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1 GENERAL

1.01 DEFINITIONS

.1 Mock-up: A full-size physical example that demonstrates materials, finishes, interrelationship of materials and assemblies, aesthetic effects, and execution. A mock-up may demonstrate coordination of multiple Subcontractors' work. A mock-up establishes a standard by which the Work will be judged. Mock-ups are not samples.

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

1.02 ADMINISTRATIVE REQUIREMENTS

.1 Submit to Manager of Forestry and Horticulture, City of Hamilton or authorized designate submittals listed for review in respective specification Sections. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

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

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

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

.5 Notify Manager of Forestry and Horticulture, City of Hamilton or authorized designate, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.6 Verify site measurements and affected adjacent Work are coordinated.

.7 Contractor's responsibility for errors and omissions in submission is not relieved by Manager of Forestry and Horticulture, City of Hamilton or authorized designate review of submittals.

.8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Manager of Forestry and Horticulture, City of Hamilton or authorized designate review.

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

1.03 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit drawings stamped and signed by professional engineer licensed in the Province of Ontario, Canada.

.2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to Contract drawings and specifications.

.3 Allow 8 working days for the Manager of Forestry and Horticulture, City of Hamilton or

authorized designate review of each submission.

.4 Adjustments made on shop drawings by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate before to proceeding with Work.

.5 Make changes in shop drawings as the Manager of Forestry and Horticulture, City of Hamilton or authorized designate may require, consistent with Contract Documents. When resubmitting, notify the Manager of Forestry and Horticulture, City of Hamilton or authorized designate in writing of revisions other than those requested.

.6 Submissions to include:

.1 Date and revision dates.

.2 Project title and number.

.3 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of site measurements and compliance with Contract Documents.

.4 Details of appropriate portions of Work as applicable:

.1 Fabrication.

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

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Relationship to adjacent work.

.7 After the Manager of Forestry and Horticulture, City of Hamilton or authorized designate review, distribute copies.

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

1.04 SAMPLES

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

.2 Deliver samples prepaid to the Manager of Forestry and Horticulture, City of Hamilton or authorized designates office at 100 King Street West, Hamilton, Ontario, L8P 1A2 (deliveries must be addressed to the 2nd floor).

.3 Notify the Manager of Forestry and Horticulture, City of Hamilton or authorized designate in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Adjustments made on samples by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate before proceeding with Work.

.5 Make changes in samples which the Manager of Forestry and Horticulture, City of Hamilton or authorized designate may require, consistent with Contract Documents.

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

1.05 MOCK-UPS

.1 Mock-ups can be used as a reference for assessing quality of workmanship and site-applied finishes as requested in the project's Contract Documents.

.2 Obtain the Manager of Forestry and Horticulture, City of Hamilton or authorized designate acceptance of mock-ups installation before beginning to install those portions of the Work represented by the mock-up.

.3 Assemble mock-ups at the Place of the Work in locations acceptable to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate, or where location is indicated in the technical specification Section.

.4 Schedule mock-ups ready for the Manager of Forestry and Horticulture, City of Hamilton or authorized designates review and in orderly sequence, to avoid delays in Work.

.1 Failure to prepare mock-ups in ample time is not considered sufficient reason to request an extension of Contract Time. Claims for extension of Contract Time by reason of such default will not be considered.

.5 Construct mock-ups using materials, finishes, colours, and methods proposed for the completed Work. Mock-ups to demonstrate proposed workmanship and range of aesthetic appearance.

.6 Where a mock-up represents or affects multiple specification Sections, coordinate activities of these Subcontractors to ensure mock-ups are complete.

.7 Modify or replace mock-ups when unacceptable to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.8 Maintain acceptable mock-ups in an undisturbed condition as a standard for judging the completed Work.

.9 Mock-ups may remain as part of Work, unless indicated otherwise in a technical specification Section.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 02 50 00.01 – Soil Protection for Public Trees

.3 Section 32 01 90.23 – Public Tree Pruning

1.02 DEFINITIONS

.1 Tree: means a self-supporting woody perennial plant which has reached or can reach a height of at least 3 metres at physiological maturity.

.2 Diameter at breast height (DBH): the trees diameter measured at approximately 1.37m above ground.

.3 Permit: means a Public Tree Permit issued by the Manager of Forestry and Horticulture, City of Hamilton.

1.03 WORK REQUIRING PUBLIC TREE PERMIT

.1 A Public Tree Permit is required to remove or damage any tree(s) on public property regardless of DBH. A permit must be acquired from the City of Hamilton prior to any work, including staging and preparatory work, occurring within the dripline of a public tree.

.2 A Public Tree Permit is requirement for any planned tree pruning activities that must occur in advance of construction works, such as pruning for construction ingress and egress, pruning for future building clearances, pruning for equipment clearances, etc.

1.04 SUBMITTALS

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

.2 To obtain a public tree permit, the following submittals are required to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate for approval:

.1 Tree and Soil Management Plan prepared by a Certified Arborist or a Landscape Architect, Full Member with Seal in Good Standing with the Ontario Association of Landscape Architects (OALA) and includes:

.1 All trees within the proposed development area, including staging areas, and extending to 6 metres beyond the proposed work area. The trees must be surveyed and accurately plotted on the plan and the plan must identify ownership (public vs private) and whether the tree is proposed to be retained or removed.

.2 All proposed surface treatments, existing and proposed underground utilities, proposed grading changes, property lines, buildings, limit of grading and disturbances, egress and ingress, staging areas and easements.

.3 A Tree Inventory Analysis Table that corresponds to the trees identified on the plan and that includes:

.1 Species by botanical and common name;

.2 Diameter in breast height by centimeters or millimeters;

.3 Ownership, municipal or private per the Public Tree By-Law 15-125;

.4 Structural conditions; and,

.5 Identify if tree is to be replaced, relocated or removed.

.4 Location and extent of all tree protection fencing for trees that are to be preserved, including tree protection detail and any mitigation or preservation techniques, such as root curtains.

.5 Identification of any trees that need to be pre-pruned in advance of construction. Alternatively, pruning works can be submitted on a separate plan.

.6 Refer to Section 02 50 00.01 – Soil Protection for Public Trees for soil areas identified for protection that have existing, minimally compacted soils that will receive future tree plantings and can be protected during construction.

.2 Loss of Canopy Fee Calculation prepared by a Certified Arborist retained by Contractor:

.1 Submit Loss of Canopy Fee Calculation for public trees that have been approved for removal using the Reproduction Method of the Trunk Formula (TFM) in accordance with the Guide for Plant Appraisal, 10th Edition, Revised by the Council of Tree and Landscape Appraisers to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 The Certified Arborist must submit the TFM calculation template to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate for approval prior to completing the loss of canopy fee calculations. The Manager of Forestry and Horticulture, City of Hamilton or authorized designate will provide the unit cost measure and the land use values to land use types to the Certified Arborist to use in the TFM.

.3 Landscape Plan prepared by a Landscape Architect, Full Member with Seal in Good Standing with the Ontario Association of Landscape Architects (OALA) and includes:

.1 Locations of all tree planting, including spacing and all tree planting beds and pits, including detail pages per the City of Hamilton's preferred hardscape planting details and soil volume calculations.

.2 All tree species to be planted in a planting list that corresponds to the landscape plan, including size, species, number of trees, type (i.e. ball and burlap, etc.) and a calculation of species diversity per the City of Hamilton's Forestry and Horticulture's Design and Preservation Standards. The Manager of Forestry and Horticulture, City of Hamilton or authorized designate will provide a City approved species list that must be followed for all public tree plantings within the right-of-way. Contractor to provide an approved species list for all naturalized areas.

.3 All proposed surfaces, site furnishings, lighting, grades, horticultural features, and existing and proposed underground services.

.4 Any proposed pruning works.

1.05 PERMIT FEES

.1 Permit fees will be tallied by the Manager of Forestry and Horticulture, City of Hamilton or

authorized designate and paid for by Contractor, for each phase of work, and will include:

.1 The loss of canopy calculation fee calculated by a Certified Arborist hired by Contractor and approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate;

.2 The street tree planting fee, if applicable, calculated by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate based on the approved landscape plan;

.3 The permit fee calculated by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate and based on the City's current fee guide at the time of permit issuance; and,

.4 Reduction fees for any proposed tree plantings that can offset the loss of canopy fees, if applicable, calculated by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 The Manager of Forestry and Horticulture, City of Hamilton or authorized designate will issue the permit fees to Contractor. Fees are payable to the City of Hamilton, Forestry and Horticulture Section.

1.06 ISSUANCE OF PERMIT

.1 A Public Tree Permit will only be issued after all of the required submittals and permit fees have been received and approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 A Public Tree Permit is valid only for the phase of work for which the required submittals have been received and approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.3 A Public Tree Permit if valid for a period of 3 years from the date issued.

1.07 WORK SEQUENCE

.1 Submit to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate the proposed work sequence and phasing approach for the project. Provide a timeline of planning, design and construction for each phase of work.

1.08 PRE-PRUNING WORK

.1 Pre-pruning works prior to construction activities occurring require a permit issued by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate. All pruning works must be in accordance with Section 32 01 90.23 – Public Tree Pruning. The City of Hamilton will not complete any pre-pruning works on behalf of Contractor.

1.09 ALTERATIONS TO CONTRACT

.1 Any changes or alterations that occur to the approved plans during the planning stages or construction stages must be submitted to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate for review and approval. Changes or alterations will be subject to permitting fees, and may require Contractor to resubmit loss of canopy fee calculations, landscape plans, tree management plans, etc. for re-approval.

.2 Failure to comply will result in the issuance of a stop work order.

1.10 DOCUMENTS REQUIRED ON-SITE

.1 Maintain at job site, one copy of each document as follows:

.1 Approved Tree and Soil Management Plan;

.2 Approved Landscape Plan; and,

.3 Public Tree Permit (s).

2 PRODUCTS

2.01 NOT USED

.1 Not used.

3 EXECUTION

3.01 NOT USED

.1 Not used.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 91 13 – Commissioning Requirements

1.02 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week before Contract completion with Contractor's representative and Manager of Forestry and Horticulture, City of Hamilton or authorized designate, and City of Hamilton operations and maintenance staff, to:

.1 Verify Project requirements.

.2 Review manufacturer's maintenance instructions and warranty requirements.

.2 Acceptance of Work Procedures:

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

.1 Notify Manager of Forestry and Horticulture, City of Hamilton or authorized designate in writing of satisfactory completion of inspection and submit verification that corrections have been made.

.2 Request Manager of Forestry and Horticulture, City of Hamilton or authorized designate inspection.

.2 Manager of Forestry and Horticulture, City of Hamilton or authorized designate Inspection:

.1 Manager of Forestry and Horticulture, City of Hamilton or authorized designate and Contractor to inspect Work and identify defects and deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Equipment and systems: tested and fully operational.

.4 Commissioning of systems: completed in accordance with 01 91 13 - Commissioning Requirements.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Two weeks before Substantial Performance of the Work, submit to Manager of Forestry and Horticulture, City of Hamilton or authorized designate final digital copies of project closeout manual.

.3 Provide spare parts, maintenance materials and special tools of same quality and

manufacture as products provided in Work.

1.04 PROJECT CLOSEOUT MANUAL - FORMAT AND CONTENT

.1 Organize data as instructional manual.

.1 Arrange content under Section numbers and sequence of Table of Contents.

.3 Text: manufacturer's printed data and warranty information.

.4 Drawings: digital format with legible mark-up of as-built conditions.

.2 Instructional manual must include:

.1 Product Data: identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.2 As-built (record) drawings and specifications: submit as-built record drawings and specifications with recorded changes to Contract.

.3 Operating and Maintenance instructions: submit operating and maintenance instructions for all site furnishings and systems, such as soil cell systems.

.4 Training record: submit record of training received by City of Hamilton operations and maintenance staff.

.5 Warranty information: submit all manufacturer's warranty instructions and maintenance schedule and operations during the warranty period, including for existing and new tree plantings.

.6 Extra parts: submit list of extra parts provided to the City of Hamilton operations and maintenance staff.

1.05 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of on-site drawings, and in copy of Project Closeout Manual.

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

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

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

.1 Measured depths of elements.

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

.3 Site changes of dimension and detail.

.4 Changes made by change orders.

.5 Details not on original Contract Drawings.

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

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

.2 Changes made by Addenda and change orders.

.6 Other Documents: Maintain inspection certifications and site test records, required by

individual specifications Sections.

.7 Provide digital photos, if requested, for site records.

1.06 EQUIPMENT, SYSTEMS AND TRAINING

.1 Operating Procedures: include start-up, shut-down and routine normal operating instructions and sequences.

.1 Include summer, winter, and any special operating instructions.

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

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

.4 Provide training to Manager of Forestry and Horticulture, City of Hamilton or authorized designate, and City of Hamilton operations and maintenance staff for soil cell systems and suspended concrete slab components in accordance wit Section 01 91 13 – Commissioning Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

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

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

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

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

1.08 FINAL CLEANING

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

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 SUMMARY

.1 This Section includes requirements relating to commissioning (Cx) of project components and systems, and required training to be provided to City staff by Contractor.

1.02 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 01 77 00 – Closeout Submittals and Procedures

1.03 ABBREVIATIONS

.1 Cx: Commissioning

.2 O&M: Operation and Maintenance.

1.04 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Manager of Forestry and Horticulture, City of Hamilton or authorized designate will observe all commissioning activities related to the testing and training of soil cell systems and the suspended concrete slab and its components.

.2 Commissioning Meetings:

.1 Hold Cx meeting prior to final acceptance. Ensure Subcontractors and relevant manufacturer representatives are present at the Cx meeting.

.2 Use Cx meeting to resolve issues, monitor progress, and identify defects and deficiencies relating to Cx.

.3 Observation of Starting and Testing:

.1 Give 8 days notice before beginning commissioning.

.2 Manager of Forestry and Horticulture, City of Hamilton or authorized designate will observe start-up and testing.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit for review and acceptance:

.1 Complete list of proposed instruments and equipment to perform commissioning to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

2 PRODUCTS

2.01 NOT USED

.1 Not used.

3 EXECUTION

3.01 GENERAL

.1 Cx is a planned program of tests, procedures, training and checks carried out systematically on systems and integrated systems of the finished Project. Perform Cx after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved.

.1 Objectives: Verify that installed integrated systems operate in accordance with Contract Documents and design criteria and intent.

.2 Effectively train O&M staff.

.2 Contractor shall assist in Cx process, operating equipment and systems, troubleshooting, and making adjustments as required.

.3 Design Criteria: To meet Project functional and operational requirements.

3.02 SOIL CELL SYSTEMS COMMISSIONING

.1 Prior to acceptance of soil cell systems, the following Cx requirements must be performed in the presence of the Manager of Forestry and Horticulture, City of Hamilton or authorized designate and City of Hamilton O&M staff:

.1 Testing:

.1 Aeration and irrigation ports: to confirm that the ports and pipes are allowing the passage of water and air to flow.

.2 Maintenance port and piping: to ensure that port and pipes are free from blockages.

.3 Subdrain: to confirm that water through the subdrain is flowing freely and is to the correct location.

.2 Training: Contractor must provide the following training to City of Hamilton operating and maintenance staff prior to acceptance:

.1 Inspection and cleanout procedures for all ports and distribution piping.

.2 Subdrain flushing procedure.

.3 Identification of soil cell limit identifiers and extent of underground system.

.4 Soil cell repair training.

3.03 SUSPENDED CONCRETE SLAB COMMISSIONING

.1 Prior to acceptance of suspended concrete slab systems, the following Cx requirements must be performed in the presence of the Manager of Forestry and Horticulture, City of Hamilton or authorized designate and City of Hamilton O&M staff:

.1 Testing:

.1 Aeration and irrigation ports: to confirm that the ports and pipes are allowing the passage of water and air to flow.

.2 Maintenance port and piping: to ensure that port and pipes are free from blockages.

.3 Subdrain: to confirm that water through the subdrain is flowing freely and is to

the correct location.

.2 Training: Contractor must provide the following training to City of Hamilton operating and maintenance staff prior to acceptance:

.1 Inspection and cleanout procedures for all ports and distribution piping.

.2 Subdrain flushing procedure.

.3 Identification of suspended concrete slab limit identifiers and extent of system.

3.04 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

.1 After start-up, operate and maintain equipment and systems until acceptance. The City of Hamilton will operate and maintain the systems after acceptance.

.2 With manufacturer's assistance, develop written maintenance program and submit to Manager of Forestry and Horticulture, City of Hamilton or authorized designate and City of Hamilton O&M staff for review and acceptance before implementation.

.3 Operate and maintain systems for length of time required for commissioning to be completed.

3.05 PROCEDURES FOR DEFICIENCIES DISCOVERED DURING COMMISSIONING

.1 Correct defects and deficiencies found during the Cx process. Re-verify equipment and components within the defective or deficient system to verify proper performance, including related systems if requested by Manager of Forestry and Horticulture, City of Hamilton or authorized designate or City of Hamilton O&M staff.

.2 Costs associated with re-commissioning defective and deficient work is the responsibility of Contractor. Above costs to be in the form of progress payment reductions or hold-back assessments.

3.06 CLOSEOUT ACTIVITIES

.1 Completion of Commissioning:

.1 Upon completion of Cx, leave systems in normal operating mode.

.2 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Manager of Forestry and Horticulture, City of Hamilton or authorized designate and City of Hamilton O&M staff.

.3 Coordinate Cx activities with closeout procedures and submittals in accordance with Section 01 77 00 – Closeout Submittals and Procedures.

END OF SECTION

1 GENERAL

1.01 SUMMARY

.1 Section includes:

.1 Pneumatic soil excavation and application of horizontal woodchip mulch layer.

.2 Application of horizontal woodchip mulch layer.

1.02 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 32 01 90.33 – Public Tree Preservation and Protection

1.03 DEFINITIONS

.1 Pneumatic soil excavation: technology used to remediate compacted soils around the roots of existing trees. Air spading uses compressed air through a supersonic nozzle to loosen the soil around the existing tree without causing damage to existing tree roots.

.2 Diameter at breast height (DBH): the trees diameter measured at approximately 1.37m above ground

1.04 ADMINISTRATIVE REQUIREMENTS.

.1 Site Meetings:

.1 Arrange and conduct a site meeting to review existing conditions and confirm mitigation requirements and extents with the Manager of Forestry and Horticulture, City of Hamilton or authorized designate prior to completing the Work.

.2 Immediately contact the Manager of Forestry and Horticulture, City of Hamilton or authorized designate if the Air spading uncovers roots 40mm or larger that may require pruning, due to damage, disease etc.

.3 Arrange and conduct a final walk-through with the Manager of Forestry and Horticulture, City of Hamilton or authorized designate to review Work performed and receive acceptance.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

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

.1 Product Data:

.1 Mulch source.

.2 Compost source.

.2 Plan Mark-up: Submit a plan identifying the existing trees and the proposed mitigation treatment for approval by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.3 Qualifications: Submit company information and qualifications to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate, if requested.

1.06 QUALITY ASSURANCE

.1 Qualifications for pneumatic soil excavation:

.1 Contractor or subcontractor with experience in similar Work within the past two years and performed by a Certified Arborist.

2 PRODUCTS

2.01 MATERIALS

.1 Fill:

.1 Native fill mixed with compost (50/50 ratio of native fill to compost).

.1 Compost: Category A compost (unrestricted use) in accordance with the Canadian Council of Ministers of the Environment (CCME) free of weeds, free of heavy metals or other deleterious contaminants and have an EC of less than 4.0mmmhos/cm.

.2 Mulch: Composted bark mulch free of invasive and noxious plants, seeds or their reproductive parts, soil, stones, roots or other extraneous materials with a uniform texture and colour.

.3 Water: free of any contaminants or impurities that would adversely affect the growth of vegetation.

2.02 EQUIPMENT

.1 Pneumatic soil excavation tool: AirSpade 200 or approved alternative.

3 EXECUTION

3.01 EXAMINATION

.1 Site Verification of Conditions:

.1 Determine extents of mitigation efforts and verify that conditions are acceptable to receive the proposed mitigation treatment. Inform the Manager of Forestry and Horticulture, City of Hamilton or authorized designate of unacceptance conditions.

.2 Proceed with mitigation efforts only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

3.02 PNEUMATIC SOIL EXCAVATION

.1 Water the soil around the existing tree to be treated one to days prior to pneumatic soil excavation.

.2 Clear the Work area around the existing tree to receive pneumatic soil excavation, including any shrubs, perennials, that may be impacted by the Work. Obtain approval from the Manager of Forestry and Horticulture, City of Hamilton or authorized designate prior to clearing the Work area.

.3 Using an AirSpade or approved alternative remove soil radially from the trunk of the existing tree out to the dripline. Trenches must be 200mm to 300mm deep and 75mm to

100mm wide. Trenches will appear like the spokes of a wagon wheel. A minimum of 8 trenches are required per tree unless otherwise approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.4 Inspect the exposed roots within the trenches for any damage, girdling roots, dead roots, diseased roots, etc. and identify mitigation efforts, such as root pruning. Obtain approval from the Manager of Forestry and Horticulture, City of Hamilton or authorized designate prior to pruning any roots 40mm in diameter or greater.

.5 Root pruning for root(s) greater than 20mm in diameter must be completed by a Certified Arborist (CA) with a valid Tree Cutting Service License issued by the City of Hamilton. The Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.6 Backfill trenches with compost mixed with native soil. Lightly tamp down backfilled trenches. Water thoroughly and top-up any uneven or sunken areas with compost mixed with native soils.

.7 All pneumatic soil excavation Work, including backfilling and mulching, must be completed within one (1) working day. No open excavations left overnight are permitted.

3.03 MULCHING

.1 Install a 75mm layer of mulch beginning 100 mm away from the trunk of the tree for trees with a DBH of less that 300mm or 200mm away from the trunk of the tree for trees with a DBH of 300mm or greater.

.2 Extend mulch to 600mm beyond dripline of tree, to a maximum of 5m radius, or as otherwise approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

3.04 WATERING

.1 Thoroughly water trees to moisture penetrates the top 150 mm to 250 mm of soil and in accordance with the schedule submitted in Section 32 01 90.33 – Public Tree Preservation and Protection.

3.05 CLEANING

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

1 GENERAL

1.01 SUMMARY

.1 Section includes:

.1 Protection requirements for uncompacted soils that can be protected during construction and will receive future public tree planting. Coordinate submissions with Section 01 33 00.01 – Public Tree Permitting.

1.02 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 33 00.01 – Public Tree Permitting

.3 Section 32 01 90.33 – Public Tree Preservation and Protection

.4 Section 32 93 10 – Public Tree Planting in Soft Scape

1.03 DEFINITIONS

.1 Soil compaction: Weight from a single intense source or small repeated forces pushes soil particles together, causing them to compact. Compacted soils have reduced macro and micro pore space, which result in limited air and water movement, restricted root growth, reduced infiltration rates and decreased biological activity. Compacted soils limit plant growth and the ability for soils to absorb rainfall and filter pollutants.

.2 Soil Protection Zone: An area protected by temporary hoarding to preserve existing, minimally compacted soils during construction that will receive future public tree plantings.

.3 Permit: means a Public Tree Permit issued by the Manager of Forestry and Horticulture, City of Hamilton.

1.04 ADMINISTRATIVE REQUIREMENTS

.1 Review of Soil Protection Fencing:

.1 Install soil protection fencing per the approved Soil Protection Plan or the approved Tree and Soil Management Plan.

.2 Coordinate locations of tree protection fencing with soil protection fencing in accordance with Section 32 01 90.33 – Public Tree Preservation and Protection.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

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

.1 Soil Protection Plan or Tree and Soil Management Plan:

.1 Identify on an individual plan or on the Tree Management Plan soil areas that can be protected during construction that meet the following criteria:

.1 Have minimal soil compaction;

.2 Are areas that do not require construction access and / or construction staging; and,

.3 Areas that will receive future public tree plantings.

.2 Identify protection methods and extent of protection, including, but not limited to: fencing and mulching.

2 PRODUCTS

2.01 MATERIALS

.1 Soil Protection Fencing: steel T-rail posts 40 x 40 x 5 x 2440 mm, at 1800 mm o.c., 38 mm x 96 mm wood nailer secured to posts, with 1200 mm high snow fencing attached to posts and wood nailer with 9-gauge wire, 13 per post or framed materials (e.g. moduloc – steel, plywood hoarding).

.2 Mulch: Composted bark mulch free of invasive and noxious plants, seeds or their reproductive parts, soil, stones, roots or other extraneous materials with a uniform texture and colour.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for the installation of soil protection fencing and mulch, where applicable in accordance with approved Soil Protection Plan or Tree and Soil Management Plan.

.1 Visually inspect areas that are to receive soil protection fencing and inform Manager of Forestry and Horticulture, City of Hamilton or authorized designate of discrepancies between site conditions, such as compaction of soils that were previously undisturbed and the requirements of the Soil Protection Plan or Tree and Soil Management Plan immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

3.02 SOIL PROTECTION FENCING

.1 Identify limits of soil protection zones to be protected per the approved Tree and Soil Management Plan or Soil Protection Plan obtained from the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 Install soil protection fencing along the limits of the soil protection zone per the approved Tree and Soil Management Plan or Soil Protection Plan obtained from the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.1 Soil protection fencing must be at least 1.2 metres in height and constructed of rigid or framed materials (e.g. moduloc – steel, plywood hoarding) with steel t-bar posts 1.8 metres apart, such that the fence location can not be altered. Snow fencing must be secured to posts and wood frame using galvanized wire.

.2 “Soil Protection Zone” signage must be installed on all closed loop segments of soil protection fencing. It is the Contractors responsibility to supply, install, maintain and remove the “Soil Protection Zone” signage. Signs must be strapped to the soil protection fencing and supported using adequate fasteners to ensure that the sign is secured against any movement and is clearly visible. Signs must be a minimum of

15 inches x 24 inches and made of lightweight “Coreplast” material.

.3 If the soil protection fencing can not installed in accordance with the approved Tree and Soil Management Plan or Soil Protection Plan, contact the Manager of Forestry and Horticulture, City of Hamilton or authorized designate to review and approve adjusted soil protection fencing location.

.4 Final approval of all locations of soil protection fencing from the Manager of Forestry and Horticulture, City of Hamilton or authorized designate must be received prior to the commencement of any Works.

.5 Soil protection fencing must remain in place until all Work is complete and the Manager or Forestry and Horticulture, City of Hamilton or authorized designate confirms that the fencing can be removed.

3.03 PROHIBITIED ACTIVITIES

.1 Do not work soils when wet, do not disturb fencing or allow any Work or storage of materials within the soil protection zone. Use designated construction routes only.

.2 If unauthorized Work occurs within the soil protection zone, immediately notify the Manager of Forestry and Horticulture, City of Hamilton or authorized designate. The Manager of Forestry and Horticulture, City of Hamilton or authorized designate reserves the right to prescribe decompaction measures in accordance with Section 32 93 10 – Public Tree Planting in Soft Scape.

3.04 MULCHING

.1 If soils are bare, apply a 75mm layer of mulch on all bares areas that are to be protected during construction. Pull back mulch prior to planting trees. Plant in accordance with Section 32 93 10 – Public Tree Planting in Soft Scape and finish surrounding area in accordance with Contract Drawings. Mulch can be re-used on site if it is free of debris and other contaminants.

3.05 CLEANING

.1 Leave Work area clean at end of each day and ensure all soil protection fencing is in good working order. Repair any damaged, falling, or sagging soil protection fencing at the start and end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment. Obtain approval from the Manager of Forestry and Horticulture, City of Hamilton or designate prior to removing soil protection fencing.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures, Forestry and Horticulture

.2 Section 03 20 00 – Concrete Reinforcing, Raised Planter Bed and Suspended Concrete Slab

.3 Section 03 30 00 – Cast-in-Place Concrete, Curbed Planter Bed, Raised Planter Bed and Suspended Concrete Slab

.4 Concrete sidewalk and curb, refer to C&MSM Form 700.

1.02 ABBREVIATIONS AND ACRONYMS

.1 HDO: High density overlay plywood

.2 MDO: Medium density overlay plywood

.3 City of Hamilton Public Works Construction and Materials Specifications Manual is referred to as C&MSM.

.4 Ontario Provincial Standard Specification is referred to as OPSS.

.1 The C&MSM shall take precedence over the OPSS.

1.03 REFERENCE STANDARDS

.1 CSA Group (CSA):

.1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete

.2 CSA O121-17, Douglas fir plywood

.3 CSA O151-17, Canadian softwood plywood

.4 CSA S269.1-16, Falsework and formwork

1.04 ADMINISTRATIVE REQUIREMENTS

.1 Coordinate with:

.1 Section 03 20 00 – Concrete Reinforcing, Raised Planter Bed and Suspended Concrete Slab.

.2 Section 03 30 00 – Cast-in-Place Concrete, Curbed Planter Bed, Raised Planter Bed and Suspended Concrete Slab.

.2 Pre-Installation Meetings with Manager of Forestry and Horticulture, City of Hamilton or authorized designate:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Coordinate with other Subcontractors.

1.05 DELIVERY, STORAGE, AND HANDLING

.1 Storage and Handling Requirements: Maintain formwork liners for architectural concrete

without defects or damages that could affect concrete appearance or cause staining.

2 PRODUCTS

2.01 MATERIALS

.1 Formwork Materials:

.1 For concrete curb and suspended concrete slab: Oiled One Side Formply Plywood.

.2 For raised concrete planter: use formwork materials to CSA A23.1/A23.2 for architectural concrete.

.2 Form Ties:

.1 For concrete not designated 'Architectural': Removable or snap-off metal ties, fixed or adjustable length, and free of devices leaving holes larger than 25 mm in diameter in concrete surface, formed to break 25mm (1") from surface of concrete after form removal, with minimum working strength of 13 kN. Wire ties shall not be used.

.2 For raised concrete planter: Snap ties complete with plastic cones and light grey precast concrete plugs.

.3 Form Liner:

.1 Plywood: HDO or MDO.

.4 Form Release Agent: Proprietary, non-volatile material that will not stain concrete or hinder the application of subsequent coatings or treatments to the concrete surface.

.5 Falsework Materials: To CSA S269.1.

.6 Form Stripping Agent: colourless mineral oil, free of kerosene, with viscosity between 70 and 110 s Saybolt Universal 15 to 24 mm^2/s at 40° C, flash point minimum 150°C, open cup.

3 EXECUTION

3.01 PREPARATION

.1 Before placing concrete, clean formwork in accordance with CSA A23.1/A23.2.

3.02 FABRICATION AND ERECTION

.1 Verify lines, levels, and centres before proceeding with formwork/falsework. Confirm that dimensions match the Contract Drawings.

.2 Fabricate and erect falsework in accordance with CSA S269.1.

.3 Fabricate and erect formwork in accordance with CSA S269.1 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA A23.1/A23.2.

.4 Align form joints and make watertight.

.1 Minimize the number of form joints used.

.5 Use 25-mm chamfer strips on external corners and 25-mm fillets at interior corners and joints, unless otherwise indicated on the Contract Drawings.

.6 Reveal / rustication strip for Raiser Planter Curb: 25mm inside face, 37.5mm outside face.

.7 Form chases, slots, openings, drips, recesses, and expansion and control joints as indicated.

.8 Build in anchors, sleeves, and other inserts required to accommodate work specified in other Sections.

.1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.9 Apply release agent by spray in accordance with manufacturer's recommendations. Ensure surfaces of form receive uniform coating.

3.03 REMOVAL AND RESHORING

.1 Leave formwork in place after placing concrete for a minimum:

.1 7 days for curbs, raised curbs, and suspended concrete slabs .

.2 Remove formwork when concrete has reached 70% of its 28-day design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.3 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.4 Reuse formwork and falsework subject to requirements of CSA A23.1/A23.2.

3.04 SITE QUALITY CONTROL

.1 Site Inspections:

.1 Professional engineer responsible for signing and stamping shop drawings to conduct on-site inspections and prepare and submit inspection reports verifying this part of the work is in accordance with Contract Documents and reviewed shop drawings.

3.05 CLEANING

.1 Waste Management:

.1 Once a form can no longer be used, deposit in an on-site recycling bin.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 03 11 00 – Concrete Formwork, Curbed Planter Bed, Raised Planter Bed and Suspended Concrete Slab

.2 Section 03 30 00 – Cast-in-Place Concrete, Curbed Planter Bed, Raised Planter Bed and Suspended Concrete Slab

1.02 REFERENCE STANDARDS

.1 CSA Group (CSA):

.1 CSA A23.1:19/CSA A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete

.2 CSA A283:19, Qualification Code for Concrete Testing Laboratories

.3 CSA A23.3:19, Design of Concrete Structures

.4 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel

.5 CSA W186:21, Welding of Reinforcing Bars in Reinforced Concrete Construction

.2 Ontario Provincial Standards (OPSS):

.1 OPSS.MUNI 1442 – Material Specification for Epoxy Coated Reinforcing Steel Bards for Concrete

.2 OPSS.MUNI 1440 – Material Specification for Steel Reinforcement for Concrete

.3 OPSS.MUNI 905 – Construction Specification for Steel Reinforcement of Concrete

.3 Reinforcing Steel Institute of Canada (RSIC):

.1 RSIC-2020, Manual of Standard Practice

1.03 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with Section 03 30 00 – Cast-in-Place Concrete

1.04 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 Shop Drawings:

.1 Submit shop drawings stamped and signed by professional engineer licensed in the Province of Ontario, Canada.

.1 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.

.2 Indicate placing of reinforcement and:

.1 Quantities of reinforcement.

.2 Identify epoxy coated reinforcement.

.3 Sizes, spacing and locations of reinforcement.

.3 Indicate the concrete cover dimension to the reinforcement.

1.05 DELIVERY, STORAGE, AND HANDLING

.1 Storage and Handling Requirements:

.1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Protect epoxy-coated portions of reinforcement bars with covering during transportation and handling.

.2 Handle, transport, store, and install epoxy-coated reinforcing steel bars in a way that prevents damage to coating. Prevent bar-to-bar abrasion and excessive sagging. Do not drop or drag bars. Store on suitable non-metallic supports. For lifting use nylon lifting slings, padded slings, separators, or other means recommended by epoxy-coated reinforcing steel fabricator.

2 PRODUCTS

2.01 MATERIALS

.1 Reinforcing Steel: Billet steel, grade 400, deformed bars to CSA G30.18, unless otherwise indicated.

.2 Epoxy Coating of non-prestressed reinforcement: To ASTM A775/A775M.

.3 Chairs, bolsters, bar supports, spacers: To CSA A23.1/A23.2.

.4 Tie wire: 1.5 mm diameter annealed wire, except epoxy coated for epoxy-coated rebar.

.5 Plain round bars: To CSA G40.20/G40.21.

2.02 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

3 EXECUTION

3.01 SITE BENDING

.1 Do not bend or weld reinforcement on site except where indicated or when authorized by a professional engineer licensed in the Province of Ontario, Canada.

.1 If site bending is authorized, bend reinforcement without heat, applying slow and steady pressure.

.2 Replace reinforcement bars that develop cracks or splits.

3.02 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on approved shop drawings and in accordance with CSA A23.1/A23.2.

.2 Use plain round bars as slip dowels in concrete.

.1 Paint portion of dowel intended to move within hardened concrete with [one coat of asphalt paint].

.2 After paint has dried, apply thick even film of mineral lubricating grease.

.3 Place reinforcement accurately and secure against displacement by using annealed iron wire ties or clips, or otherwise specified, at intersections. Tack welding of reinforcement to secure in place will not be permitted.

.4 Maintain minimum concrete cover to reinforcement during concrete placement.

.5 Do not drive or force reinforcement into fresh concrete.

3.03 EPOXY COATED REINFORCING

.1 Provide epoxy coated reinforcing in all concrete exposed to de-icing chemicals including all framed slabs and exterior walls adjacent to walkways, whether or not covered with waterproof finishes.

.2 Welding coated bars is not permitted.

.3 Touch-up reinforcing steel where damaged and at cut ends of epoxy-coated reinforcing with compatible epoxy paint and galvanized reinforcing to ASTM A780.

3.04 CLEANING

.1 Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 03 10 00 - Concrete Forming and Accessories, Curbed Planter Bed, Raised Planter Bed, and Suspended Concrete Slab

.3 Section 03 20 00 - Concrete Reinforcing, Raised Planter Bed, and Suspended Concrete Slab

.4 Section 32 33 00 – Site Furnishings

.5 Section 32 93 10.01 – Public Tree Planting in Hard Scape

.6 Section 32 93 10.02 – Public Tree Planting, Suspended Concrete Slab

1.02 ABBREVIATIONS AND ACRONYMS

.1 Portland Cement:

.1 GU: General use cement.

.2 City of Hamilton Public Works Construction and Materials Specifications Manual is referred to as C&MSM.

.3 Ontario Provincial Standard Specification is referred to as OPSS.

.1 The C&MSM shall take precedence over the OPSS.

1.03 DEFINITIONS

.1 Workability: This term broadly describes the total properties and expectations for concrete delivered to site as follows:

.1 Individual tested properties of concrete that account for confined or free flow slump, penetration, compaction, or relative plasticity of various concrete mix designs used for the Project.

1.04 REFERENCE STANDARDS

.1 ASTM International (ASTM):

.1 ASTM C171-20, Standard Specification for Sheet Materials for Curing Concrete

.2 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete

.3 ASTM C309-19, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

.4 ASTM C494/C494M-17, Standard Specification for Chemical Admixtures for Concrete

.5 ASTM C881/C881M-20a, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete

.6 ASTM C1017/C1017M-13e1, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete

.7 ASTM C1059/C1059M-21, Standard Specification for Latex Agents for Bonding Fresh

to Hardened Concrete

.8 ASTM D1751-18, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

.9 ASTM D1752-18, Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

.2 CSA Group (CSA):

.1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete

.2 CSA A3000-18, Cementitious Materials Compendium

1.05 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings: Conduct a site meeting 1 week before beginning work of this Section and attended by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate, the site supervisor and other related Subcontractors to:

.1 Verify project requirements for planting material to ensure that soil volumes are adequate.

.2 Review installation and substrate conditions.

1.06 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 Submit the following action submittals minimum 4 weeks before starting work of this Section:

.1 Shop drawing of Suspended Concrete Slab and raised planter stamped and signed by a professional engineer licensed in the Province of Ontario, Canada showing layout plan, cross sections, details of all connection points and total soil volume achieved.

.1 Coordinate with Section 32 33 00 – Site Furnishings if a mountable bench with be fastened to the raised planter.

.2 Product data:

.1 Product literature and data sheets for proprietary materials used in cast-in-place concrete, including product characteristics, performance criteria, physical sizes, finishes (the raised planter bed must be architectural concrete), and limitations.

.2 Product sheets for permeable aeration tubes and biodegradable form board (suspended concrete slabs only).

.3 Source quality control submittals:

.1 Valid and recognized certificate from the plant delivering the concrete.

.2 Test data and certification by qualified independent inspection and testing laboratory, confirming materials and mix designs used in concrete mixture meet specified requirements.

.3 Submit the following informational submittals as work progresses:

.1 Site quality control submittals:

.1 Testing results and reports: Submit concrete slump, temperature, cast air content and strength (cylinder tests) in accordance with C&MSM for every 100 cubic metres of concrete per day.

1.07 QUALITY ASSURANCE

.1 Mock-Ups: Construct mock-up of one entire curbed planter, one entire raised planter and a concrete stamp identifier.

.1 Demonstrate forming methods and materials, and procedures proposed to achieve concrete finishes.

.2 Locations: As directed by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.3 Acceptable mock-ups may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

.1 Delivery and Acceptance Requirements:

.1 Concrete hauling time: Deliver to site of Work and discharge within 120 minutes after batching.

1.09 SITE CONDITIONS

.1 Placing concrete during rain or weather events that could damage concrete is prohibited.

.2 Protect newly placed concrete from rain or weather events in accordance with CSA A23.1/CSA A23.2.

.3 Cold Weather Protection:

.1 Maintain protection equipment in readiness on site.

.2 Use protection equipment when ambient temperature is below 5°C, or when temperature may fall below 5°C before concrete has cured.

.3 Placing concrete upon or against surface at temperature below 5°C is prohibited.

.4 Hot Weather Protection:

.1 Protect concrete from direct sunlight when ambient temperature is above 27°C.

.2 Prevent forms from getting too hot before concrete is placed. Apply accepted methods of cooling that will not negatively affect concrete.

.5 Protect concrete from drying.

2 PRODUCTS

2.01 MATERIALS

.1 Portland Cement: GU, Normal.

.2 Water: To OPSS 1302.

.3 Aggregates: To OPSS 1001 and OPSS 1002. The maximum nominal size of the aggregate

shall not exceed 19.0 mm.

.4 Admixtures:

.1 Air entraining admixture: To ASTM C260/C260M.

.2 Chemical admixture: To ASTM C1017/C1017M. The Manager of Forestry and Horticulture, City of Hamilton or authorized designate to review accelerating or set retarding admixtures during cold and hot weather placing.

.5 Pre-Moulded Joint Fillers:

.1 Sponge rubber: To ASTM D1752, Type I.

.6 Aeration tube (for Suspended Concrete Slab):

.1 Permeable tube 450mm deep and 100mm wide with cap that allows for air and water exchange and wrapped in geotextile sock. If aeration tube is located in a soft surface cap shall be a convection cap.

.7 Rigid Insultation (for raised planters only):

.1 100mm thick rigid insulation for external use.

2.02 MIXES

.1 Design the concrete mix to CSA A23.1/CSA A23.2, the C&MSM Form 700 and as follows:

.1 Submit concrete mix materials for testing to verify they meet requirements of CSA A23.1/CSA A23.2.

.2 Identify and report immediately to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate when concrete mix design and parameters pose anticipated problems or deficiencies related to construction.

.3 Concrete Mix for Curb Planter Bed, Raised Planter Bed and Suspended Concrete Slab:

.1 Class of exposure: C-2.

.2 Cement: Type GU.

.3 Aggregate: 20 mm aggregate.

.4 Slump: 80mm, ± 20mm

.5 Air Entrainment: 5-8%

3 EXECUTION

3.01 PREPARATION

.1 Fine grade and compact subgrade in accordance with OPSS.MUNI 206.

.2 Install granular base material in accordance with OPSS 314 and 1010. Material shall be supplied from an approved source and shall meet the requirements of OPSS.MUNI 1010, C&SMS Form 600 and Form 900.

.3 Place concrete formwork and accessories in accordance with Section 03 20 00 - Concrete Reinforcing, Raised Planter Bed, and Suspended Concrete Slab.

.4 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.

.5 During concreting operations:

.1 Prevent development of cold joints.

.2 Verify concrete delivery and handling facilitate placing with minimum amount of re-handling, and without damage to existing structure or Work.

.6 Disturbing reinforcement and inserts during concrete placement is prohibited.

.7 Finishes:

.1 Curbed planter bed: smooth finish.

.2 Raised planter bed: architectural concrete, in accordance with Section 03 10 00 Concrete Forming and Accessories.

.3 Suspended Concrete Slab: broom finish.

.8 Protect previous work from staining.

.9 Clean and remove stains before applying concrete finishes.

.10 Maintain accurate records of poured concrete items. Indicate date, location of pour, quality, workability, air content, temperature, and test samples taken.

.11 Drill holes in existing concrete in locations new concrete is dowelled to existing work.

.1 Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions indicated.

3.02 AERATION SYSTEM AND TOPSOIL PLACEMENT (FOR SUSPENDED CONCRETE SLABS)

.1 Place topsoil and aeration system in accordance with Section 32 93 10.02 – Public Tree Planting, Suspended Concrete Slab.

3.03 INSTALLATION / APPLICATION

.1 Perform cast-in-place concrete work in accordance with CSA A23.1/CSA A23.2.

.2 Finishing and Curing:

.1 Finish concrete to CSA A23.1/CSA A23.2. Refer honeycombed areas to the Project Manager for inspection and repair or replace if instructed to do so.

.1 Bring the surfaces of all exposed concrete to a smooth rubbed finish not later than 5-6 hours after removal of forms and in accordance with CAN/CSA A23.1/A23.2. The raised planter bed must have an architectural concrete finish.

.2 The producing of smooth surfaces by means of cement plaster will not be permitted unless otherwise specified or scheduled.

.3 Make good all temporary openings left in concrete work for pipes, conduit, ducts and other such work during construction using a mix or mortar of the same proportions as the surrounding work, reinforced with wire mesh as required, and finish to match surrounding work. Carry out patching as specified in C&MSM.

.4 Protect concrete and other work from marking and other damage. Until set, the Contractor is expected to remain on site to ensure that no vandalism occurs during the initial curing stage.

.2 Cure concrete in accordance with CSA A23.1/CSA A23.2.

.1 The curing period shall be a minimum of 7 Days for concrete subject to cold

weather, concrete cured with curing compound, and HPC. For all other concrete, the curing period shall be a minimum of 4 Days. When the ambient air temperature is 0 °C or higher at the time of placing, components of structures shall be cured with burlap and water except as specified in the Curing Formed Surfaces clause.

.2 When the ambient air temperature is below 0 °C at the time of placing, components shall be cured with moisture vapour barrier, except for HPC, which shall be moist cured with burlap and water regardless of ambient air temperature. During cold weather, burlap shall be prevented from freezing. Curing compound shall only be permitted for non-structural elements such as slope paving.

.3 Joint Fillers Installation:

.1 Provide filler for each joint in single piece for depth and width required for joint.

.2 When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.

.3 Locate and form isolation, construction and expansion joints as indicated on the Contract Drawings.

.4 Install joint filler.

.5 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

.4 Concrete Stamp Identifier to delineate Suspended Concrete Slab (for Suspended Concrete Slabs only):

.1 Contractor shall identify the extent of the suspended concrete slab with a visible marker embedded into the surface pavement materials. Markers shall be a concrete stamp or as indicated on the Contract Drawings and shall indicate “SUSPENDED CONCRETE TRENCH ZONE” and the date of construction. Suspended concrete slab zone markers shall be placed at each corner of the suspended concrete slab, and along each edge at 10 m intervals.

3.04 SITE QUALITY CONTROL

.1 Site Tests: Conduct tests and submit report as described in ACTION AND INFORMATIONAL SUBMITTALS in this Section.

.1 Concrete pours

.2 Slump

.3 Air content

.4 Compressive strength at 7 and 28 days

.5 Air and concrete temperature

.2 Inspection and testing of concrete and concrete materials carried out by testing laboratory designated in accordance with CSA A23.1/CSA A23.2 and submitted to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate prior to pouring the concrete.

.3 Payment for Testing Laboratory Services: by Contractor.

.4 Inspection or testing by the City does not augment or replace Contractor's quality control or relieve the Contractor of contractual responsibility.

3.05 CLEANING AND DUST CONTROL

.1 Provide appropriate area on Project site where concrete trucks can be safely washed.

.2 Contractor shall maintain dust control using water methods to the satisfaction of the Manager of Forestry and Horticulture, City of Hamilton or authorized designate. Do not use calcium chloride or any other methods that will have an adverse effect on the soil and future sod and tree growth. Costs for dust control shall be borne by Contractor.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 01 33 00.01 – Public Tree Permitting

.3 Section 32 01 90.23 – Public Tree Pruning

.4 Section 32 01 90.33 – Public Tree Preservation and Protection

1.02 DEFINITIONS

.1 Selective tree removal: Consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.

.2 Grubbing: Consists of excavation and disposal of stumps and roots to not less than specified depth below existing ground surface.

.3 Permit: means a Public Tree Permit issued by the Manager of Forestry and Horticulture, City of Hamilton.

1.03 REFERENCE STANDARDS

.1 Migratory Birds Convention Act, 1994 and Migratory Birds Regulations, 2022.

.2 Endangered Species Act, 2007, S.O. 2007, c.6.

1.04 PERMITTING REQUIREMENTS

.1 Before any Work starts, an approved Public Tree Permit obtained from the Manager of Forestry and Horticulture, City of Hamilton or authorized designate and in accordance with Section 01 33 00.01 – Public Tree Permitting.

.2 Arrange for a site meeting, before Work starts, with Manager of Forestry and Horticulture, City of Hamilton or authorized designate to:

.1 Verify tree removals.

.3 Contractor is responsible for obtaining or coordinating any permits required for selective tree removal and grubbing works.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

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

1.06 HEALTH AND SAFETY

.1 Safety Requirements: Worker protection.

.1 Ensure workers are wearing appropriate protection while performing removal and grubbing activities.

1.07 QUALITY CONTROL

.1 Regulatory requirements:

.1 For trees around overhead powerlines and electrical equipment: provide proof of 444B

Certified Utility Arborists Certification for any pruning and removal work within the 'limit of approach' per the Ontario Health and Safety Act.

.2 Comply with hauling and disposal regulations of authority having jurisdiction.

.2 Qualifications:

.1 Tree removal work must be completed by a Certified Arborist (CA) with a valid Tree Cutting Service License issued by the City of Hamilton.

.2 Submit proof of qualifications when requested by Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

1.08 DELIVERY, STORAGE, AND HANDLING

.1 Prevent damage to existing trees that are to remain through tree protection measures in accordance with Section 32 01 90.33 – Public Tree Preservation and Protection.

1.09 ENVIRONMENTAL REQUIREMENTS

.1 Perform tree removal and grubbing work in accordance with the Migratory Birds Convention Act, 1994 and *Migratory Birds Regulations*, 2022. Contractor is responsible for complying with the requirements of the Act and Regulations, including Schedule 1 listed species whose nests are protected year-round from destruction. Contractor is responsible for hiring a Qualified Avian Biologist, if required, to determine if nests are present and provide recommendations, including potential mitigation measures, prior to any tree removal.

.2 Contractor is required to comply with all requirements of the *Endangered Species Act*, and is responsible for all work and costs to comply, including, if required, conducting a Butternut Health Assessment.

2 PRODUCTS

2.01 MATERIALS

.1 Soil Material for Fill:

.1 Excavated soil material: Free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, deleterious, or objectionable materials and has been reviewed for geotechnical suitability, environmental suitability, and moisture content in accordance with Ontario Regulation 406/19, regulation respecting On-site and Excess Soils Management, as amended.

3 EXECUTION

3.01 PREPARATION

.1 Inspect site and verify with Manager of Forestry and Horticulture, City of Hamilton or authorized designate any items designated to remain.

.2 Locate and protect utility lines. Notify utility authorities before starting selective tree removal activities.

.3 Keep roads and walks free of dirt and debris.

3.04 SELECTIVE TREE REMOVAL

.1 Cut off individual trees in accordance with the approved Public Tree Permit approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate as close to ground level as possible or at height of not more than 300 mm above ground surface.

.2 Grub out isolated tree stumps.

.3 Prune individual trees approved by Manager of Forestry and Horticulture, City of Hamilton or authorized designate and in accordance with Section 32 01 90.23 – Public Tree Pruning.

3.06 GRUBBING

.1 Remove and dispose of roots larger than 7.5 cm in diameter, matted roots, and designated stumps from indicated grubbing areas.

.2 Grub out stumps and roots to not less than 200mm below ground surface.

.3 Grub out visible rock fragments and boulders, greater than 300mm in greatest dimension.

.4 Fill depressions made by grubbing with suitable material and to make new surface conform with existing adjacent surface of ground.

3.07 REMOVAL AND DISPOSAL

.1 Remove cleared and grubbed materials off site.

3.08 FINISHED SURFACE

.1 Leave ground surface in condition suitable for construction activities that are to follow selective tree removal and grubbing works.

3.09 CLEANING

.1 Clean and remove debris and sediment from work area drainage devices and dispose of to an approved landfill site.

.2 Do not clean equipment in the waterbody or where the wash-water can enter the waterbody.

.3 Maintain tidy Work area, free from accumulation of waste products and debris.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 01 33 00.01 – Public Tree Permitting

1.02 DEFINITIONS

.1 Permit: means a Public Tree Permit issued by the Manager of Forestry and Horticulture, City of Hamilton.

1.03 REFERENCE STANDARDS

.1 American National Standard Institute (ANSI)

.1 ANSI A300 (Part 1)-2001, Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance - Standard Practices (revision and re-designation of ANSI A300-1995) (includes supplements).

.2 Canadian Nursery Landscape Association (CNLA) / Canadian Society of Landscape Architects (CSLA)

.1 Canadian Landscape Standard 2016, First Edition

1.04 QUALITY ASSURANCE

.1 Certification: provide certification in compliance with the requirements of International Society of Arboriculture.

.2 Regulatory requirements for trees around overhead powerlines and electrical equipment: provide proof of 444B Certified Utility Arborists Certification for any pruning work within the ‘limit of approach’ per the Ontario Health and Safety Act.

.3 Acceptance of Work will be determined by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate proposed tree pruning works.

.1 All pruning and pre-pruning works prior to construction activities occurring require a permit in accordance with Section 01 33 00.01 – Public Tree Permitting issued by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate. The City of Hamilton will not complete any pre-pruning works on behalf of Contractor.

1.06 TOOL MAINTENANCE

.1 Ensure that tools are clean and sharp throughout pruning operation: do not use tools that crush or tear bark.

.2 Disinfect tools before each tree is pruned.

.3 On diseased plant material disinfect tools before each cut.

2 PRODUCTS

2.01 DISINFECTANT

.1 20% solution of sodium hypochlorite or 70% solution of ethyl alcohol.

2.02 PRUNING PAINT

.1 Pruning paint: latex-based paint.

3 EXECUTION

3.01 APPLICATION

.1 Manufacturer's instructions: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.02 GENERAL

.1 Prune in accordance with ANSI A300, and approved Public Tree Permit approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate. Where discrepancies occur between standard and specifications, specifications govern.

.1 Where unplanned pruning works must occur during construction, notify immediately the Manager of Forestry and Horticulture, City of Hamilton or authorized designate and obtain approval in writing prior to proceeding.

.2 Notify immediately Manager of Forestry and Horticulture, City of Hamilton conditions detrimental to health of a tree(s).

.3 Prune during plant dormant period or after leaves have matured. Avoid pruning during leaf formation, at time of leaf fall, or when seasonal temperature drops below minus 10 degrees C.

.4 Retain natural form and shape of plant species.

.5 Do not:

.1 Flush cut branches.

.2 Crush or tear bark.

.3 Cut behind branch bark ridge.

.4 Damage branch collars.

.5 Damage branches to remain.

3.03 PRUNING

.1 Tree pruning work must be completed by a Certified Arborist (CA) with a valid Tree Cutting Service License issued by the City of Hamilton in accordance with approved Public Tree Permit.

.2 Remove dead, dying, and diseased limbs from tree. Pruning of limbs over 10cm is not

permitted without a Public Tree Permit issued by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

3.04 PRUNING OF OAK TREES

.1 Avoid pruning Oak (*Quercus*) species from April 1st through October 31st, which is considered a high-risk period for the spread of Oak Wilt. If an Oak species must be pruned during the high-risk period notify the Manager of Forestry and Horticulture, City of Hamilton or authorized designate to receive approval for the pruning and oversee the pruning. Immediately (within 15 minutes) after pruning, paint the pruning cut with pruning paint.

.2 Winter (December, January and February) is the best time to prune Oak species and if pruning occurs within this time frame, pruning paint does not need to be applied to the wound.

.3 If an Oak species is accidentally damaged during construction and a wound is created during the high-risk period, immediately (within 15 minutes) paint the wound with pruning paint and notify the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.4 If Oak Wilt is detected immediately notify the Canadian Food Inspection Agency by e-mailing OakWiltReportingOntario-Fletrissementduchene@inspection.gc.ca. and follow the Canadian Food Inspection Agency's guidelines for containing the infestation, which may include removing and chipping or burning the infested trees, including the stumps, and breaking root connections with nearby oak trees. All costs to do the Work will be incurred by Contractor.

3.05 CLEAN-UP

.1 Collect and dispose of pruned material and remove from site.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 00 33 00 – Submittal Procedures

.2 Section 01 33 00.01 – Public Tree Permitting

.3 Section 01 77 00 – Closeout Submittals and Procedures

.4 Section 02 50 00 – Soil Mitigation for Existing Public Tree in Soft Surfaces

.5 Section 02 50 00.01 – Soil Protection for Public Trees

.6 Section 31 11 00 – Selective Public Tree Removal

.7 Section 32 01 90.23 – Public Tree Pruning

1.02 DEFINITIONS

.1 Dripline: The area defined by the outermost circumference of a tree canopy.

.2 Permit: means a Public Tree Permit issued by the Manager of Forestry and Horticulture, City of Hamilton.

1.03 REFERENCE STANDARDS

.1 Canadian Society of Landscape Architects (CSLA)/ Canadian Nursery Landscape Association (CNLA)

.1 Canadian Landscape Standard 2016, First Edition

.2 Department of Justice Canada (Jus)

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.3 Health Canada - Pest Management Regulatory Agency (PMRA)

.1 National Standard for Pesticide Education, Training and Certification in Canada (1995).

.4 American National Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Management – Standard Practices (Root Management)

.1 ANSI A300 – 2013 Root Management

1.04 ADMINISTRATIVE REQUIREMENTS

.1 Review of Tree Protection Fencing:

.1 Install a mock-up of tree protection fencing around the dripline of a public tree asset to remain for review by Manager of Forestry and Horticulture, City of Hamilton or authorized designate prior to proceeding with any Work, including, but not limited to equipment staging and preparatory Works. If approved, mock-up may remain as part of final installed tree protection fencing.

.2 Install all tree protection fencing per the approved Tree and Soil Management Plan for review by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate prior to proceeding with any Work, including, but not limited to equipment staging and preparatory Works.

.3 Coordinate locations of tree protection fencing with soil protection fencing in accordance with Section 02 50 00.01 – Soil Protection for Public Trees.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Watering Schedule during construction.

.3 Product Data:

.1 Mulch source.

.2 Imported topsoil testing conducted by a Canadian Standards Association (CSA) accredited laboratory. Laboratory testing must include Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) texture analysis, soluble salts, nitrogen, Phosphorus, Potassium, Calcium, Magnesium, organic matter content, pH value, cation exchange capacity, and growth inhibiting herbicides.

.4 Warranty Submittals:

.1 Provide a written report once every 3 months on maintenance during warranty period, to Manager of Forestry and Horticulture, City of Hamilton or authorized designate identifying:

.1 Maintenance work carried out, including watering schedule and fertilization application.

.2 Development and condition of plant material.

.3 Preventative or corrective measures required which are outside Contractor responsibility.

1.06 DELIVERY, STORAGE AND HANDLING

.1 Storage and Handling Requirements:

.1 Store and protect tree protection materials from defects and deformations.

.2 Replace defective or damaged materials with new.

1.07 MAINTENANCE DURING WARRANTY PERIOD

.1 From time of acceptance by Manager of Forestry and Horticulture, City of Hamilton or authorized designate to end of warranty period **(2-year warranty period),** perform following maintenance operations.

.1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion. Water must provide adequate soil moisture within the top 150 to 250 mm of soil. Watering must occur weekly through periods of drought and every other week throughout the summer months (June, July, August and September).

.3 Apply fertilizer in early spring in accordance with manufacturer's suggested rate. Submit recommended fertilization program to Manager of Forestry and Horticulture, City of Hamilton or authorized designate for approval at the beginning of April prior to fertilizing.

.4 Remove dead, broken or hazardous branches from plant material in accordance with Section 32 01 90.23 – Pruning.

.2 If the health and condition of an existing public tree asset declines during the warranty period and must be removed due to its poor or dead condition rating in the opinion of the Manager of Forestry and Horticulture, or authorized designate then Contractor must pay for and remove the public tree asset, including stump removal in accordance with Section 31 11 00 – Selective Public Tree Removal, using a Certified Arborist with a valid Tree Cutting Service License issued by the City of Hamilton, pay for the loss of canopy fees to the City of Hamilton's Forestry and Horticulture Section as calculated by the Manager of Forestry and Horticulture, or authorized designate, and pay for a replacement tree to the City of Hamilton's Forestry and Horticulture Section in accordance with the City of Hamilton's Approved User Fees and Charges (fees used will be based on current edition at time of removal). The City of Hamilton will replant a new tree in a suitable location as determined by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

2 PRODUCTS

2.01 MATERIALS

.1 Imported Topsoil:

.2 A fertile, friable, natural loam (A horizon layer), capable of sustaining vigorous plant growth, free of subsoil contamination, stones over 30mm in diameter, roots and fragments over 40mm diameter, free of weeds, and meeting the following requirements:

Soil Texture Range (OMAFRA soil texture triangle):	Loam to sandy loam
pH range:	5.5 to 7.2
Organic Matter (%):	5% to 15%
P - Phosphorus (ppm):	10 – 60
K - Potassium (ppm):	80 – 250
Mg - Magnesium (ppm):	100 – 300
Ca - Calcium (ppm):	1000 – 5000
Soluble Salt / Salt Conductivity:	less than 1.0mmhos/cm
Cation Exchange Capacity:	greater than 20meq/100g
Percent Organic Matter:	2.5 – 5%

.2 Fertilizer:

.1 To Canada Fertilizer Act and Fertilizers Regulations.

.2 Complete, commercial, slow release with 35% of nitrogen content in water-insoluble form.

.3 Root Curtain:

.1 Filter Cloth: Type 2: biodegradable burlap.

.2 Wood posts: 38 x 89 x 2400 mm length, untreated wood.

.3 Welded wire fabric (WWF): 100 x 100 mm, MW 11.1 x MW 11.1, to CSA G30.18.

.4 Tree Protection Fencing: steel T-rail posts 40 x 40 x 5 x 2440 mm, at 1800 mm o.c., 38 mm x 96 mm wood nailer secured to posts, with 1200 mm high snow fencing attached to posts and wood nailer with 9 gauge wire, 13 per post.

.5 Mulch: Composted bark mulch free of invasive and noxious plants, seeds or their reproductive parts, soil, stones, roots or other extraneous materials with a uniform texture and colour.

.6 Water: free of any contaminants or impurities that would adversely affect the growth of vegetation.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for the installation of tree protection fencing and tree protection measures in accordance with approved Tree Management Plan.

.1 Visually inspect areas that are to receive tree protection fencing and inform Manager of Forestry and Horticulture, City of Hamilton or authorized designate of discrepancies between site conditions and the requirements of the Tree Management Plan immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

3.02 WORK NEAR TREES

.1 Prior to any Work activity, Contractor must have an approved Public Tree Permit obtained from the Manager of Forestry and Horticulture, City of Hamilton or authorized designate in accordance with Section 01 33 00.01 – Public Tree Permitting.

.2 Unless an approved Public Tree Permit obtained from the Manager of Forestry and Horticulture, City of Hamilton or authorized designate, no Work within the dripline of existing trees to remain or activities that could negatively impact existing trees to remain can occur. Prohibited activities within the dripline of an existing tree to remain include:

.1 Do not place any materials or equipment, including outhouses.

.2 Do not attach signs, notices or posters to a tree.

.3 Do not raise or lower the existing grade.

.4 Tunnel or bore when digging.

.5 Do not damage the root system, trunk, or branches of any trees.

.6 Ensure that exhaust fumes from all equipment are not directed toward any tree

canopy.

.7 Do not extend hard surfacing or significantly change landscaping.

.8 Do not dispose of any liquids or harmful substances.

.3 Removal activities within the dripline of existing trees to remain must be submitted and approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate. Submission must include a plan of the area showing all Work that is to occur and identify construction methods. All removals within the dripline of an existing tree to remain, or in direct contact with the critical root zone must be done manually. Equipment such as backhoes or bob cats shall not be used to remove or break up material.

.4 The Manager of Forestry and Horticulture, City of Hamilton or authorized designate must be notified immediately when any municipally owned tree is impacted during construction that was not authorized through the approved Public Tree Permit, such as broken limbs, scrapes and abrasions to trunks and / or limbs or exposed or severed roots. The Manager of Forestry and Horticulture, City of Hamilton or authorized designate will identify mitigation measures that Contractor is responsible for completing within 5 business days. Mitigation measures must be completed by a Certified ISA Arborist and may include:

.1 Decompaction / aeriation of soil using pneumatic aeration tools in accordance with Section 02 50 00 – Soil Mitigation for Existing Public Tree in Soft Surfaces;

.2 Mulching of dripline or critical root zone in accordance with Section 02 50 00 – Soil Mitigation for Existing Public Tree in Soft Surfaces;

.3 Pruning of damaged branches;

.4 Bark tracking around stem wounds;

.5 Root pruning;

.6 Fertilization;

.7 Other treatments, as deemed necessary; or,

.8 Removal of tree in accordance with Section 31 11 00 – Selective Public Tree Removal if mitigation techniques will not be sufficient to preserve the health of the existing tree. If removal is required, Contractor must pay for and remove the public tree asset, including stump removal, using a Contractor with a valid Tree Cutting Service License issued by the City of Hamilton, pay for the loss of canopy fees to the City of Hamilton's Forestry and Horticulture Section as calculated by the Manager of Forestry and Horticulture, or authorized designate, and pay for a replacement tree to the City of Hamilton's Forestry and Horticulture Section in accordance with the City of Hamilton's Approved User Fees and Charges (fees used will be based on current edition at time of removal). The City of Hamilton will replant a new tree in a suitable location as determined by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

3.03 INSTALLATION OF TREE PROTECTION FENCING

.1 Identify existing trees assets and limits of root systems to be preserved per the approved Public Tree Permit obtained from the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 Protect plant and root systems from damage, compaction and contamination resulting from construction as approved by the Manager of Forestry and Horticulture, City of Hamilton or

authorized designate.

.3 Install tree protection fencing at dripline of all existing trees to remain and per the approved Public Tree Permit obtained from the Manager of Forestry and Horticulture, City of Hamilton or authorized designate. If existing trees are identified that are not on the approved Public Tree Permit obtained from the Manager of Forestry and Horticulture, City of Hamilton or authorized designate, contact the Manager of Forestry and Horticulture, City of Hamilton or authorized designate to review the tree and confirm tree protection measures. Contractor is responsible for paying for and installing the tree protection measures.

.1 Tree protection fencing must be at least 1.2 metres in height and constructed of rigid or framed materials (e.g. moduloc – steel, plywood hoarding) with steel t-bar posts, such that the fence location can not be altered. Snow fencing must be secured to posts and wood frame using galvanized wire. All supports and bracing must be placed outside of the dripline and installation must minimize damage to existing roots.

.2 "Tree Protection Zone" signage must be installed on all closed loop segments of tree protection fencing. It is the Contractors responsibility to supply, install, maintain and remove the "Tree Protection Zone" signage. Signs must be strapped to the tree protection fencing and supported using adequate fasteners to ensure that the sign is secured against any movement and is clearly visible. Signs must be a minimum of 15 inches x 24 inches and made of lightweight "Coreplast" material.

.4 If the tree protection fencing can not extend to the dripline of an existing tree to remain, contact the Manager of Forestry and Horticulture, City of Hamilton or authorized designate to review and approve adjusted tree protection fencing location.

.5 Final approval of all locations of tree protection fencing from the Manager of Forestry and Horticulture, City of Hamilton or authorized designate must be received prior to the commencement of any Works.

.6 Tree protection fencing must remain in place until all Work is complete and the Manager or Forestry and Horticulture, City of Hamilton or authorized designate confirms that the fencing can be removed.

3.04 ROOT CURTAIN SYSTEM

SPEC NOTE: Use the following paragraphs when excavating adjacent to trees to be retained. Contract Drawings should indicate layout and dimensioning.

.1 Identify limits for required construction excavation as approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 Before construction excavation, hand dig trench or use non-invasive excavation techniques, such as pneumatic soil excavation as approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate, minimum 500 mm wide x 1500 mm deep, along perimeter of excavation limits.

.3 Prune exposed roots cleanly at side of trench nearest plants to be preserved. Pruned ends to point obliquely downwards.

SPEC NOTE: When depth of excavation for walls, foundations, and footings exceeds 1500 mm, provide additional support for posts and curtain as required.

.4 Install wooden posts and welded wire fabric against construction edge of trench.

.5 Securely attach Type 2 filter fabric on plant side of wire mesh.

.6 Prepare homogeneous mixture of fertilizer, parent material and organic matter.

.1 Add organic matter to mixture to achieve 7-9 % organic matter content by weight.

.2 Incorporate with mixture grade 2:12:8 ratio fertilizer (dry) at rate of 1.5 kg/m ^{3}.

.7 Backfill with approved imported topsoil between curtain wall and plants to be preserved in layers not exceeding 150 mm in depth. Compact each layer to 85 % Standard Proctor Density.

.8 Protect root curtain from damage during construction operations.

.9 Water plants and root curtain sufficiently during construction to maintain optimum soil moisture condition until backfill operations are complete.

.10 Remove root curtain before during backfill operations, unless otherwise noted or approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

3.05 EXCAVATION AND TUNNELING

.1 Do not excavate or tunnel within the dripline of existing trees to remain unless approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate. Non-invasive trenching and tunneling methods that incur the least damage to existing trees are required when working within their dripline, such as directional boring, hydro-vacuuming, hand-digging and / or pneumatic soil excavation. Centre line location and limits of trench / tunnel excavation within dripline of existing trees and the construction methods must be approved by Manager of Forestry and Horticulture, City of Hamilton or authorized designate before excavation.

.2 Underground servicing Work that must be installed within the dripline of an existing tree to remain or that may impact the critical root zone of an existing tree to remain must be done using trenchless technology and must be approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate. Trenchless technology must also be used where a tree root with a diameter of 20mm or larger is encountered within a trench.

.3 Manual excavation is required for any new hardscape surface Work that must be installed within the dripline of an existing tree to remain or that may impact the critical root zone of an existing tree. If roots greater than 40mm diameter are uncovered, immediately notify the Manager of Forestry and Horticulture, City of Hamilton or authorized designate and obtain approval prior to severing the roots. Protect roots, and cut roots cleanly with sharp disinfected tools.

.4 For servicing that can not be installed using trenchless technologies hydro-vacuum excavation equipment must be used and in areas where tree roots 40mm diameter or greater are encountered. Excavation must remain a minimum of 2 metres from edge of trunk on either side. The following protection layers are required during work:

.1 Protection layer for foot traffic: permeable landscape fabric, 100mm layer of wood chip mulch and 14mm (3/8”) plywood (or equivalent material such as rubber mats or steel plates if plywood is not sufficient).

.2 Protection layer for light vehicle traffic: permeable landscape fabric, 200mm layer of wood chip mulch and 19mm (3/4”) plywood (or equivalent material such as rubber mats or steel plates if plywood is not sufficient).

.3 Protection layer for heavy vehicle traffic: permeable landscape fabric, 300mm layer of

wood chip mulch and rubber mats or steel plates.

.5 Keep roots moist by spraying or covering with moist burlap while the roots are exposed during the excavation and before backfilling.

.6 Protection measures are required such as temporarily mulching 100 mm to 150 mm within the tree's dripline or using straw mats or plywood on the ground to alleviate soil compaction.

.7 Backfill for trench to 85% Standard Proctor Density with clear approved fill. Avoid damage to trunk and roots of tree.

.8 Complete excavation and backfilling at tree within one (1) weeks of beginning Work.

3.06 PRUNING

.1 If a tree needs to be pruned, contact the Manager of Forestry and Horticulture, City of Hamilton or authorized designate for approval. If approved by the Manager of Forestry and Horticulture, City of Hamilton, prune in accordance with Section 32 01 90.23 – Pruning. Prune promptly broken or damaged limbs incurred as a result of construction with proper cuts by a Certified Arborist (CA) and with a valid Tree Cutting Service License issued by the City of Hamilton.

3.07 ROOT PRUNING

.1 Root pruning must comply with arboriculture best practices ANSI A300 – 2013 Root Management Standard.

.2 Root pruning for root(s) greater than 20mm in diameter must be completed by a Certified Arborist (CA) with a valid Tree Cutting Service License issued by the City of Hamilton. The Manager of Forestry and Horticulture, City of Hamilton or authorized designate must be on-site to review root pruning of any roots with a diameter of 20mm or greater.

.3 Root pruning for roots less than 20mm can be completed by Contractor. Roots must be cleanly cut with a clean, sharp tool, such as hand pruners or loppers to the limits of excavation.

.4 Areas where roots with a diameter of 20mm or greater are exposed, they must be cut flush with a sharp saw and then backfilled with clean loam to protect from contamination or damage.

.5 Contractor shall, wherever possible, avoid cutting surface roots. If root cuts are necessary, they should be done quickly, making smooth flush cuts. The roots shall be back-filled and watered before they have a chance to dry out.

3.08 WATERING

.1 Existing trees to remain must be watered weekly during the months of June, July, August and September throughout the construction period. Contractor must submit the watering schedule to the Manager of Forestry and Horticulture or designate for review prior to starting Work.

.2 Water trees to ensure moisture penetrates the top 150 mm to 250 mm of soil.

3.09 MULCHING

.1 For existing trees that will remain, install a 75mm layer of mulch beginning 100 mm away from the trunk of the tree for trees with a DBH of less that 300mm or 200mm away from

the trunk of the tree for trees with a DBH of 300mm or greater.

.2 Extend mulch to 600mm beyond dripline of tree, to a maximum of 5m radius, or as otherwise approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.3 For existing trees that will remain, but require additional protection layers due to anticipate construction foot traffic or equipment, refer to Item 3.05 Excavation and Tunneling.

.4 For existing tree that will remain, but that require soil mitigation due to unanticipated or anticipate construction impacts complete work in accordance with Section 02 50 00 – Soil Mitigation for Existing Public Trees in Soft Surfaces prior to applying mulch layer.

3.10 WORKING NEAR OAK TREES

.1 If an Oak species is accidentally damaged during construction and a wound is created during the high-risk period, from April 1st through October 31st, immediately (within 15 minutes) paint the wound with pruning paint and notify the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 If Oak Wilt is detected immediately notify the Canadian Food Inspection Agency by e-mailing OakWiltReportingOntario-Fletrissementduchene@inspection.gc.ca. and follow the Canadian Food Inspection Agency's guidelines for containing the infestation, which may include removing and chipping or burning the infested trees, including the stumps, and breaking root connections with nearby oak trees. All costs to do the Work will be incurred by Contractor.

3.11 CLEANING

.1 Leave Work area clean at end of each day and ensure all tree protection fencing is in good working order. Repair any damaged, falling, or sagging tree protection fencing at the start and end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment. Obtain approval from the Manager of Forestry and Horticulture, City of Hamilton or designate prior to removing tree protection fencing.

3.12 CLOSEOUT ACTIVITIES

.1 Submit tree maintenance schedule in accordance with Section 01 77 00 – Closeout Submittals and Procedures for review by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 03 30 00 – Cast-in-Place Concrete

.3 Section 01 77 00 - Closeout Submittals and Procedures

.4 Section 32 93 10.01 – Public Tree Planting in Hard Scape

1.02 DEFINITIONS

.1 AODA: means the Accessibility for Ontarians with Disabilities Act, 2005 and the Design of Public Spaces Standard.

1.03 REFERENCE STANDARDS

.1 ASTM International (ASTM):

.1 ASTM A53/A53M-22, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

.2 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

.3 ASTM A153/A153M-16a, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

1.04 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data for tree grates and mounted bench:

.1 Provide manufacturer’s instructions, printed product literature and data sheets for furniture and include product characteristics, performance criteria, physical size, finish, limitations and total quantity.

.3 Shop Drawings for decorative planter railing and mounted bench:

.1 Submit shop drawing stamped and signed by a professional engineer licensed in the Province of Ontario, Canada indicating materials, finishes, dimensions, sizes, assembly, anchorage and installation details for each furnishing specified.

.2 Coordinate shop drawing with Section 03 30 00 – Cast-in-Place Concrete.

1.05 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for care and cleaning of site furnishings for incorporation into manual specified in Section 01 77 00 - Closeout Submittals and Procedures.

1.06 QUALITY ASSURANCE

.1 If proposing an alternative product, Contractor is responsible for ensuring that the product is equivalent or better in performance, can conform to the layout plan and detailed design identified in the Contract Drawings, is a compatible system and complies with all safety

and legislative requirements. Proposed alternatives must follow the same overall aesthetic and colour scheme as the furnishings in the original design.

.2 The Manager of Forestry and Horticulture, City of Hamilton or authorized designate must approve the submitted alternative.

.3 Coordinate all Works with Section 32 93 10.01 – Public Tree Planting in Hard Scape.

1.07 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect furnishings from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.08 WARRANTY

.1 Provide manufacturer's standard warranty against defects in material and workmanship to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

2 PRODUCTS

2.01 TREE GRATES

SPEC NOTE: Tree grates shall only be used when it's proven to the Manager of Forestry and Horticulture that the design can not accommodate an open planting pit.

.1 Tree grates: cast from 100% gray iron or aluminum.

.1 Out perimeter:

.1 Must be square or rectangular.

.2 Must be a minimum of 1.75m wide and long.

.2 Inner ring:

.1 Must provide a trunk opening of 600mm.

.3 Slot sizes: maximum slot openings must comply with the AODA.

.4 Finish: cast-iron, natural.

.2 Tree grate must sit flush with surrounding grade.

.3 Tree grate must accommodate a typical root ball diameter of 750mm with a minimum free space of 300mm between edge of root ball and edge of tree grate opening.

.4 Tree grate must be offset a minimum of 500mm from back of curb.

.5 Acceptable product: Parkway Tree Grate or Sunburst Tree Grate, with largest inner ring opening.

.1 Manufacturer: Iron Smith

.2 Website: https://ironsmith.cc/contact-us/

.3 Supplier: Park Street Solutions, kevin@parkst.ca

.6 Coordinate with Section 03 30 00 – Cast-in-Place Concrete.

.1 Provide concrete subcontractors with copies of reviewed product data and setting templates.

2.02 DECORATIVE PLANTER RAILING (OPTIONAL)

SPEC NOTE: Use decorative metal railings in heavily trafficked areas and / or Business Improvements Areas (BIA's).

.1 Basic construction material: metal suitable for exterior use and exposure to salts and moisture. Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.1 Steel Tube: formed to shapes and sizes as indicated.

.2 Finish for Exterior Railings: Galvanized steel with zinc-rich primer.

.3 Colour: black.

.2 Coordinate with Section 03 30 00 – Cast-in-Place Concrete.

.1 Provide concrete Subcontractors with copies of reviewed shop drawings and setting templates.

2.03 MOUNTED BENCH

.1 Mounted bench affixed to raised planter wall. Bench dimensions and mounting hardware must be coordinated with Contract Drawings and compatible with raised planter wall.

.1 Seat: high density polyethylene (HDPE), jatoba wood or approved alternative.

.2 Seat colour: natural 'wood' colour finish for HDPE material or approved alternative. If wood product is selected, natural finish.

.3 All steel components shall be protected with e-coat rust proofing and all metal surfaces shall have powdercoat finishes.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for exterior site furnishing installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 Inform Manager of Forestry and Horticulture, City of Hamilton or authorized designate of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

3.02 PREPARATION

.1 Locate and protect utility lines.

.2 Notify and acquire written acknowledgement from utility authorities before beginning installation Work

3.03 INSTALLATION

.1 Assemble furnishings in accordance with manufacturer's written recommendations. Supply sleeves, bolts, anchors, template, etc. required by other trades, for building the units specified.

.2 All site furnishings to be located in accordance with the Contract Drawings. Contractor must obtain approval from Manager of Forestry and Horticulture, City of Hamilton or authorized designate of site furnishing locations prior to installation.

.3 For decorative planter railing and mounted bench: Install in accordance with reviewed shop drawings, square, plumb, straight, true, accurately fitted, and with tight joints and intersections.

.1 Touch up galvanized surfaces burned by site welding with zinc-rich primer after installation.

.2 Zinc-rich primer: In accordance with FINISHES in this Section.

.4 Install furnishing true, plumb, anchored as indicated on Contract Drawings.

.5 Touch-up damaged finishes to approval of Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.6 Provide suitable anchorage such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles as indicated on reviewed shop drawings and in accordance with manufacturer's written recommendations.

.7 Provide exposed fastening devices to match finish and be compatible with material through which they pass.

3.04 CLEANING

.1 Progress Cleaning:

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.05 PROTECTION

.1 Protect installed products and components from damage during construction. Damaged site furnishings will be rejected and must be replaced by Contractor at no additional cost.

.2 Repair damage to adjacent materials caused by site furnishings installation.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 33 00.01 – Public Tree Permitting

.3 Section 01 77 00 – Closeout Submittals and Procedures

.4 Section 02 50 00 – Soil Mitigation for Existing Public Tree Plantings in Soft Surfaces

.5 Section 02 50 00.01 – Soil Protection for Public Trees

.6 Section 32 01 90.23 – Public Tree Pruning

1.02 DEFINITIONS

.1 Mycorrhiza: Association between fungus and roots of plants. This symbiosis enhances plant establishment in newly landscaped and imported soils.

.2 Permit: means a Public Tree Permit issued by the Manager of Forestry and Horticulture, City of Hamilton.

1.03 REFERENCE STANDARDS

.1 National Resources Canada (NRCan):

.1 Canada's Plant Hardiness Zones, current edition.

.2 Canadian Society of Landscape Architects (CSLA) / Canadian Nursery Landscape Association (CNLA):

.1 Canadian Landscape Standard, 2020.

.2 Canadian Nursery Stock Standard 2017, Ninth Edition.

.3 Support Document for Compost Quality Criteria:

.1 National Standard of Canada CAN/BNQ 0413-200, Canadian Council of Ministers of the Environment (CCME) Guidelines and Agriculture and Agri-Food Canada (AAFC) Criteria.

1.04 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling: obtain approval from Manager of Forestry and Horticulture, City of Hamilton or authorized designate of schedule seven (7) days in advance of shipment of plant material.

.2 Schedule to include:

.1 Quantity and type of plant material.

.2 Shipping dates.

.3 Arrival dates on site.

.4 Planting dates.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures to the Manager of

Forestry and Horticulture, City of Hamilton or authorized designate for review.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for mycorrhiza, watering bag and mulch and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit samples of mulch.

.4 Testing:

.1 Submit imported topsoil testing conducted by a Canadian Standards Association (CSA) accredited laboratory. Laboratory testing must include Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) texture analysis, soluble salts, nitrogen, Phosphorus, Potassium, Calcium, Magnesium, organic matter content, pH value, cation exchange capacity, and growth inhibiting herbicides.

.5 Plans:

.1 Submit Landscape Plans and planting lists in accordance with Section 01 22 00.02 – Public Tree Permitting.

.2 Submit Decompaction Plans in accordance with Section 02 50 00 – Soil Mitigation for Existing Public Tree Plantings in Soft Surfaces.

.6 Warranty Submittals:

.1 Provide a written report once every 3 months on maintenance during warranty period, to Manager of Forestry and Horticulture, City of Hamilton or authorized designate identifying:

.1 Maintenance work carried out, including watering schedule and fertilization application.

.2 Development and condition of plant material.

.3 Preventative or corrective measures required.

1.06 QUALITY ASSURANCE

.1 Qualifications: Provide proof of qualifications when requested by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.1 Landscape Contractor: to be a Member in Good Standing of the International Society of Arboriculture.

1.07 DELIVERY, STORAGE, AND HANDLING

.1 No plant shall be harvested or transported from the time of bud break until the newly formed leaves are fully developed and matured. Any plant to be planted after the emergence of leaves, shall be harvested prior to bud break and stored in a partially shaded area protected from wind and extreme weather exposure.

.2 Delivery and Acceptance Requirements:

.1 Supply and deliver plant material specified on the approved Landscape Plan.

.2 Protect plant material from frost, excessive heat, wind and sun during delivery.

.3 Protect plant material from damage during transportation:

.1 Delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.

.2 Delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.

.3 Protect foliage and root balls using tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.

.4 Carefully tie all branches before transporting.

.3 Storage and Handling Requirements:

.1 Immediately store and protect plant material which will not be installed within one (1) hour.

.2 Plants must be handled by the root ball or container, and under no circumstances shall plants be dragged or pulled by the trunk or foliage.

.3 Protect stored plant material from frost, wind and sun to ensure planting success as follows:

.1 For pots and containers, maintain moisture level in containers.

.2 For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

.4 Plants delivered to the job site may be rejected by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate if there are any abrasions, damage or deformations to the plant material.

.5 Bulk materials:

.1 Do not deliver or place soils and soil amendments in frozen, wet, or muddy conditions.

.2 Provide protection including tarps, plastic or matting between all bulk materials and any finished surfaces sufficient to protect the material.

.3 Provide erosion-control and dust control measures to prevent erosion or displacement of bulk materials, including airborne dust particles. Use water only for dust control.

1.08 SUBSTITUTIONS

.1 Supply and install plant material as specified on the approved Landscape Plans. Substitutions of size, species or cultivar must be submitted in writing and approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

1.09 PLANTING SEASON

.1 Trees shall be planted in the spring following ground thaw, or in the fall between leaf-drop and ground freeze up. Trees planted outside of this window must be approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate prior to ordering the trees and a watering and maintenance regime must be submitted at the time of request by Contractor.

1.10 WARRANTY

.1 All public trees must be warrantied for a period of two (2) years from the date the installed

trees are approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.1 Warranty inspections shall be completed by the Manager of Forestry and Horticulture, City of Hamilton after leaf-on and before leaf-out during the first year and second year of the warranty period.

.2 During the warranty period, Contractor is responsible for replacing all material that is dead or not in a satisfactory, healthy growing state or which does not meet the requirements of this specification, at the sole discretion of the Manager of Forestry and Horticulture, City of Hamilton or authorized designate, at no extra cost to the contract.

.3 All replacements must be plants of the same size and species, as shown on the approved Landscape Plans and planting in accordance with this specification.

.4 Replacement plantings must be done within 4 weeks of notification by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate. Waiting until the end of the warranty period to replace plant material is not acceptable.

.3 End-of-warranty inspection will be conducted by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.4 The Manager of Forestry and Horticulture, City of Hamilton or authorized designate reserves the right to extend Contractor's warranty responsibilities for an additional one year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.

2 PRODUCTS

2.01 PLANT MATERIAL

.1 Type of root preparation, sizing, grading and quality: comply to Canadian Nursery Stock Standard.

.1 Source of plant material: grown in Zone 6a or Zone 6b, depending on location within the Municipal boundary in accordance with Plant Hardiness Zones in Canada.

.2 All native trees shall be source identified and have originated in Seed Zone 37. Native trees sources outside of Seed Zone 37 must be approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 Plant material shall be planted in zone specified as appropriate for its species.

.3 Plant material in location appropriate for its species.

.2 Trees:

.1 Free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.

.2 With straight trunks, well and characteristically branched for species.

.3 Healthy, vigorous, fees from defects, decay, diseases, sunscald injuries, bark abrasions, insect pests and all forms of infestation or objectional disfigurements.

.4 Balled and burlapped trees shall have solid root balls and root ball size must be large enough to accommodate at least 75% of the fibrous root system.

.5 Trees must conform to the following sizes:

.1 Deciduous Trees:

Caliper (mm)	Minimum Acceptable Root Ball Diameter (cm)
50mm	70cm
60mm	75cm
70mm	80cm
80mm	85cm

.2 Coniferous Trees (shall not be planted within the public right-of-way unless approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate):

Height (cm)	Minimum Acceptable Root Ball Diameter (cm)
175cm	60cm
200cm	70cm
225cm	75cm
250cm	80cm

2.02 WATER

.1 Free of impurities that would inhibit plant growth.

2.03 WATERING BAGS

.1 Slow release watering bag capable of holding 20 gallons of water.

2.04 SOIL

.1 On-site topsoil:

.1 Tested on-site topsoil meeting the requirements for imported topsoil or can be modified to meet the requirements for imported topsoil.

.2 Topsoil is defined as the existing “A” horizon layer and contains organic matter.

.3 If on-site topsoil is being stripped and stored on site, it may be reused if it meets the requirements for imported topsoil or can be modified to meet the requirements for imported topsoil. Stripped topsoil identified for re-use must be cleared of all scrub, weeds, grass, stumps, and rocks over 75mm and over and all other extraneous materials. On-site topsoil can not be mixed with other horizon layers if it is to be re-used as a growing medium and must be stockpiled in an area protected against contamination and compaction.

.2 Imported topsoil:

.1 A fertile, friable, natural loam (A horizon layer), capable of sustaining vigorous plant growth, free of subsoil contamination, stones over 30mm in diameter, roots and fragments over 40mm diameter, free of weeds, and meeting the following requirements:

Soil Texture Range (OMAFRA soil texture triangle):	Loam to sandy loam
pH range:	5.5 to 7.2
Organic Matter (%):	5% to 15%
P - Phosphorus (ppm):	10 – 60
K - Potassium (ppm):	80 – 250
Mg - Magnesium (ppm):	100 – 300
Ca - Calcium (ppm):	1000 – 5000
Soluble Salt / Salt Conductivity:	less than 1.0mmhos/cm
Cation Exchange Capacity:	greater than 20meq/100g
Percent Organic Matter:	2.5 – 5%

2.05 COMPOST

.1 Category A compost (unrestricted use) in accordance with the Canadian Council of Ministers of the Environment (CCME) free of weeds, free of heavy metals or other deleterious contaminants and have an EC of less than 4.0mmmhos/cm.

2.06 STAKES

.1 Wood, pointed one end, 38 x 38 x 2300 mm.

2.07 TREE STAKE TIE

.1 Use approved tree stake tie per the City of Hamilton's Construction Material Specifications Manual available at https://www.roadauthority.com/ASP/mpl/mpl.asp?MPIShortName=Hamilton+MPL.

2.08 TRUNK PROTECTION

.1 Plastic forms 25cm high tree trunk wrap. Use approved tree guard per the City of Hamilton's Construction Material Specifications Manual available at https://www.roadauthority.com/ASP/mpl/mpl.asp?MPIShortName=Hamilton+MPL.

2.09 MULCH

.1 Mulch used shall be one of the following:

.1 Bark chip: varying in size from 25 to 50 mm in diameter, from bark of coniferous trees.

.2 Shredded wood: varying in size from 25 to 125 mm in length, from coniferous trees.

2.10 MYCORRHIZA

.1 Apply Root Rescue Transplanter MS-CS, or approved alternative, as recommended by manufacturer's written recommendations.

.1 Ensure new root growth is in contact with mycorrhiza.

2.11 SOURCE QUALITY CONTROL

.1 Obtain approval from the Manager of Forestry and Horticulture, City of Hamilton or authorized designate of plant material and plant material source before planting. Plant material imported from warmer plant hardiness zones are no acceptable and plant material sources within a 100 km radius of Hamilton is required, unless otherwise approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: Verify conditions of substrate previously installed under other Sections or Contracts are acceptable for planting installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 Inform Manager of Forestry and Horticulture, City of Hamilton or authorized designate of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

3.02 PRE-PLANTING PREPARATION

.1 Proceed only after receipt of written acceptability of plant material from Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 Remove damaged roots and branches from plant material in accordance with Section 32 01 90.23 – Public Tree Pruning.

.3 Locate and protect utility lines.

.4 Notify and acquire written acknowledgement from utility authorities before beginning excavation of planting pits for trees.

3.03 DECOMPACTION, EXCAVATION AND PREPARATION OF PLANTING BEDS

.1 For areas to receive planting where existing trees are not present proceed with the following decompaction and preparation techniques, unless soils have been protected during constriction with soil protection fencing in accordance with Section 02 50 00.01 – Soil Protection for Public Trees.

.1 Subsoiling:

.1 Spread mature, stable compost (add this to products) up to 100mm in depth over

compacted subsoil.

.2 Use a backhoe rear bucket with a tined bucket or approved alternative to break up compacted subsoil and incorporate compost into subsoil up to 600mm deep. Work backwards to ensure that treated soil is not trafficked by the equipment.

.3 Work the compost into the subsoil until clumps of compact soil are smaller than 300mm.

.4 To ensure that subsoiling has reached the appropriate depth, use a push tube soil sampler to verify that compost is present at 600mm depth.

.2 Replacement of topsoil:

.1 Spread approved topsoil over surface to minimum 150mm depth. Rototill topsoil to a depth of 150mm-200mm when soil is neither dry nor moist. Rototill to ensure that topsoil and subsoil layer mix by a minimum of 25mm.

.2 For individual planting holes:

.1 Stake out location and obtain approval from Manager of Forestry and Horticulture, City of Hamilton or authorized designate before excavating.

.2 Excavate to depth, width and angles as indicated on the Contract Drawings.

.3 Remove rocks, roots, weed clumps and grass from planting hole.

.4 Scarify sides of planting hole.

.5 Remove water which enters excavations before planting.

3.04 PLANTING

.1 For jute burlapped root balls, cut away top one third of wrapping and wire basket without damaging root ball.

.1 Do not pull burlap or rope from under root ball.

.2 For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.

.3 Plant vertically in locations as indicated on the Contract Drawings.

.1 Orient plant material to give best appearance in relation to structure, roads and walks.

.4 For trees and shrubs:

.1 Backfill topsoil in 150 mm lifts.

.1 Tamp each lift to eliminate air pockets.

.2 When two thirds of depth of planting pit has been backfilled, fill remaining space with water.

.3 After water has penetrated into soil, backfill to finish grade.

.2 Form watering saucer as indicated on the Contract Drawings.

.5 Water plant material thoroughly.

.6 After soil settlement has occurred, fill with soil to finish grade.

3.05 TRUNK PROTECTION

.1 Install trunk protection on deciduous trees as indicated on the Contract Drawings.

.2 Install trunk protection before installation of tree supports.

3.06 TREE SUPPORTS

.1 Install tree supports as indicated on the Contract Drawings.

.2 Use two (2) untreated wood stakes only. Guy wires with anchors and metal t-bars are not acceptable. Do not place any stakes within the root ball. Orient stakes in line with the prevailing wind.

.1 Drive stake 200 mm minimum into undisturbed soil beneath roots.

.2 Ensure stake is secure, vertical and unsplit.

.3 Do not girdle the tree trunk with the tree restraint. Create a loose restraint around the trunk as indicated on the Contract Drawings. Knot the tree restraints at 30mm away from the trunk.

.4 After tree supports have been installed, remove broken branches with clean, sharp tools and in accordance with Section 32 01 90.23 – Public Tree Pruning.

3.07 MULCHING

.1 Ensure soil settlement has been corrected before mulching.

.2 Cultivate planting soil and remove all weeds before placing approved mulch. Install mulch to cover soil of exposed trees saucers to 50mm at the trunk and increasing to 100mm depth at the perimeter.

3.08 WATERING BAGS

.1 Place watering bags in accordance with manufacturer's instructions. Fill watering bags weekly starting immediately after planting and for two (2) years following acceptance until completion of the warranty period.

3.09 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following maintenance operations from time of planting to acceptance by Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.1 Fill watering bags weekly starting immediately after planting and for two (2) years following acceptance until completion of the warranty period.

.2 Remove weeds every monthly during the growing season.

.3 Replace or re-spread damaged, missing or disturbed mulch.

.4 Use appropriate control methods if required, to control insects, fungus and disease, in accordance with federal, provincial and municipal regulations. Obtain product approval from Manager of Forestry and Horticulture, City of Hamilton or authorized designate before application.

.5 Remove dead or broken branches from plant material in accordance with Section 32 01 90.23 – Public Tree Pruning.

.6 Keep trunk protection in proper repair and adjustment.

.7 Remove and replace dead plants and plants not in healthy growing condition and

notify Manager of Forestry and Horticulture, City of Hamilton or authorized designate prior to removing and replacing. Make replacements in same manner as specified for original plantings.

3.10 MAINTENANCE DURING WARRANTY PERIOD

.1 From time of acceptance by Manager of Forestry and Horticulture, City of Hamilton or authorized designate to end of two (2) year warranty period, perform following maintenance operations.

.1 Fill watering bags weekly starting immediately after planting and for two (2) years following acceptance until completion of the warranty period.

.2 Remove weeds monthly during the growing season.

.3 Replace or re-spread damaged, missing or disturbed mulch.

.4 Use appropriate control methods if required, to control insects, fungus and disease, in accordance with federal, provincial and municipal regulations. Obtain product approval from Manager of Forestry and Horticulture, City of Hamilton or authorized designate before application.

.5 Remove dead or broken branches from plant material in accordance with Section 32 01 90.23 – Public Tree Pruning.

.6 Keep trunk protection in proper repair and adjustment.

.7 Remove trunk protection, tree supports and level watering saucers at end of warranty period.

.8 Remove and replace dead plants and plants not in healthy growing condition and notify Manager of Forestry and Horticulture, City of Hamilton or authorized designate prior to removing and replacing. Make replacements in same manner as specified for original plantings.

3.11 CLEANING

.1 Upon completion remove surplus materials, rubbish, tools and equipment.

3.12 CLOSEOUT ACTIVITIES

.1 Submit trees, shrubs and other plantings maintenance schedule in accordance with Section 01 77 00 – Closeout Submittals and Procedures for review by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 33 00.01 – Public Tree Permitting

.3 Section 01 77 00 – Closeout Submittals and Procedures

.4 Section 03 30 00 – Cast-in-Place Concrete, Curbed Planter Bed, Raised Planted Bed and Suspended Concrete Slab

.5 Section 32 01 90.23 – Public Tree Pruning

.6 Section 32 33 00 – Site Furnishings

.7 Section 32 93 10.02 – Public Tree Planting, Suspended Concrete Slab

.8 Section 32 93 10.03 – Public Tree Planting, Soil Cells

1.02 DEFINITIONS

.1 Mycorrhiza: Association between fungus and roots of plants. This symbiosis, enhances plant establishment in newly landscaped and imported soils.

.2 Permit: means a Public Tree Permit issued by the Manager of Forestry and Horticulture, City of Hamilton.

1.03 REFERENCE STANDARDS

.1 National Resources Canada (NRCan):

.1 Canada's Plant Hardiness Zones, current edition

.2 Canadian Society of Landscape Architects (CSLA) / Canadian Nursery Landscape Association (CNLA):

.1 Canadian Landscape Standard, 2020

.2 Canadian Nursery Stock Standard 2017, Ninth Edition

.3 Support Document for Compost Quality Criteria:

.1 National Standard of Canada CAN/BNQ 0413-200, Canadian Council of Ministers of the Environment (CCME) Guidelines and Agriculture and Agri-Food Canada (AAFC) Criteria

.4 City of Hamilton Public Works Construction and Materials Specifications Manual is referred to as C&MSM.

.5 Ontario Provincial Standard Specification is referred to as OPSS.

.1 The C&MSM shall take precedence over the OPSS.

.6 American Association of State Highway and Transportation Officials (AASHTO):

.1 AASHTO M288-21 "Table 1 Geotextile Strength Property Requirement.

1.04 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling: obtain approval from Manager of Forestry and Horticulture, City of Hamilton or

authorized designate of schedule seven (7) days in advance of shipment of plant material.

.2 Schedule to include:

.1 Quantity and type of plant material.

.2 Shipping dates.

.3 Arrival dates on site.

.4 Planting dates.

.3 Pre-Installation Meetings: Conduct a site meeting 1 week before beginning work of this Section and attended by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate, the site supervisor, and other related Subcontractors to:

.1 Verify project conditions of previously installed Works is acceptable to receive plant material.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate for review.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for mycorrhiza, watering bag and mulch and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit samples of mulch.

.4 Testing:

.1 Submit imported topsoil testing conducted by a Canadian Standards Association (CSA) accredited laboratory. Laboratory testing must include Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) texture analysis, soluble salts, nitrogen, Phosphorus, Potassium, Calcium, Magnesium, organic matter content, pH value, cation exchange capacity, and growth inhibiting herbicides.

.5 Plans:

.1 Submit Landscape Plans and planting lists in accordance with Section 01 33 00.01 – Public Tree Permitting.

.6 Mock-Ups:

.1 Construct mock-up of one entire curbed planter, one entire raised planter and a concrete stamp identifier in accordance with Section 03 30 00 – Cast-in-Place Concrete, Curbed Planter Bed, Raised Planter Bed and Suspended Concrete Slab.

.7 Warranty Submittals:

.1 Provide a written report once every 3 months on maintenance during warranty period, to Manager of Forestry and Horticulture, City of Hamilton or authorized designate identifying:

.1 Maintenance work carried out, including watering schedule and fertilization application.

.2 Development and condition of plant material.

.3 Preventative or corrective measures required.

1.06 QUALITY ASSURANCE

.1 Qualifications: Provide proof of qualifications when requested by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.1 Landscape Contractor: to be a Member in Good Standing of the International Society of Arboriculture.

1.07 DELIVERY, STORAGE, AND HANDLING

.1 No plant shall be harvested or transported from the time of bud break until the newly formed leaves are fully developed and matured. Any plant to be planted after the emergence of leaves, shall be harvested prior to bud break and stored in a partially shaded area protected from wind and extreme weather exposure.

.2 Delivery and Acceptance Requirements:

.1 Supply and deliver plant material specified on the approved Landscape Plan.

.2 Protect plant material from frost, excessive heat, wind and sun during delivery.

.3 Protect plant material from damage during transportation:

.1 Delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.

.2 Delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.

.3 Protect foliage and root balls using tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.

.4 Carefully tie all branches before transporting.

.3 Storage and Handling Requirements:

.1 Immediately store and protect plant material which will not be installed within one (1) hour.

.2 Plants must be handled by the root ball or container, and under no circumstances shall plants be dragged or pulled by the trunk or foliage.

.3 Protect stored plant material from frost, wind and sun to ensure planting success as follows:

.1 For pots and containers, maintain moisture level in containers.

.2 For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.

.4 Plants delivered to the job site may be rejected by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate if there are any abrasions, damage or deformations to the plant material.

.5 Bulk materials:

.1 Do not deliver or place soils and soil amendments in frozen, wet, or muddy conditions.

.2 Provide protection including tarps, plastic or matting between all bulk materials and any finished surfaces sufficient to protect the material.

.3 Provide erosion-control and dust control measures to prevent erosion or displacement of bulk materials, including airborne dust particles. Use water only for dust control.

1.08 SUBSTITUTIONS

.1 Supply and install plant material as specified on the approved Landscape Plans. Substitutions of size, species or cultivar must be submitted in writing and approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

1.09 PLANTING SEASON

.1 Trees shall be planted in the spring following ground thaw, or in the fall between leaf-drop and ground freeze up. Trees planted outside of this window must be approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate prior to ordering the trees and a watering and maintenance regime must be submitted at the time of request by Contractor.

1.10 WARRANTY

.1 All public trees must be warrantied for a period of two (2) years from the date the installed trees are approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.1 Warranty inspections shall be completed by the Manager of Forestry and Horticulture, City of Hamilton after leaf-on and before leaf-out during the first year and second year of the warranty period.

.2 During the warranty period, Contractor is responsible for replacing all material that is dead or not in a satisfactory, healthy growing state or which does not meet the requirements of this specification, at the sole discretion of the Manager of Forestry and Horticulture, City of Hamilton or authorized designate, at no extra cost to the contract.

.3 All replacements must be plants of the same size and species, as shown on the approved Landscape Plans and planting in accordance with this specification.

.4 Replacement plantings must be done within 4 weeks of notification by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate. Waiting until the end of the warranty period to replace plant material is not acceptable.

.2 End-of-warranty inspection will be conducted by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.3 The Manager of Forestry and Horticulture, City of Hamilton or authorized designate reserves the right to extend Contractor's warranty responsibilities for an additional one year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.

2 PRODUCTS

2.01 PLANT MATERIAL

.1 Type of root preparation, sizing, grading and quality: comply to Canadian Nursery Stock Standard.

.1 Source of plant material: grown in Zone 6a or Zone 6b, depending on location within the Municipal boundary in accordance with Plant Hardiness Zones in Canada.

.2 All native trees shall be source identified and have originated in Seed Zone 37. Native trees sources outside of Seed Zone 37 must be approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 Plant material shall be planted in zone specified as appropriate for its species.

.3 Plant material in location appropriate for its species.

.2 Trees:

.1 Free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.

.2 With straight trunks, well and characteristically branched for species.

.3 Healthy, vigorous, fees from defects, decay, diseases, sunscald injuries, bark abrasions, insect pests and all forms of infestation or objectional disfigurements.

.4 Balled and burlapped trees shall have solid root balls and root ball size must be large enough to accommodate at least 75% of the fibrous root system.

.5 Trees must conform to the following sizes:

.1 Deciduous Trees:

Caliper (mm)	Minimum Acceptable Root Ball Diameter (cm)
50mm	70cm
60mm	75cm
70mm	80cm
80mm	85cm

.2 Coniferous Trees (shall not be planted within the public right-of-way unless approved by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate):

Height (cm)	Minimum Acceptable Root Ball Diameter (cm)
175cm	60cm
200cm	70cm
225cm	75cm
250cm	80cm

2.02 WATER

.1 Free of impurities that would inhibit plant growth.

2.03 WATERING BAGS

.1 Slow release watering bag capable of holding 20 gallons of water.

2.04 PERFORATED SUBDRAIN AND GEOTEXTILE

.1 Perforated subdrain: 100mm diameter perforated big ‘o’ subdrain with filter sock, continuous along perimeter of soil cell trench and connected to stormwater management system.

.1 Underdrain where soil infiltration rates are less than 15mm / hr, when tree trench is membrane lined or when recommended by a professional engineer licensed in the Province of Ontario, Canada.

.2 For underdrain and filtration applications use non-woven needle punch, Class II according to AASHTO M288.

.1 Geotextile shall be inert to biological degradation and resistant of naturally occurring chemicals, alkalis and acids.

.3 Clear stone: 19mm Type I clear stone in accordance with OPSS.PROV 1004.

2.05 SOIL

.1 On-site topsoil:

.1 Tested on-site topsoil meeting the requirements for imported topsoil or can be modified to meet the requirements for imported topsoil.

.2 Topsoil is defined as the existing “A” horizon layer and contains organic matter.

.3 If on-site topsoil is being stripped and stored on site, it may be reused if it meets the requirements for imported topsoil or can be modified to meet the requirements for imported topsoil. Stripped topsoil identified for re-use must be cleared of all scrub, weeds, grass, stumps, and rocks over 75mm and over and all other extraneous materials. On-site topsoil can not be mixed with other horizon layers if it is to be re-used as a growing medium and must be stockpiled in an area protected against contamination and compaction.

.2 Imported topsoil:

.1 A fertile, friable, natural loam (A horizon layer), capable of sustaining vigorous plant growth, free of subsoil contamination, stones over 30mm in diameter, roots and fragments over 40mm diameter, free of weeds, and meeting the following requirements:

Soil Texture Range (OMAFRA soil texture triangle):	Loam to sandy loam
pH range:	5.5 to 7.2
Organic Matter (%):	5% to 15%
P - Phosphorus (ppm):	10 – 60
K - Potassium (ppm):	80 – 250
Mg - Magnesium (ppm):	100 – 300
Ca - Calcium (ppm):	1000 – 5000
Soluble Salt / Salt	less than

Conductivity:	1.0mmhos/cm
Cation Exchange Capacity:	greater than 20meq/100g
Percent Organic Matter:	2.5 – 5%

.3 Imported topsoil for soil cells:

.1 Refer to Section 32 93 10.03 – Public Tree Planting, Soil Cells.

2.06 COMPOST

.1 Category A compost (unrestricted use) in accordance with the Canadian Council of Ministers of the Environment (CCME) free of weeds, free of heavy metals or other deleterious contaminants and have an EC of less that 4.0mmmhos/cm.

2.07 MULCH

.1 Mulch used shall be one of the following:

.1 Bark chip: varying in size from 25 to 50 mm in diameter, from bark of coniferous trees.

.2 Shredded wood: varying in size from 25 to 125 mm in length, from coniferous trees.

2.08 MYCORRHIZA

.1 Apply Root Rescue Transplanter MS-CS, or approved alternative, as recommended by manufacturer's written recommendations.

.1 Ensure new root growth is in contact with mycorrhiza.

2.09 TREE OPENING

SPEC NOTE: Delete unused sections. Preference is always to have an open planter type.

.1 Open planter with concrete curb: minimum 1750mm square opening for tree planting, surrounded by a 150mm high concrete curb and in accordance with Section 03 30 00 – Cast-in-Place Concrete, Curbed Planter Bed, Raised Planted Bed and Suspended Concrete Slab.

.2 Open planter in raised planter: minimum 1750mm square opening for tree planting, surrounded by a 300mm to 600mm high raised concrete planter and in accordance with Section 03 30 00 – Cast-in-Place Concrete, Curbed Planter Bed, Raised Planted Bed and Suspended Concrete Slab.

.1 Rigid insulation: 100mm thick rigid insulation for external use.

.2 Watering port: Permeable tube 450mm deep, unless otherwise noted on Contract Drawings and 100mm wide with cap that allows for air and water exchange and wrapped in geotextile sock. If aeration tube is located in a soft surface cap shall be a convection cap.

.3 Tree grate: refer to Section 32 33 00 – Site Furnishings.

2.10 GRANULAR BASE

.1 Aggregate base: Crushed Limestone Granular “A” as specified in OPSS.MUNI 1010 and Form 600 of the City’s C&MSM.

2.11 DECORATIVE PLANTER RAIL

.1 Decorative planter rail: refer to Section 32 33 00 – Site Furnishings.

2.12 SOURCE QUALITY CONTROL

.1 Obtain approval from the Manager of Forestry and Horticulture, City of Hamilton or authorized designate of plant material and plant material source before planting. Plant material imported from warmer plant hardiness zones are no acceptable and plant material sources within a 100 km radius of Hamilton is preferred.

2.13 ADDITIONAL PRODUCTS TO ACHIEVE REQUIRED SOIL VOLUMES

SPEC NOTE: Forestry prefers to achieve soil volumes using open planting beds only, if this can not be achieved then use a hybrid option of open planting bed and soil cells or suspended concrete slab. Only using soil cells and grates, or suspended concrete slabs and grates is strongly discouraged and must be proven to the Manager of Forestry and Horticulture as to why it must be used.

.1 If minimum soil volumes can not be achieved in open planting beds accordance with Forestry and Horticulture’s Design and Preservation Manual for Assets on Public Property (most recent version), incorporate one of the following:

.1 Suspended Concrete Slab: in accordance with Section 32 93 10.02 – Public Tree Planting, Suspended Concrete Slab.

.2 Soil Cells: in accordance with Section 32 93 10.03 – Public Tree Planting, Soil Cells.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: Verify conditions previously installed under other Sections are acceptable for planting installation in accordance with manufacturer’s written instructions.

.1 Visually inspect previously installed conditions in presence of Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 Inform Manager of Forestry and Horticulture, City of Hamilton or authorized designate of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 Locate and protect utility lines.

.1 Notify and acquire written acknowledgement from utility authorities before beginning excavation of planting pits for trees.

3.02 INSTALLATION OF TREE OPENING

.1 Open planter with concrete curb:

.1 Excavation: excavate to specified depth indicated on the Contract Drawings, remove and dispose of existing material.

.2 Subgrade: regrade and compact subgrade to 98% SPMDD in accordance with OPSS.MUNI 206.

.3 Subdrain: supply and install subdrain surrounded by 100mm of open graded drainage layer and wrapped in non-woven geotextile. Underdrains must be sloped to drain and connected to the nearest catchbasin. Install a clean-out for every 30 meters of subdrain.

.4 Granular: supply, install and compact granular A material in accordance with OPSS 314 and 1010. Material shall be supplied from an approved source and shall meet the requirements of OPSS.MUNI 1010, C&SMS Form 600 and Form 900.

.5 Concrete: supply and install concrete planter curbs in locations indicated on the Contract Drawings and in accordance with Section 03 30 00 – Cast-in-Place Concrete, Curbed Planter Bed, Raised Planter Bed and Suspended Concrete Slab.

.2 Open planter in raised planter:

.1 Excavation: excavate to specified depth indicated on the Contract Drawings, remove and dispose of existing material.

.2 Subgrade: regrade and compact subgrade to 98% SPMDD in accordance with OPSS.MUNI 206.

.3 Subdrain: supply and install subdrain surrounded by 100mm of open graded drainage layer and wrapped in non-woven geotextile. Underdrains must be sloped to drain and connected to the nearest catchbasin. Install a clean-out for every 30 meters of subdrain.

.4 Granular: supply, install and compact granular A material in accordance with OPSS 314 and 1010. Material shall be supplied from an approved source and shall meet the requirements of OPSS.MUNI 1010, C&SMS Form 600 and Form 900.

.5 Concrete: supply and install raised concrete planter beds in locations indicated on the Contract Drawings and in accordance with Section 03 30 00 – Cast-in-Place Concrete, Curbed Planter Bed, Raised Planter Bed and Suspended Concrete Slab.

.6 Rigid insulation: supply and install rigid insulation on the inside of the planter. Install insulation 100mm below the top of the planter wall and extend to the bottom of the planter wall. Insulation shall have no gaps.

.7 Watering port: supply and install watering port at each end of planter.

.3 Tree grate: refer to Section 32 33 00 – Site Furnishings.

3.03 INSTALLATION OF GROWING MEDIUM

.1 Re-excavate to required depths as required using manual methods only. Excavate to depth, width and angles as indicated on Contract Drawings.

.2 Remove rocks, roots, weed clumps and grass from planting hole.

.3 Remove water which enters excavations before installing growing medium.

.4 Install planting in lifts not exceeding 300mm. Lightly compact the soil to remove air

pockets and settle the soil. Do not compact greater than 80% SPMDD. Check the soil compaction with a penetrometer or densimeter.

.1 If planting soil is over compacted, remove the soil and reinstall.

.5 Ensure that the planting soil under the root ball is compacted to 85% SPMDD to prevent settlement of the root ball.

3.04 PLANTING

.1 For jute burlapped root balls, cut away top one third of wrapping and wire basket without damaging root ball.

.1 Do not pull burlap or rope from under root ball.

.2 For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.

.3 Plant vertically in locations as indicated on the Contract Drawings.

.1 Orient plant material to give best appearance in relation to structure, roads and walks.

.4 For trees and shrubs:

.1 Backfill topsoil in 150 mm lifts.

.1 Tamp each lift to eliminate air pockets.

.2 When two thirds of depth of planting pit has been backfilled, fill remaining space with water.

.3 After water has penetrated into soil, backfill to finish grade.

.2 Form watering saucer as indicated on Drawings.

.5 Water plant material thoroughly.

3.05 MULCHING

.1 Ensure soil settlement has been corrected before mulching.

.2 Install mulch to cover soil to 50mm at the trunk and increasing to 100mm depth at the perimeter.

3.06 WATERING BAGS

.1 Place watering bags in accordance with manufacturer's instructions. Fill watering bags weekly starting immediately after planting and for two (2) years following acceptance until completion of the warranty period.

3.07 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following maintenance operations from time of planting to acceptance by Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.1 Fill watering bags weekly starting immediately after planting and for two (2) years following acceptance until completion of the warranty period.

.2 Remove weeds every monthly during the growing season.

.3 Replace or re-spread damaged, missing or disturbed mulch.

.4 Use appropriate control methods if required, to control insects, fungus and disease, in

accordance with federal, provincial and municipal regulations. Obtain product approval from Manager of Forestry and Horticulture, City of Hamilton or authorized designate before application.

.5 Remove dead or broken branches from plant material in accordance with Section 32 01 90.23 – Public Tree Pruning.

.6 Remove and replace dead plants and plants not in healthy growing condition and notify Manager of Forestry and Horticulture, City of Hamilton or authorized designate prior to removing and replacing. Make replacements in same manner as specified for original plantings.

3.08 MAINTENANCE DURING WARRANTY PERIOD

.1 From time of acceptance by Manager of Forestry and Horticulture, City of Hamilton or authorized designate to end of two (2) year warranty period, perform following maintenance operations.

.1 Fill watering bags weekly starting immediately after planting and for two (2) years following acceptance until completion of the warranty period.

.2 Remove weeds monthly during the growing season.

.3 Replace or re-spread damaged, missing or disturbed mulch.

.4 Use appropriate control methods if required, to control insects, fungus and disease, in accordance with federal, provincial and municipal regulations. Obtain product approval from Manager of Forestry and Horticulture, City of Hamilton or authorized designate before application.

.5 Remove dead or broken branches from plant material in accordance with Section 32 01 90.23 – Public Tree Pruning.

.6 Remove and replace dead plants and plants not in healthy growing condition and notify Manager of Forestry and Horticulture, City of Hamilton or authorized designate prior to removing and replacing. Make replacements in same manner as specified for original plantings.

3.09 CLEANING

.1 Upon completion remove surplus materials, rubbish, tools and equipment.

3.10 CLOSEOUT ACTIVITIES

.1 Submit tree maintenance schedule in accordance with Section 01 77 00 – Closeout Submittals and Procedures for review by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 77 00 – Closeout Submittals and Procedures

.3 Section 01 91 13 – Commissioning Requirements

.4 Section 01 33 00.01 – Public Tree Permitting

.5 Section 03 30 00 – Cast-in-Place Concrete

.6 Section 32 33 00 – Site Furnishings

.7 Section 32 93 10.01 – Public Tree Planting in Hard Scape

1.02 DEFINITIONS

.1 Suspended Concrete Slab: designed to be suspended over planting soil to permit a continuous soil trench beneath pavement to achieve required soil volumes to support the healthy, and vigorous growth of trees in hard surface areas.

.2 Permit: means a Public Tree Permit issued by the Manager of Forestry and Horticulture, City of Hamilton.

1.03 REFERENCE STANDARDS

.1 City of Hamilton Public Works Construction and Materials Specifications Manual is referred to as C&MSM.

.2 Ontario Provincial Standard Specification is referred to as OPSS.

.1 The C&MSM shall take precedence over the OPSS.

.3 American Association of State Highway and Transportation Officials (AASHTO):

.1 AASHTO M288-21 “Table 1 Geotextile Strength Property Requirement.

1.04 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling and coordination:

.1 Schedule all utility installations prior to beginning Work in this Section. Schedule and coordinate the installation of the suspended concrete slab with all other Work that may impact the Works covered under this Section.

.2 Pre-Installation Meetings: Conduct a site meeting 1 week before beginning work of this Section and attended by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate, the site supervisor and other related Subcontractors to:

.1 Verify project requirements for the suspended concrete slab, review installation layout, procedures, means and methods.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate for review.

.2 Shop Drawings:

.1 Shop drawing stamped and signed by a professional engineer licensed in the Province of Ontario, Canada in accordance with Section 03 30 00 – Cast-in-Place Concrete.

.2 The shop drawings shall be coordinated with the approved Landscape Plans submitted to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate in accordance with Section 01 33 00.01 – Public Tree Permitting.

.3 Mock-Up:

.1 Prior to the installation of all suspended concrete slab systems for the project, construct a mock-up of a complete suspended concrete slab system in the presence of the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 The mock up shall be of a complete suspended concrete slab system and include the installation of sub-drainage, base course aggregate planting soil, aeration ports, irrigation ports, and all required accessories.

.3 The mock up may remain as part of the installed Work at the of the project, provided it was installed to the satisfaction of the professional engineer licensed in the Province of Ontario, Canada who stamped the shop drawings and the Manager of Forestry and Horticulture, City of Hamilton or authorized designate and meets the specification.

.4 Testing:

.1 Submit imported topsoil testing for the soil cells conducted by a Canadian Standards Association (CSA) accredited laboratory. Laboratory testing must include Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) texture analysis, soluble salts, nitrogen, Phosphorus, Potassium, Calcium, Magnesium, organic matter content, pH value, cation exchange capacity, and growth inhibiting herbicides.

.2 Compaction testing conducted by a Canadian Standards Association (CSA) accredited laboratory results for granular materials and soil, including testing of granular and soils for the installed mock up.

.3 Testing must be completed by an independent and qualified laboratory.

.5 Photo-record:

.1 Submit photo record of each phase of install to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

1.06 LAYOUT AND ELEVATION CONTROL

.1 Provide layout and elevation control during installation of suspended concrete slabs. Utilize grade stakes, benchmarks, surveying equipment and other means and methods to assure that layout and elevations conform to the layout and elevations indicated on the plans.

1.07 DELIVERY, STORAGE, AND HANDLING

.1 Bulk materials:

.1 Do not deliver or place backfill, soils and soil amendments in frozen, wet, or muddy

conditions.

.2 Provide protection including tarps, plastic or matting between all bulk materials and any finished surfaces sufficient to protect the material.

.3 Provide erosion-control and dust control measures to prevent erosion or displacement of bulk materials, including airborne dust particles. Use water only for dust control.

2 PRODUCTS

2.01 PERFORATED SUBDRAIN AND CLEAR STONE

.1 Perforated subdrain: 100mm diameter perforated big ‘o’ subdrain with filter sock, continuous along perimeter of soil cell trench and connected to stormwater management system.

.1 Underdrain where soil infiltration rates are less than 15mm / hr, when tree trench is membrane lined or when recommended by a professional engineer licensed in the Province of Ontario, Canada.

.2 Clear stone: 19mm Type I clear stone in accordance with OPSS.PROV 1004.

2.02 BIODEGRADABLE BOARD

.1 Biodegradable form board: 50mm biodegradable board to create a void space directly under the suspended concrete slab.

2.03 GEOTEXTILE

.1 For underdrain and filtration applications use non-woven needle punch, Class II according to AASHTO M288. For roadway applications use non-woven needle punch Class I according to AASHTO M288. Overlay of geotextile shall be in accordance with AASHTO M288.

.1 Geotextile shall be inert to biological degradation and resistant of naturally occurring chemicals, alkalis and acids.

2.04 BACKFILL

.1 General fill material: clean, free from debris, organic matter and other deleterious material. Fill materials shall not have any contaminants in excess of the applicable Excess Soil Quality Standards for the intended location of placement and depth.

.2 Granular fill material: in accordance with the Contract Drawings and conforming in all respects with OPSS.MUNI 1010 and Form 600 of the City’s Construction and Material Specifications Manual, latest version and the Ontario Regulation (O.Reg.) 406/19.

2.05 PLANTING SOIL

.1 In accordance with Section 32 93 10.01 – Public Tree Planting in Hard Scape and the following:

.1 Purity: Be free of pests and disease that would render the soil unsuitable for horticultural use;

.2 Foreign matter: On visual inspection, free from non-soil material, brick and other building materials, and free from wastes, sharps, hydrocarbons, plant matter,

weed roots, stolons, rhizomes, and any other foreign matter or material or substance that would render the soil unsuitable for horticultural use;

.3 Contamination: Do not use soils contaminated with, chemical and biological contaminants or any other materials that are: corrosive, explosive or flammable, hazardous to human or animal life, or detrimental to healthy plant growth; and,

.4 Must be able to sustain vigorous plant growth and be compatible with the soil cell system.

2.06 AERATION AND IRRIGATION PORT AND PIPING

.1 Permeable tube 450mm deep and 100mm wide with cap that allows for air and water exchange and wrapped in geotextile sock. If aeration tube is located in a soft surface cap shall be a convection cap.

2.07 MULCH

.1 Mulch used shall be one of the following:

.1 Bark chip: varying in size from 25 to 50 mm in diameter, from bark of coniferous trees.

.2 Shredded wood: varying in size from 25 to 125 mm in length, from coniferous trees.

2.08 MYCORRHIZA

.1 Apply Root Rescue Transplanter MS-CS, or approved alternative, as recommended by manufacturer's written recommendations.

.1 Ensure new root growth is in contact with mycorrhiza.

2.09 TREE WATERING BAG

.1 Refer to Section 32 93 10.01 – Public Tree Planting in Hard Scape.

2.10 TREE OPENING

SPEC NOTE: Delete unused sections. Preference is always to have an open planter type.

.1 Open planter with concrete curb: refer to Section 32 93 10.02 – Public Tree Planting in Hard Scape.

.2 Open planter in raised planter: refer to Section 32 93 10.02 – Public Tree Planting in Hard Scape.

.3 Tree grate: refer to Section 32 33 00 – Site Furnishings.

2.11 WATER

.1 Free of impurities that would inhibit plant growth.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: Verify conditions, layout and limit of Works are acceptable to

install the suspended concrete slab(s).

.1 Inform Manager of Forestry and Horticulture, City of Hamilton or authorized designate of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

3.02 LAYOUT

.1 Layout and stake the limits of excavation and horizontal and vertical control points to install the suspended concrete slab(s) and required drainage features.

.2 Locate and protect all utility lines.

3.03 EXCAVATION

.1 Excavate to the depths and horizontal dimensions indicated on the Contract Drawings. Base of excavation shall be smooth soil, level and free of lumps or debris.

.2 Do not over-excavate existing soil beside or under the limits of excavation required for the installation. If soil is over-excavated, install compactable fill material in lifts not exceeding 150mm deep and compact each lift to required density. Compaction testing is required to ensure conformance.

3.04 SUBGRADE

.1 Verify that subgrade below the suspended concrete slab is compacted to a minimum of 95% SPMDD or in accordance with the manufacturer's specifications.

.2 Proof compact the subgrade with a minimum of three passes of a suitable vibrating compacting machine.

3.05 INSTALLATION OF SUB-DRAIN

.1 Install subdrain surrounded by 100mm of open graded drainage layer and wrapped in non-woven geotextile. Underdrains must be sloped to drain and connected to the nearest catchbasin. Install a clean-out for every 30 meters of subdrain.

3.06 INSTALLATION OF SUSPENDED CONCRETE SLAB, PLANTING SOIL AND AERATION / IRRIGATION PORTS

.1 Install planting soil in lifts not exceeding 300mm to level of granular base material. Lightly compact the soil inside the frames at each lift to remove air pockets and settle the soil within the frames. Do not compact greater than 80% SPMDD. Check the soil compaction with a penetrometer or densometer.

.2 Install permeable aeration tubes at appropriate levels and depth to ensure penetration into topsoil and ensure that cap will sit at grade after concrete is poured. Protect opening of aeration tubes while pouring concrete to prevent concrete from entering tube.

.1 The distribution pipes shall be wrapped in a geotextile and laid level with the top of the suspended concrete slab or growing mediums at the depths indicated on the Contract Drawings. The distribution pipes shall be installed with perforations facing down. Configure and connect the distribution pipes to the inlet pipe using flexible

rubber couplings.

.2 Passive irrigation pipes dug into installed growing medium shall be backfilled with growing medium to maximum soil volume achieved.

.3 Protect installed planting soil plywood or approved alternative from contamination and over compaction.

.4 Install granular base material in accordance with OPSS 314 and 1010. Material shall be supplied from an approved source and shall meet the requirements of OPSS.MUNI 1010, C&SMS Form 600 and Form 900.

.5 Form with biodegradable form boards and place reinforcement for concrete in accordance with Section 03 30 00 – Cast-in-Place Concrete.

.6 Remove plywood and any construction debris or contaminants and place remaining topsoil in lifts not exceeding 300mm to final level.

.7 Protect topsoil during concrete pour with sheet plywood or approved alternative. Use a biodegradable form board for concrete that will sit directly onto or against topsoil.

.8 Pour, finish and cure concrete in accordance with Section 03 30 00 – Cast-in-Place Concrete.

.9 The planting soil must be 25mm below the bottom of the suspended concrete slab when completely installed.

.10 Remove the temporary cap from the aeration / irrigation ports and install the riser pipe cover flush with finished grade upon completion of construction.

3.07 INSTALLATION OF SUSPENDED CONCRETE SLAB IN PAVING ABOVE THE SOIL CELL SYSTEM

.1 Contractor must identify the extent of the suspended concrete slab system with a visible marked embedded into the surface pavement material.

.2 Markers shall be a concrete stamp or as indicated on the Contract Drawings and shall indicate “SUSPENDED CONCRETE SLAB ZONE” and the date of construction.

.3 Suspended concrete slab zone markers shall be placed at each corner of the suspended concrete slab system, and along each edge at 10 m intervals.

3.08 INSTALLATION OF TREE OPENING AND PLANTING SOIL

.1 Refer to the Contract Drawings for the type of tree opening and in accordance with Section 32 93 10.02 – Public Tree Planting in Hard Scape.

.2 Prior to planting the tree(s), install additional planting soil to the depths indicated on the Contract Drawings within the tree opening.

.3 Ensure that the planting soil under the root ball is compacted to 85% SPMDD to prevent settlement of the root ball.

.4 The planting soil within the tree opening shall be the same soil as within the suspended concrete slab system, unless otherwise indicated.

.5 Mulch as indicated on the Contract Drawings and in accordance with Section 32 93 10.02 – Public Tree Planting in Hard Scape.

3.09 INSTALLATION OF TREE

.1 Install tree in accordance with Section 32 93 10.02 – Public Tree Planting in Hard Scape.

3.10 PROTECTION

.1 Ensure that all construction traffic is kept clear from the limits of the suspended concrete slab system until the finished surface materials are installed and accepted.

.2 Provide fencing and other barriers to keep vehicles from entering into the area.

3.11 CLEANING

.1 Perform cleanup during the installation of Work and upon completion of Work. Maintain the site free of soil and sediment, free of trash and debris. Remove from site all excess materials, debris, and equipment. Repair any damage to adjacent materials and surfaces resulting from installation of this Work.

3.12 CLOSEOUT ACTIVITIES AND COMMISSIONING

.1 Perform commissioning activities in accordance with Section 01 91 13 – Commissioning Requirements.

.2 Perform and submit closeout activities and documentation in accordance with Section 01 77 00 – Closeout Submittals and Procedures.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 77 00 – Closeout Submittals and Procedures

.3 Section 01 91 13 – Commissioning Requirements

.4 Section 01 33 00.01 – Public Tree Permitting

.5 Section 32 33 00 – Site Furnishings

.6 Section 32 93 10.01 – Public Tree Planting in Hard Scape

1.02 DEFINITIONS

.1 Soil cells: Modular, structural, cellular system, designed to be filled with planting soil for tree rooting, stormwater management, and support of loaded pavements, including vehicles, if required. The term can be used to refer to a single soil cell or a stack of soil cells.

.2 Permit: means a Public Tree Permit issued by the Manager of Forestry and Horticulture, City of Hamilton.

1.03 REFERENCE STANDARDS

.1 City of Hamilton Public Works Construction and Materials Specifications Manual is referred to as C&MSM.

.2 Ontario Provincial Standard Specification is referred to as OPSS.

.1 The C&MSM shall take precedence over the OPSS.

.3 American Association of State Highway and Transportation Officials (AASHTO):

.1 AASHTO M288-21 “Table 1 Geotextile Strength Property Requirement.

1.04 ADMINISTRATIVE REQUIREMENTS

.1 Scheduling and coordination:

.1 Obtain approval from Manager of Forestry and Horticulture, City of Hamilton or authorized designate of schedule prior to shipment of soil cell systems.

.2 Schedule all utility installations prior to beginning Work in this Section. Schedule and coordinate the installation of soil cells with all other Work that may impact the Works covered under this Section.

.2 Pre-Installation Meetings: Conduct a site meeting 1 week before beginning work of this Section and attended by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate, the site supervisor, soil cell installer, soil cell manufacturer, and other related Subcontractors to:

.1 Verify project requirements for soil cells, review installation layout, procedures, means and methods.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate for review.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for all elements of the structural soil cell system and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Shop Drawings:

.1 Shop drawing stamped and signed by a professional engineer licensed in the Province of Ontario, Canada showing layout plan, cross sections, details of all connection points, all elements of the structural soil cell system, grades and dimensions, total soil volume achieved and that the product satisfies the loading requirements of the project.

.2 The shop drawings shall be coordinated with the approved Landscape Plans submitted to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate in accordance with Section 01 33 00.01 – Public Tree Permitting.

.3 Mock-Up:

.1 Prior to the installation of all soil cell systems for the project, construct a mock-up of a complete soil system in the presence of the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.2 The mock up shall be of a complete, closed soil cell system and include the installation of sub-base compaction, sub-drainage installation, base course aggregate and geotextile, geogrids, backfill, soil cells, planting soil with compaction, root barrier, if required, aeration ports, irrigation ports, top geotextiles and all required accessories.

.3 The mock up may remain as part of the installed Work at the of the project, provided it was installed to the satisfaction of the professional engineer licensed in the Province of Ontario, Canada who stamped the shop drawings and the Manager of Forestry and Horticulture, City of Hamilton or authorized designate and meets the specification.

.4 Testing:

.1 Submit imported topsoil testing for the soil cells conducted by a Canadian Standards Association (CSA) accredited laboratory. Laboratory testing must include Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) texture analysis, soluble salts, nitrogen, Phosphorus, Potassium, Calcium, Magnesium, organic matter content, pH value, cation exchange capacity, and growth inhibiting herbicides.

.2 Compaction testing conducted by a Canadian Standards Association (CSA) accredited laboratory results for granular materials and soil, including testing of granular and soils for the installed mock up.

.3 Testing must be completed by an independent and qualified laboratory.

.5 Photo-record:

.1 Submit photo record of each phase of install to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

1.06 QUALITY ASSURANCE

.1 Qualifications: Provide proof of qualifications when requested by the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.1 Soil Cell Installer: the installer and field supervisor must have a minimum of five years successful experience with construction of similar scope.

1.07 LAYOUT AND ELEVATION CONTROL

.1 Provide layout and elevation control during installation of soil cells. Utilize grade stakes, benchmarks, surveying equipment and other means and methods to assure that layout and elevations conform to the layout and elevations indicated on the plans.

1.08 DELIVERY, STORAGE, AND HANDLING

.1 Soil cells: protect soil cells from damage during delivery, storage and handling.

.1 Store under tarp to protect from sunlight when time from delivery to installation exceeds one week. Storage must be on smooth surfaces, free of dirt and debris.

.2 Handling must be performed with equipment appropriate to the weight and size of the soil cells and care given to ensure that no damage occurs to the soil cells. Contractor is responsible for paying for and replacing any damaged soil cells due to improper storage or handling.

.2 Bulk materials:

.1 Do not deliver or place backfill, soils and soil amendments in frozen, wet, or muddy conditions.

.2 Provide protection including tarps, plastic or matting between all bulk materials and any finished surfaces sufficient to protect the material.

.3 Provide erosion-control and dust control measures to prevent erosion or displacement of bulk materials, including airborne dust particles. Use water only for dust control.

1.09 WARRANTY

.1 Provide manufacturer's standard warranty against defects in material and workmanship to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

2 PRODUCTS

2.01 DESCRIPTION

.1 A complete soil cell system designed and tested for the purpose of growing healthy trees, and supporting loads of specified pavement systems. The soil cell system must have the ability of being assembled around existing and proposed structures and utilities, specific to the site requirements and achieve the City of Hamilton's required soil volumes. The system must be capable of being disassembled and reassembled to allow for utility repair within and below the system.

2.02 APPROVED MANUFACTURERS

.1 The following manufacturers are approved for use within the City of Hamilton:

.1 GreenBlue Urban

.1 Address: 71 Bysham Park Drive Woodstock, Ontario, N4T 1P1, Canada

.2 Website: https://greenblue.com/ce/

.2 DeepRoot Canada Corporation

.1 Address: Suite 341 – 550 West Broadway, Vancouver, British Columbia, V5Z 0E9, Canada

.2 Website: https://www.deeproot.com/contact/

.3 Citygreen Urban Landscape Solutions (Citygreen Canada)

.1 Address: 720 - 999 West Broadway, Vancouver, British Columbia, V5Z 1K5, Canada

.2 Website: https://citygreen.com/about-us/contact-us/

2.03 PERFORATED SUBDRAIN AND CLEAR STONE

.1 Perforated subdrain: 100mm diameter perforated big ‘o’ subdrain with filter sock, continuous along perimeter of soil cell trench and connected to stormwater management system.

.1 Underdrain where soil infiltration rates are less than 15mm / hr, when tree trench is membrane lined or when recommended by a professional engineer licensed in the Province of Ontario, Canada.

.2 Clear stone: 19mm Type I clear stone in accordance with OPSS.PROV 1004.

2.04 GEOTEXTILE

.1 For underdrain and filtration applications use non-woven needle punch, Class II according to AASHTO M288. For roadway applications use non-woven needle punch Class I according to AASHTO M288. Overlay of geotextile shall be in accordance with AASHTO M288.

.1 Geotextile shall be inert to biological degradation and resistant of naturally occurring chemicals, alkalis and acids.

2.05 SUB-BASE

.1 Aggregate sub-base: Crushed Limestone Granular “A” as specified in OPSS.MUNI 1010 and Form 600 of the City’s C&MSM.

2.06 GEOGRID

.1 Geogrid shall be woven polyester fabric with PVC coating, uni-axial or biaxial geogrid, inert to biological degradation, resistant to naturally occurring chemicals, alkalis, and acids and in accordance with manufacturer’s specifications.

2.07 BACKFILL

.1 General fill material: clean, free from debris, organic matter and other deleterious material. Fill materials shall not have any contaminants in excess of the applicable Excess Soil Quality Standards for the intended location of placement and depth.

.2 Granular fill material: in accordance with the Contract Drawings and conforming in all

respects with OPSS.MUNI 1010 and Form 600 of the City's Construction and Material Specifications Manual, latest version and the Ontario Regulation (O.Reg.) 406/19.

2.08 SOIL CELLS

.1 Soil cells shall be modular structural units designed to be filled with growing medium for tree rooting, stormwater management and support of loaded pavements appropriate to the Contract Drawings.

2.09 PLANTING SOIL

.1 In accordance with manufacturer's specification's and must:

.1 Purity: Be free of pests and disease that would render the soil unsuitable for horticultural use;

.2 Foreign matter: On visual inspection, free from non-soil material, brick and other building materials, and free from wastes, sharps, hydrocarbons, plant matter, weed roots, stolons, rhizomes, and any other foreign matter or material or substance that would render the soil unsuitable for horticultural use;

.3 Contamination: Do not use soils contaminated with, chemical and biological contaminants or any other materials that are: corrosive, explosive or flammable, hazardous to human or animal life, or detrimental to healthy plant growth; and,

.4 Must be able to sustain vigorous plant growth and be compatible with the soil cell system.

2.10 ROOT BARRIER (PROVISIONAL)

.1 Root barrier shall be black, injection molded panels, 1.5 to 2.0mm minimum thickness designed as a root diversion device and manufactured with a minimum of 50% postconsumer recycled polypropylene plastic with UV inhibitors; recyclable.

.1 Must be designate with a joining system for instant assembly and no gaps.

.2 Must be installed by Contractor at the discretion of the Manager of Forestry and Horticulture, City of Hamilton or authorized designate, or when requested by third-party authorities where proposed utilities or existing utilities cross through the soil cell zone.

2.11 MAINTENANCE PORT AND PIPING

.1 Maintenance piping: rigid, schedule 40 non-perforate 100mm diameter PVC pipe.

.2 Maintenance port: cast iron clean out cap with screw top and inset lug to fit standard PVC schedule 40 pipe fittings.

2.12 AERATION AND IRRIGATION PORT AND PIPING

.1 Permeable tube 450mm deep and 100mm wide with cap that allows for air and water exchange and wrapped in geotextile sock. If aeration tube is located in a soft surface cap shall be a convection cap.

2.13 MULCH

.1 Mulch used shall be one of the following:

.1 Bark chip: varying in size from 25 to 50 mm in diameter, from bark of coniferous trees.

.2 Shredded wood: varying in size from 25 to 125 mm in length, from coniferous trees.

2.14 MYCORRHIZA

.1 Apply Root Rescue Transplanter MS-CS, or approved alternative, as recommended by manufacturer's written recommendations.

.1 Ensure new root growth is in contact with mycorrhiza.

2.15 TREE WATERING BAG

.1 Refer to Section 32 93 10.01 – Public Tree Planting in Hard Scape.

2.16 TREE OPENING

SPEC NOTE: Delete unused sections. Preference is always to have an open planter type.

.1 Open planter with concrete curb: refer to Section 32 93 10.02 – Public Tree Planting in Hard Scape.

.2 Open planter in raised planter: refer to Section 32 93 10.02 – Public Tree Planting in Hard Scape.

.3 Tree grate: refer to Section 32 33 00 – Site Furnishings.

2.17 WATER

.1 Free of impurities that would inhibit plant growth.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: Verify conditions, layout and limit of Works are acceptable to install the soil cells.

.1 Inform Manager of Forestry and Horticulture, City of Hamilton or authorized designate of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

3.02 LAYOUT

.1 Layout and stake the limits of excavation and horizontal and vertical control points to install the soil cells and required drainage features.

.2 Locate and protect all utility lines.

3.03 EXCAVATION

.1 Excavate to the depths and horizontal dimensions indicated on the Contract Drawings. Base

of excavation shall be smooth soil, level and free of lumps or debris.

.2 Do not over-excavate existing soil beside or under the limits of excavation required for the installation. If soil is over-excavated, install compactable fill material in lifts not exceeding 150mm deep and compact each lift to required density. Compaction testing is required to ensure conformance.

.3 Confirm that the depths of the excavation is accurate to accommodate the depths and thickness of materials required and that the width and length of the excavation is a minimum of 150mm in all directions beyond the edges of the soil cell unless otherwise specified by the manufacturer.

3.04 SUBGRADE

.1 Verify that subgrade below the soil cells is compacted to a minimum of 95% SPMDD or in accordance with the manufacturer's specifications.

.2 Proof compact the subgrade with a minimum of three passes of a suitable vibrating compacting machine.

3.05 INSTALLATION OF SUB-DRAIN

.1 Install subdrain surrounded by 100mm of open graded drainage layer and wrapped in non-woven geotextile. Underdrains must be sloped to drain and connected to the nearest catchbasin. Install a clean-out for every 30 meters of subdrain.

.1 Underdrain where soil infiltration rates are less than 15mm / hr, when tree trench is membrane lined or when recommended by a professional engineer licensed in the Province of Ontario, Canada.

3.06 INSTALLATION OF GEOTEXTILE OVER SUBGRADE

.1 Install geotextile over compacted subgrade.

.2 Ensure that geotextile joints overlap by a minimum of 450mm. Lay geotextile flat with no folds or creases.

3.07 INSTALLATION OF MAINTENANCE PORTS AND PIPING

.1 Cut PVC pipe to fit vertically from soil cell deck to top of finished grade.

.2 Manually perforate riser. Pipe must be rigid at level of pavement section and perforated through level of soil cell system.

.3 Wrap pipe in geotextile and secure with zip ties. Brace riser for the remainder of installation to secure its location and elevation.

.4 Install caps on top of ear riser flush with grade.

3.08 INSTALLATION OF SUB-BASE BELOW SOIL CELL FRAME

.1 Install aggregate sub-base to depths indicated on the Contract Drawings. Sub-base must extend a minimum of 150mm beyond the edge of the soil cells.

.2 Compact aggregate sub-base to a minimum of 95% SPMDD. Compact the subgrade with a minimum of three passes of a suitable vibrating compacting machine.

.3 The maximum slope on the surface of the subgrade is 5%. Where proposed grades on

finished paving are greater than 5%, the soils cells must be stepped to maintain proper relationships with finished grade.

3.09 INSTALLATION OF SOIL CELLS, PLANTING SOIL, GEOGRID AND BACKFILL

.1 Identify the outline layout of the structure and the edges of paving around tree plantings on sub-base using spray paint or chalk.

.2 Layout out the first layout of soil cells frames on the sub-base. Verify that the layout is consistent with the required locations and dimensions of paving edges to be construction over the soil cells.

.3 Install the first layer of soil cell frames in accordance with the manufacturer's specifications.

.4 Install soil cells frames around, over, or under existing or proposed utility lines as indicated on the Contract Drawings.

.5 Ensure that each frame sits evenly and soundly on the surface of the sub-base. Frames shall not rock or bend. Adjust sub-base material including aggregate under each frame to provide a solid base of support. Maximum tolerance for deviations is 6mm over 1200mm.

.6 Anchor each soil cell into base in accordance with manufacturer's specifications.

.7 Do not set any frame half on one cell frame below and half on an adjacent frame. Install no more than two layers of soil cells frames before beginning to install planting soil, geogrid and backfill material outsides the frames in alternating lifts to achieve the specified compaction.

.8 Install strongbacks on top of the soil cell frames prior to the installation of planting soil and backfill. Strongbacks are required only during the installation and compaction of the planting soil and backfill and must be moved as the Work progresses. Strongbacks must be removed prior to the installation of the soil cell deck.

.9 Install and compact planting soil, geogrid and backfill together in several alternating operations to ensure specified compaction levels are achieved.

.1 Install and compact backfill material in the space between the soil cells and the side of the excavation in lifts that do not exceed 150mm. Compact backfill to 95% SPMDD. Maintain the geogrid curtain between the soil cells frames and the backfill material. Install backfill in alternating lifts with the planting soil inside the soil cells.

.2 Fill the first layer of soil cell frames with planting soil and install in lifts not exceeding 300mm. Lightly compact the soil inside the frames at each lift to remove air pockets and settle the soil within the frames. Do not compact greater than 80% SPMDD. Check the soil compaction with a penetrometer or densometer.

.3 If planting soil is over compacted, remove the soil and reinstall. Use hand tools to avoid damage to the soil cells.

.4 Geogrid curtains are required between the edge of the soil cells and any soils to be compacted to support paving beyond the soil cell area. Do not place geogrid curtains between the edge of the soil cells and any planting area adjacent to the soil cells.

.5 Pre-cut the geoqrid to allow for 150mm under lapping below the backfill and 300mm overlapping on the soil cell stack. A 300mm overlap is required between different sheets of geogrid.

.10 Do not walk directly on horizontal beams of the frames.

.11 Ensure that the planting soil, backfill and geotextile have been properly installed. Remove the strongbacks, sweep any soil from tops before adding the next layer of frames.

.12 Install each subsequent layer of frames, strongbacks, planting soil, backfill and geotextile until the system is complete. Snap in frames in accordance with manufacturer's specifications.

.13 The planting soil must be 25mm below the bottom of the soil cell deck when completely installed.

.14 These specification must be read alongside the manufacturers specifications and any discrepancies must be reported to the Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

.1 Proceed with installation only after discrepancies have been clarified and after receipt of written approval to proceed from Manager of Forestry and Horticulture, City of Hamilton or authorized designate.

3.10 INSTALLATION OF GEOTEXTILE, GEOGRID AND INSPECTION RISER OVER THE DECK

.1 Overlap geogrid from the sides of the soil cells over the top of the soil cell deck and overlap a minimum of 300mm.

.2 Place geotextile over the top of the soil cell deck and where indicated on the Contract Drawings and extend beyond the outside edge of the excavation by a minimum of 450mm. Joints must overlap a minimum of 450mm.

.3 Install maintenance riser for soil above geotextile as indicated on the Contract Drawings. Cut PVC pipe to fit vertically from soil cell deck to finish surface.

.1 Align riser with slots in soil cell deck.

.2 Wrap pipe in geotextile and secure with zip ties.

.3 Cut geotextile to overlap soil cell deck by a minimum of 300mm. Cut geotextile inside the pipe to allow access. Do not cut or otherwise damage soil cell deck.

.4 Install caps on top of each riser flush with final paving surface. Install temporary caps to protect the pipes from construction debris. Remove the temporary cap and install the riser pipe cover flush with finished grade upon completion of construction.

3.11 INSTALLATION OF AERATION AND IRRIGATION PORT AND PIPING

.1 The distribution pipes shall be wrapped in a geotextile and laid level with the growing mediums at the depths indicated on the Contract Drawings. The distribution pipes shall be installed with perforations facing down. Configure and connect the distribution pipes to the inlet pipe using flexible rubber couplings.

.2 Passive irrigation pipes dug into installed growing medium shall be backfilled with growing medium to maximum soil volume achieved.

.3 Temporarily cap off the end of the pipe risers to protect the distribution pipes from construction debris. Remove the temporary cap and install the riser pipe cover flush with finished grade upon completion of construction.

3.12 INSTALLATION OF PAVING ABOVE THE SOIL CELL SYSTEM

.1 Refer to the Contract Drawings for the paving material above the soil cell system. Do not damage the soil cell system and its component when placing the paving material system above the soil cell system.

.2 Turn down edge of all concrete pacing to cell deck along the edges of all planting areas the retain the aggregate base course.

3.13 INSTALLATION OF SOIL CELL MARKER IN PAVING ABOVE THE SOIL CELL SYSTEM

.1 Contractor must identify the extent of the soil cell system with a visible marked embedded into the surface pavement material.

.2 Markers shall be a concrete stamp or as indicated on the Contract Drawings and shall indicate “SOIL CELL ZONE” and the date of construction.

.3 Soil cell zone markers shall be placed at each corner of the soil cell system, and along each edge at 10 m intervals.

3.14 INSTALLATION OF TREE OPENING AND PLANTING SOIL

.1 Refer to the Contract Drawings for the type of tree opening and in accordance with Section 32 93 10.02 – Public Tree Planting in Hard Scape.

.2 Prior to planting the tree(s), install additional planting soil to the depths indicated on the Contract Drawings within the tree opening.

.3 Ensure that the planting soil under the root ball is compacted to 85% SPMDD to prevent settlement of the root ball.

.4 The planting soil within the tree opening shall be the same soil as within the soil cell system, unless otherwise indicated.

.5 Mulch as indicated on the Contract Drawings and in accordance with Section 32 93 10.02 – Public Tree Planting in Hard Scape.

3.15 INSTALLATION OF TREE

.1 Install tree in accordance with Section 32 93 10.02 – Public Tree Planting in Hard Scape.

3.16 PROTECTION

.1 Ensure that all construction traffic is kept clear from the limits of the soil cells until the finished surface materials are installed and accepted. No vehicles shall drive directly on the soil cell deck or aggregate base course.

.2 Provide fencing and other barriers to keep vehicles from entering into the area.

.3 Maintain a minimum of 100mm of aggregate base course over the geotextile material during construction.

3.17 CLEANING

.1 Perform cleanup during the installation of Work and upon completion of Work. Maintain the site free of soil and sediment, free of trash and debris. Remove from site all excess materials, debris, and equipment. Repair any damage to adjacent materials and surfaces resulting from installation of this Work.

3.18 CLOSEOUT ACTIVITIES AND COMMISSIONING

.1 Perform commissioning activities in accordance with Section 01 91 13 – Commissioning Requirements.

.2 Perform and submit closeout activities and documentation in accordance with Section 01 77 00 – Closeout Submittals and Procedures.

END OF SECTION