grout at 28 days shall be 40MPa. Colour of structural grout shall match adjacent surfaces as nearly as possible.

PART THREE EXECUTION

3.01 EXCAVATION:

- A. Excavation shall be in accordance with Section 02200 - Excavation, Backfill & Site Grading, or as required during the course of the Work by the Owner. Disturbed material in the bottom of the excavation shall be thoroughly consolidated to the satisfaction of the Owner by rolling or tamping, or both.
- B. The sub-grade shall be excavated or filled with suitable material to the required grades and lines. Filled sections shall be compacted and extend a minimum of 300mm outside the form lines. Water shall be used as an aid to compaction where required.

3.02 GRANULAR BASE:

- A. The Contractor shall not proceed with placement of the granular base until the finished sub-grade has been verified by the Owner.
- B. On the sub-grade brought to the correct line and elevation as above described shall be placed a layer of Granular Base Course "Type A" (G.B.C.'A') After being placed and compacted, the granular base course shall have a minimum uniform thickness of base depth.
- C. The compaction requirements for the granular base shall be as indicated on the Drawings and in accordance with Specification Section 02200.

CONCRETE WORKS SPECIFICATION

- D. Prior to the placing of the concrete, a vapour barrier of sub-grade paper or polyethylene film shall be placed on the prepared base. The polyethylene film shall be a minimum of 4mm thick.

3.03 FORMWORK:

- A. Forms shall be of wood or metal and of sufficient strength to resist springing, tipping or other displacement due to the placing of concrete and such other loads as may be superimposed during construction. Forms shall be free from warps, splits, holes and bulges and all bolts, rivets and fittings shall be countersunk. Forms shall be erected without the use of internal ties and shall be sufficiently tight to prevent leakage. The faces of forms against which concrete is to be placed shall, before the placing of concrete, be thoroughly cleaned and coated with an approved non-staining oil or other approved material. Flexible or rigid forms of proper curvature may be used for curves having a radius of 30m or less. Division plates shall be metal. Forms when tested with a 3-metre straight edge or curved template shall not deviate on the top surface more than 3mm nor on the inside faces more than 6mm from the testing edge of the template. Build formwork with joints sufficiently tight to prevent leakage of grout or cement paste. Install chamfers at external corners exposed to view where shown on the Drawings. Do not embed wood in concrete.

3.04 PLACING REINFORCEMENT:

- A. Place reinforcement in accordance with requirements of CAN3-A23.3, typical details and as indicated on the Drawings. Support reinforcing steel with spacers, chairs or hangers in spaced as closely as possible to prevent displacement of reinforcement from intended position. Bottom steel for slabs resting on granular materials may be supported on concrete chairs.
- B. Bar hooks shall have standard hook dimensions using minimum bend diameters
- C. Do not cut reinforcement to incorporate other Work.
- D. Relocate or re-bend bars only on written instructions of the Owner.
- E. Tie, do not weld, reinforcement in place.

3.05 ADJUSTING AND CLEANING:

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

CONCRETE WORKS SPECIFICATION

3.06 PLACING CONCRETE:

- A. Notify Owner and obtain permission at least 24 hours prior to proceeding with concrete operation.
- B. No concrete shall be placed until the forms and the base course on which the concrete is to be placed have been inspected by the Owner.
- C. Coat formwork with form release agent before reinforcement and other built-in items are installed. Do not coat plywood forms pre-treated with release agent.
- D. The freshly mixed concrete shall be deposited on the sub-grade as close as possible to its final position, by methods which will prevent the separation or loss of the materials. The fresh concrete shall be thoroughly spaded along the sides of the forms and at all joints. Concrete shall be thoroughly consolidated in an approved manner to the full depth as soon as it has been placed.
- E. Equipment for chuting, pumping and pneumatically conveying concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery end without separation of the materials. Maximum vertical drop from chutes shall be 1.5 metres.
- F. When placed in the forms, the concrete shall be tamped and struck off with a template riding on the side forms. The concrete should be placed a little high and the template must be sufficiently heavy to compress the concrete and bring it to the required elevation and slope.
- G. Concrete shall not be placed when the prepared sub-grade is frozen or when the sub-grade under the adjacent pavement is frozen. Concrete shall not be placed when the air temperature in the shade is 4.5 deg. C. or less and falling.

3.07 EXPANSION JOINTS:

- A. Joints shall be formed with 13mm thick full depth joint filler material types 'A' or 'C'.
- B. Granulated cork fillers will not be accepted.
- C. Panels shall be pre-cut from a single piece to the shape of the cross-section as shown the standard Drawings but so as to provide a 6mm recess on the exposed surfaces.
- D. Maximum spacing of expansion joints to be 4800mm.

CONCRETE WORKS SPECIFICATION

- E. Joints shall be formed with the materials as specified above. Joint filler panels shall be set in a vertical position.
- F. Work in close co-operation with other surface setting trades where this Work becomes integral with other materials. Adhere strictly to expansion and control joint patterns, where indicated.

3.08 CONTROL / CONSTRUCTION JOINTS:

- A. Transverse weakened-planed contraction joints shall be saw-cut or hand-formed. Sawing shall be done early after the concrete has set to prevent the formation of uncontrolled cracking. Saw cut control joints to a depth of 12mm minimum. The joints may be hand-formed either by (1) using a narrow or triangular jointing tool or a thin metal blade to impress a place of weakness into the plastic concrete, or (2) inserting 3mm thick steel strips into the plastic concrete temporarily. Steel strips shall be withdrawn before final finishing of the concrete.
- B. For sidewalks, contraction joints are to be placed so as to divide transversely into lengths of not more than 2000 mm. All edges shall be finished with a tool which produces a rounded edge and a smooth surface of not more than 50mm in width and a 3mm thick groove equal to at least one-quarter the depth of 50mm at 2000mm intervals. Width of cut shall be 3mm.

3.09 FINISHING:

- A. The concrete on the upper surface shall be floated with a wood or magnesium float only, to a smooth uniform finish to the required cross-section, free of open texturing, plucked aggregate and local projections.
- B. Care shall be taken to avoid over finishing or working more mortar to the surface than is actually required.
- C. Unless otherwise provided, back edges shall be rounded by use of a 6mm radius edging.
- D. Treat formed surfaces in accordance with CAN3-A23.1, Clause 24 and as additionally specified herein.
- E. Unless otherwise indicated on the Drawings or herein, finish exposed surfaces of concrete paving with a broomed finish having lines running parallel to a single axis.
- F. Provide medium broom finish to all concrete surfaces that will remain exposed after completion of the Work.

CONCRETE WORKS SPECIFICATION

3.10 CURING, SEALING AND PROTECTION:

- A. Cure concrete in accordance with CAN3-A23.1, Clause 21 and as specified herein.
- B. White-pigmented curing compound **may** be used on any exposed concrete surfaces, unless specifically indicated on the Drawings or herein.
- C. Structural concrete is to be cured using wet burlap placed in two layers. Strips shall overlap by 150mm. The burlap is to be kept continuously wet throughout the curing period. The burlap is to be pre-soaked for 24 hours prior to placing by immersing it in water.
- D. Apply curing compound evenly to form a continuous film. Follow manufacturer's instructions.
- E. The Contractor shall always have materials available to protect the surface of the plastic concrete against rain. These materials shall consist of waterproof paper or plastic sheeting. For slipform construction, materials such as wood planks or forms to protect the edges shall also be required.
- F. When concrete is being placed in cold weather and the temperature may be expected to drop below 2 deg. C. suitable protection shall be provided to keep the concrete from freezing until it is at least 10 days old. Concrete injured by frost action shall be removed and replaced at the Contractor's expense.

3.11 STRIPPING OF FORMWORK:

- A. Be responsible for safety of structure, both before and after removal of forms, until concrete has reached 70% of its specified 28-day strength.
- B. Do not remove plywood formwork by jerking loose or by metal pinch bars. Use wood wedges and gradually force panels loose. Leave plywood forms in place as long as possible to permit maximum shrinkage away from concrete.
- C. Take particular care not to damage external corners when stripping formwork.

3.12 BACKFILLING:

- A. The Contractor shall place earth shouldering at the edge of concrete works with an approved backfill material to grades approved by the Owner.

CONCRETE WORKS SPECIFICATION

3.13 PROTECTION OF THE PAVEMENT FROM TRAFFIC:

- A. The Contractor shall by barricades, watchmen, or by other means, protect all concrete surfaces from harm by traffic until the Owner authorizes the facility to be opened to public use.
- B. The Contractor shall at all times prior to the opening to traffic provide suitable bridging as other means of access to adjacent properties, but will only be required to do so at existing traffic points.

3.14 DEFECTIVE WORK, ADJUSTMENT AND CLEANING:

- A. Replacement of Defective Work: Replace defective concrete Work to match balance of Work. Honeycombing, rough surfaces and other deficiencies will be replaced or repaired with mortar at the discretion of the Owner. Plastering or rubbing down with a rich cement paste is not acceptable.
- B. Cleaning: Clean finish surfaces to remove stains, mortar, sealant and other foreign materials without damaging surfaces.
- C. Variations in excess of specified tolerances and marked or disfigured surfaces that cannot be repaired by approved methods will be considered defective Work performed by this section.
- D. Replace or modify concrete that is out of place or does not conform to lines, detail or grade as directed by the Owner.
- E. Replace or repair defectively placed or finished concrete as directed by the Owner.
- F. Shrinkage cracking caused by lack of shrinkage control, such as saw-cutting delay or lack of chemical control, will be replaced at the Contractor's expense.

3.15 REPAIRING & CLEANUP:

- A. The Contractor shall be held responsible for any damage or defacing done to the finished Work by other parties until the finished Work is accepted by the Owner and shall repair or replace any damaged or defaced portion of the Work as required by the Owner. The Contractor is required to provide adequate protection to ensure that fresh concrete is not vandalized.

END OF SECTION