Section 00 01 10

Table of Contents

Contents

Section 02 41 13
Selective Site Demolition

PART 1 GENERAL

1.1 Section includes

.1 Section includes requirements for demolishing, salvaging, recycling and removing site work items identified for removal in whole or in part, and for backfilling trenches and excavations resulting from site demolition activities.

.1 Removal shall mean removal from site and safe disposal in a legal manner.

.2 Comply with the regulations under the Construction Safety Act as in effect at the time of construction.

1.2 Related requirements

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 31 11 05 – Clearing and Grubbing

.3 Section 31 22 13 - Rough Grading

.4 Section 32 01 90 – Tree & Shrub Preservation

1.3 Reference standards

.1 All referenced standards shall be the current edition or edition referenced by the Ontario Building Code currently in force.

.2 City of Toronto Construction Standards

.1 City of Toronto Tree Protection Policy and Specifications for Construction Near Trees, July 2016

.2 City of Toronto Tree Pruning Guidelines

.3 Toronto Region conservation authority (TRCA)

.1 Erosion and Sediment Control Guide for Urban Construction (Toronto and Region Conservation Authority, 2019)

.4 City of Toronto Municipal Code

.1 Ravine and Natural Feature Protection (RNFP) by-Law

.5 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS. MUNI 180, The Management of Excess Materials

.2 OPSS 491, Preservation, Protection and Reconstruction of Existing Facilities

.3 OPSS 510, Removal

.6 Ontario Ministry of the Environment, Conservation and Parks (MECP)

.1 Soil, ground water and sediment standards for use under Part XV.1 of the Environmental Protection Act, R.S.O. 1990, c. E.19

.2 O. Reg. 406/19: On-site and Excess Soil Management

.7 Ontario Invasive Plant Council

.1 Clean Equipment Protocol for Industry, 2016.

.8 Department of Justice Canada (Jus)

.1 Canadian Environmental Assessment Act (CEAA), 2012

.2 Canadian Environmental Protection Act (CEPA), 2012

.1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34

.2 Hazardous Materials Information Review Act, 1985

.9 Reference Documents:

.1 Arborist Report and Tree Preservation Plan, as prepared by Kuntz Forestry Consulting Inc., dated 2023-01-24.

.2 Geotechnical Investigations Report for Proposed Bluffer's Park Pavilion, as prepared by Davroc Testing Laboratories Inc., dated 2023-04-13.

1.4 Administrative requirements

.1 Coordination: Coordinate with Owner for the material ownership including the following:

.1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner 's property, demolished materials shall become Contractor 's property and shall be removed from Project site.

.2 Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during demolition remain Owner 's property:

.1 Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

.2 Coordinate with Owner 's historical adviser, who will establish special procedures for removal and salvage operations.

.2 Pre-Demolition Meetings.

.1 Convene pre-installation meeting 1 week before beginning work of this Section, with Contractor, Representative, and Consultant in accordance with 01 31 19 - Project Meetings to:

.1 Verify project requirements.

.2 Verify existing site conditions adjacent to demolition work

.3 Coordinate with other construction sub trades

.4 Examine existing site conditions adjacent to demolition work, prior to start of Work

.5 Waste reporting requirements

.2 Hold project meetings every two (2) weeks.

.3 Ensure key personnel attend.

.4 WMC will provide verbal report on status of waste diversion activity at each meeting.

.5 Consultant will provide written notification of change of meeting schedule established upon contract award 24 hours prior to scheduled meeting.

.3 Scheduling:

.1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion.

.2 In event of unforeseen delay notify Consultant.

1.5 Submittals

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

.2 If a demolition permit is required by the municipal building department having jurisdiction at the Place of the Work, it is a requirement of this Contract that the Contractor obtain the demolition permit such that the engineer for the Contractor responsible for the preparation of the demolition report becomes the Engineer of Record for the demolition work. It is understood that this may

require preparation and submission of certain reports, possibly including Drawings, as part of the municipal permit process prior to, during, and upon completion of the demolition work. Copies of the permit with the name of the Engineer of Record shall be submitted.

.1 If an application has been made, by or on behalf of the Owner, to the building department having jurisdiction at the Place of the Work, it is a requirement of this Contract that the Contractor obtain an amendment to this application/permit such that the engineer for the Contractor responsible for the preparation of the demolition report becomes the Engineer of Record for the demolition work. It is understood that this may require preparation and submission of certain reports, possibly including Drawings, as part of the municipal permit process prior to, during, and upon completion of the demolition work. Copies of the permit with the name of the Engineer of Record shall be submitted and received by the Contract Administrator prior to the commencement of demolition.

.3 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Shop Drawings:

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

.2 Submit for approval drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, where required by authorities having jurisdiction.

.3 Submit for approval drawings, diagrams or details showing vehicle accesses, sidewalk accesses and pedestrian access to buildings.

.2 Certificates: Submit copies of certified weigh bills from authorized disposal sites and reuse and recycling facilities for material removed from site on weekly basis upon request of Consultant.

.3 Inventory: Prior to start of removals, prepare typed inventory of units to be salvaged and cross-reference to drawing showing existing elevations. Inventory shall designate size of units, face setting bed, or natural setting bed. Provide temporary marking to salvaged units correlated to this inventory.

.4 Existing conditions documentation: Prior to start of removals, document existing conditions and any adjoining construction or site improvements, including pre-existing damage to finish surfaces that might be misconstrued as damage caused by demolition operations.

.1 Provide photographs using minimum 10 megapixel digital camera.

.2 Provide a minimum of 50 photographs. Photographs shall be date-stamped, at maximum resolution colour photos in JPEG format.

.4 Informational Submittals: Provide the following submittals during the course of the Work:

.1 Inventory: Submit a list of items that have been removed and salvaged after selective site demolition is complete

.2 Landfill Records: Indicate receipt and acceptance of impacted materials or hazardous wastes by a landfill facility licensed to accept such materials.

1.6 Quality assurance

.1 Regulatory Requirements: ensure Work is performed in compliance with applicable Provincial and Federal regulations..

.2 Comply with hauling and disposal regulations of Authority Having Jurisdiction.

1.7 Site conditions

.1 Environmental protection:

.1 Ensure Work is done in accordance with 01 35 43 - Environmental Procedures.

.2 Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.3 Fires and burning of waste or materials is not permitted on site.

.4 Burying of rubbish waste materials is not permitted.

.5 Disposal of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers, is not permitted.

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

.2 Pumping of water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties, is not permitted.

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction.

.4 Protect trees, plants and foliage on site and adjacent properties where indicated.

.5 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.

.6 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

.7 Conduct selective site demolition so Owner 's operations will not be disrupted:

.1 Provide not less than 72 hours' notice to Owner of activities that will affect operations.

.2 Maintain access to existing walkways, exits, and other adjacent occupied or used facilities:

.1 Closing or obstructing walkways, exits, or other occupied or used facilities without written permission from Authority Having Jurisdiction is not permitted.

.8 Consultant assumes no responsibility for Selective Site elements being demolished:

.1 Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

.2 Before selective site demolition, remove, protect and store salvaged items as directed by Owner:

.1 Salvage items as identified by Consultant.

.2 Deliver to Owner as directed.

1.8 Site conditions

.1 Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work:

.1 Hazardous materials will be as defined in the Hazardous Materials Act.

.2 Hazardous materials will be removed by Owner before start of the Work.

.2 If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Consultant. Hazardous materials will be removed by Owner Representative under a separate contract or as a change to the Work.

.3 If material resembling spray or trowel applied asbestos or other designated substance listed as hazardous be encountered in course of demolition, stop work, take preventative measures, and notify Consultant immediately. Proceed only after receipt of written instructions have been received from Consultant.

.4 Site elements that will be demolished are based on their condition on date that tender is accepted, at time of examination prior to tendering.

.5 Site Environmental Requirements:

.1 Perform work in accordance with applicable Provincial and Federal regulation and in accordance with site-specific environmental reports.

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

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

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

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

.6 Control disposal or runoff of water containing suspended materials or other harmful substances as directed by Consultant.

.7 Protect trees, plants and foliage on site and adjacent properties where indicated.

.6 TRCA Requirements:

.1 The site is within the jurisdiction of the TRCA. In order to comply with regulations pertaining to Species-at Risk (SAR), TRCA recommends that:

.1 Tree removals be completed between October 15 and April 15.

.2 Contractor shall coordinate start of demolition and removal activities with all required TRCA wildlife surveys and wildlife relocation.

.7 RNFP Requirements:

.1 The site is within the jurisdiction of the RNFP and shall comply with their tree by-law when removing trees within their jurisdiction.

.8 Implement a Clean Equipment Protocol as outlined by the Ontario Invasive Plant Council in areas where invasive plants are known to be present. Submit a Clean Vehicle Protocol procedure prior to commencement of Works.

PART 2 PRODUCTS

2.1 Equipment

.1 Contractor is required to provide all relevant equipment and materials to complete required demolition / decommissioning activities.

PART 3 EXECUTION

3.1 Examination

.1 Carry out examination of the structures and materials to be removed.

.2 Verify that utilities have been disconnected and capped.

.3 Survey existing conditions and correlate with requirements indicated to determine extent of selective site demolition required.

.4 Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged

.5 Provide Consultant with written description of proposed method of removal for review. Assume full responsibility for removal method and safety.

.6 When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Promptly submit a written report to Consultant.

.7 Verify that hazardous materials have been remediated before proceeding with site demolition operations.

3.2 Preparation

.1 Temporary Erosion and Sedimentation Control:

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to: sediment and erosion control drawings.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during demolition.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal after completion of demolition work.

.2 Protection of in-place conditions:

.1 Work in accordance with Erosion and Sedimentation Control Plan and 01 35 43 - Environmental Procedures.

.2 Prevent movement, settlement or damage of adjacent structures, services, walks, paving, trees, landscaping, adjacent grades, and properties.

.1 Provide bracing, shoring and underpinning as required.

.2 Repair damage caused by demolition as directed by Consultant.

.3 Support affected site elements and, if safety of site element being demolished adjacent structures or services appears to be endangered, take preventative measures, stop Work and immediately notify Consultant.

.4 Prevent debris from blocking surface drainage system, elevators, mechanical and electrical systems which must remain in operation.

.3 Surface Preparation:

.1 Disconnect and re-route electrical and service lines within the site to be demolished.

.1 Post warning signs on electrical lines and equipment which must remain energized to serve other properties during period of selective site demolition.

.2 Disconnect and cap designated mechanical services.

.1 Natural gas supply lines: remove in accordance with gas company requirements.

.2 Sewer and water lines: remove in accordance with authority having jurisdiction.

.3 Other underground services: remove and dispose of as directed by Consultant in accordance with Section.

3.3 Removal and demolition operations

.1 Remove items as indicated.

.2 Disruption of items designated to remain in place is not permitted.

.3 Removal of pavements, curbs and gutters:

.1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Consultant.

.2 Protect adjacent joints and load transfer devices.

.3 Protect underlying and adjacent granular materials.

.4 Excavate at least 300 mm below pipe invert, when removing pipes under existing or future pavement area.

.5 Decommission water wells and monitoring wells in accordance with Provincial regulations.

.6 Remove designated trees during demolition.

.1 Obtain written approval of Consultant prior to removal of trees not designated.

.7 Stockpile topsoil for final grading and landscaping:

.1 Provide erosion control and seeding if not immediately used.

.8 Salvage:

.1 Dismantle items containing materials for salvage and stockpile salvaged materials at locations as indicated.

.9 Disposal of Material:

.1 Dispose of materials not designated for salvage or reuse on site as instructed by Consultant.

.10 Backfill: Backfill in areas as indicated and in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3.4 Stockpiling

.1 Label stockpiles, indicating material type and quantity.

.2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.

.3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.

.4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.5 Removal from site

.1 Dispose of materials not designated for salvage as applicable and in accordance with regulatory requirements.

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

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

.4 Transport material designated for alternate disposal using approved facilities listed in CWM Plan and in accordance with applicable regulations:

.1 Written authorization from Consultant is required to deviate from facilities listed in CWM Plan.

.5 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.

.1 Disposal Facilities: approved and listed in Waste Reduction Workplan.

.2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

3.6 Restoration

.1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work unless otherwise stipulated in the Contract Documents.

.2 Restore the work site and access route to existing conditions unless specified otherwise within the Contract.

.1 All disturbed grass area to be seeded or sodded as directed by the Consultant.

.2 All damaged pavement to be re-paved for full width of the roadway or walkway.

.3 All exiting surfaces used by the contractor shall be re-graded and resurfaced with new material to match original.

.3 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.7 Cleaning

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Remove debris, trim surfaces and leave work site clean, upon completion of Work

.3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Section 05 50 00
Metal Fabrications

PART 1 GENERAL

1.1 Section includes

.1 This section includes requirements for the supply and installation of materials and components for metal fabrications, including:

.1 Galvanized and painted steel fence posts and framing for wood privacy fence.

.2 Galvanized steel paver edge.

.3 Galvanized steel toe rail.

1.2 Related requirements

.1 Section 01 33 00 - Submittal Procedure

.2 Section 06 15 01 - Timber and Woodwork

.3 Section 32 14 13 - Precast Concrete Unit Paving

1.3 Reference standards

.1 All referenced standards shall be the current edition or edition referenced by the Ontario Building Code currently in force.

.2 CSA Group (CSA):

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

.2 CSA G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles

.3 CSA S16:19, Design of Steel Structures

.4 CSA W48:23, Filler Metals and Allied Materials for Metal Arc Welding

.5 CSA W59-18, Welded Steel Construction (Metal Arc Welding)

.3 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

.4 ASTM A307-21, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength

.4 The Master Painters Institute (MPI):

.1 Architectural Painting Specification Manual (ASM), current edition

.2 Approved Products List (APL), current edition

1.4 Submittals

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

.2 Action Submittals: Submit the following before starting work of this Section:

.1 Product Data: Submit product data for each type of manufactured material and product indicated. Include product characteristics, performance criteria, physical size, finish and limitations in use,

.1 WHMIS SDS for site-applied primers, coatings, paints, and other finishes.

.2 Submit manufacturer's available range of colours for specified paint finish.

.3 Shop Drawings: Submit electronic shop drawings for Consultant review, prior to fabrication.

.1 Shop drawings shall include plans, sections and large-scale details, and shall indicate components and methods of assembly, materials and their characteristics, fastenings, metal finishes, welds, and their structural characteristics relative to their purpose, and other fabrication information required.

.1 Shop Drawings for privacy fence shall be coordinated with and shall include all relevant details included in Work of Section 06 15 01 - Timber and Woodwork.

.2 Indicate proposed site connections and methods.

.3 Shop drawings for work of this Section shall bear seal of qualified Professional Engineer licensed to practice in the Province of Ontario.

.2 Alternative details may be considered by the Consultant. Full details of any alternatives to be shown on shop drawings.

.3 Submit design calculations for work of this Section bearing seal of qualified Professional Engineer licensed to practice in the Province of Ontario

.4 Samples:

.1 Submit duplicate samples of shop finished materials, for each metal type, finish and finish direction, for approval by Consultant.

.2 Submit painted metal samples, allowing for up to three (3) colour variations, in mid-to dark grey range for Consultant selection.

.3 Informational Submittals: Submit the following submittals during the course of the Work:

.1 Mock-up:

.1 Submit one (1) complete bay of fence, completely fabricated, including fence posts and slats, and incorporating all elements and fastening components of final installation work and integrated work of other trades.

.2 Submit one (1) 4.0 meters long section (min.) of toe rail, full height, including a slip joint and a minimum of three (3) posts and one (1) end section.

.3 Location of mock-up to be proposed by Contractor and approved by Consultant on site. Acceptable mock-ups may become part or the completed work if undisturbed at time of Substantial Completion.

.4 When accepted, mock-up will demonstrate minimum standard for this work.

.4 Closeout Submittals:

.1 Operation and Maintenance Data: Include, in the operation and maintenance manual, manufacturer's maintenance instructions and recommended cleaning materials and methods and methods for repairing damage to the finish.

1.5 Quality assurance

.1 Execute Work only by company with adequate plant, equipment, and skilled workers to perform Work expeditiously, having been responsible for a high standard of workmanship in similar installation to that specified using architectural metals during a period of at least the immediate past 5 years. Specialized experience and capabilities in managing fine detailing will be required with respect to the following:

.1 Accuracy of metalwork

.2 Neatness of workmanship

.3 Hairline joinery

.4 Possessing proper equipment and know-how for the work.

.5 Possessing keen understanding of cleanliness of shop, tools, methods, cleaning, blasting, and brushing work, so as to finish work with clean, consistent finishes free of staining.

.2 All materials, components and workmanship to conform to building and local by-laws. Contractor to obtain all necessary permits and approvals.

.3 Weld structural components in steel to conform to requirements of CSA W59, and by a fabricator fully certified by the Canadian Welding Bureau to conditions of CSA W47.1 and W55.3, and other current applicable standards

.4 Requirements of regulatory agencies: the work of this section that functions to resist forces imposed by dead and live loads shall conform to requirements of jurisdictional authorities.

1.6 Design requirements

.1 Design Work of this Section by qualified Professional Engineer registered in the Province of Ontario.

.2 Design, fabricate, and install in accordance with the building code and requirements of all other governing authorities.

.3 Exterior metal fabrication items shall be designed to withstand expansion and contraction of the component parts at an ambient temperature range of 80°C without causing harmful buckling, opening of joints, overstressing of fasteners, or other harmful effects.

.4 Design assemblies and connections to withstand own dead load, super-imposed dead loads, and fabrication forces, without permanent distortions or deformation, to maximum allowable deflection of L/360, within the following construction tolerances:

.1 Maximum variation from plumb in vertical lines: 3.2 mm (1/8”) in 3 m (10 ft)

.2 Maximum variation from level: 3.2 mm (1/8”) in 9 m (30 ft.).

.3 Maximum variation from straight: 3.2 mm (1/8”) in 3 m (10 ft.) under a 3 m (10 ft.) straight edge.

.4 Maximum variation from angle indicated: 10 seconds.

.5 Tolerances shall be non-cumulative

1.7 Delivery, storage and handling

.1 Label, tag or otherwise mark metal fabrications supplied for installation by other sections to indicate its function, location in building and shop drawing designation.

.2 Protect Work from damage during delivery, storage and handling. Handle with fabric slings, store and transport on non-staining wood blocking.Protect against scuffing during shipment.

.3 Deliver work to location at the Place of the Work designated by Contractor and to meet requirements of construction schedule.

1.8 Waste management and disposal

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Divert unused metal materials from landfill to metal recycling facility.

PART 2 PRODUCTS

2.1 Materials - general

.1 Include materials, products, accessories, and supplementary parts necessary to complete assembly and installation of work of this section.

.2 Incorporate only metals that are free from defects that are visible, or that impair strength or durability. Install only new metals of best quality, and free from rust or waves and buckles, and that are clean, straight, and with sharply defined profiles.

.3 Be responsible for structural design, member sizes, arrangement, supports, connections, and anchoring of Work of this Section. Coordinate and maintain materials, dimensions, layout and appearance.

2.2 Steel

.1 Steel, structural shapes, plate, bars: hot-rolled, to meet specified requirements of CSA G40.20/G40.21, Grade 300W.

.2 Steel, hollow structural sections: hot-formed, seamless, to meet specified requirements of CSA G40.20/G40.21, Grade 350W, Class H.

.3 Steel, sheet: cold rolled, stretcher levelled, fully pickled, to meet specified requirements of CSA G40.20/G40.21, Grade 350W, Class H.

.4 Steel Pipe: To ASTM A53/A53M, Type E or S, Grade A or B, standard weight, Schedule 40 seamless black or AISI MT 1010/1015, or acceptable alternative.

.5 Welding Materials: To CSA W59.

2.3 Galvanized steel

.1 Hot Dip Galvanizing: to ASTM A123/A123M-13, minimum zinc coating of 600 g/m2, Coating Grade 85.

.2 Fabricate steel to be galvanized in accordance with ASTM A123/A123M-13. Avoid fabrication techniques that could cause distortion or embrittlement of steel.

.3 Remove welding slag, splatter, burrs, grease, oil, paint, lacquer, and other deleterious material prior to galvanizing.

.4 Remove by blast cleaning or other methods surface contaminants and coatings not removable by normal chemical cleaning process in the galvanizing operation.

.5 Hot dip galvanize steel members, fabrications, and assemblies after fabrication and all welding is complete, in accordance with ASTM A123/A123M-13. Use air cooling method (no water or chromate dipping treatment permitted).

.6 Hot dip galvanize A325 and A490 bolts, nuts, washers, and hardware components in accordance with ASTM A123/A123M-13. Oversize holes to allow for zinc alloy growth. Shop assemble bolts, nuts and washers with special lubricant and test in accordance with ASTM A123/A123M-13.

.7 Galvanize components of bolted assemblies separately before assembly.

.8 Welding on galvanized surfaces is not permitted.

2.4 Shop painting over galvanized steel

.1 Premium paint finish, mid-grey colour RAL 7016 “Anthracite Grey" or similar as selected by the Consultant.

.2 Maintain dry condition and 5°C minimum temperature until paint is thoroughly dry.

.3 Two coat epoxy / aliphatic urethane paint system over hot dip galvanizing. Acceptable products include: Carboguard 893 / Carbothane 134 HG, by Carboline Company, or approved equivalent.

.1 Prior to commencing, all parts are to be inspected for damage. All sharp edges to be de-burred and sanded.

.2 All components first to be prepared to SSPC SP1, solvent wiped to ensure the removal of oils, grease, dust, dirt and other markings on the surface.

.3 All components then to be prepared to SSPC SP7 Brush-Off Blast. Care shall be taken to ensure surfaces are not excessively blasted and excessively coarse. If this occurs, a light sanding of the coarse surface shall be done to remove the excessive roughness.

.4 After abrasive blast is performed, all surfaces to be blown down with clean dry air to remove residual dust.

.5 Parts to be hung on racks or carts in a manner that would be best for coating application, ensuring minimal touch ups after full coating system application is performed.

.6 After parts are hung, one coat of epoxy primer to be applied at 3-5 mils dry film thickness.

.7 Once coated and parts are cured, dry film thickness measurements are to be taken and recorded. Visual inspection is to be done to ensure there are no runs, sags, or dry spray. Any deficiencies found to be repaired prior to topcoat application.

.8 After epoxy primer is cured, topcoat of Aliphatic Urethane to be applied at 2-3 mils dry film thickness.

.9 Once topcoat has cured sufficiently, dry film thickness measurements to be taken and recorded. Visual inspection to be done to ensure there are no runs, sags, or dry spray.

.10 Environmental conditions to be taken daily and documented, as well as batch numbers for all coatings used.

.11 At the end of the project, coating inspection reports and a certificate of compliance is to be supplied to the Consultant assuring conformance to all specification requirements.

2.5 Fasteners

.1 Metal fasteners shall be uniform to metal materials and components being anchored or of a metal which will not set-up a galvanic action causing damage to the fastening or metal component under moist conditions.

.2 Fasteners for pre-finished materials shall be of concealed type unless otherwise indicated, and when exposed finish is required, of matching pre-finishing materials.

.3 Metal fastenings and accessories shall be of same texture, colour, and finish as material on which they occur, as selected by the Consultant.

.4 Bolts, nuts, washers, screws: Type 304 stainless steel to ASTM A314-23.

.5 High strength bolts: to ASTM F3125/F3125M-23.

.6 All exposed fasteners to be tamper-proof.

.7 Where noted, anti-seize paste will be applied to fasteners.

2.6 Grout

.1 Epoxy grout: non-shrink, non-expanding, 'Sikadur Injection Gel Fast-Set' as manufactured by Sika Canada Inc., HY-150 as manufactured by Hilti, REZI-WELD 3/2 EPOXY GROUT/PATCH by W.R. Meadows, or approved alternative.

.2 Cementitious grout: non-shrink, non-expanding to ASTM C1107/C1107M, 'Sika Grout 212' as manufactured by Sika, 'Sealtight CG-86 Construction Grout' as manufactured by W.R. Meadows, or approved alternative.

2.7 Concrete footings

.1 Concrete placing, curing, and protection from the elements, in accordance with OPSS 904.

PART 3 EXECUTION

3.1 General

.1 Coordinate installation with work of Section 06 15 01 – Timber and Woodwork and with other appropriate Sections to ensure proper scheduling for fabrication and installation of the work specified herein.

.2 Assemble items in the shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

.3 Incorporate means for fastenings of other Work secured to Work of this Section.

.4 Joints shall be milled to a close fit. Corner joints shall be coped or mitred, well formed, and in true alignment.

.5 Protection against galvanic action shall be provided wherever dissimilar metals are in contact. Protection shall be by application of an appropriate gasket, neoprene spacer or other approved galvanic isolator.

3.2 Examination

.1 Verify condition and dimensions of previously installed work, related work, and conditions under which this work is to be performed.

.2 Notify Consultant in writing of all deficiencies and conditions detrimental to the proper completion of this work.

.3 Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work means Installer accepts substrate, previously installed work, and existing conditions.

3.3 Fabrication

.1 Take site measurements to ensure that Work is fabricated to fit surrounding construction, around obstructions and projections in place.
Construction:

.2 Fabricate metal components with machinery and tools specifically designed for the intended manufacturing processes and by skilled tradesmen.

.3 Fabricate Work with materials, component sizes, metal gauges, reinforcing, anchors, and fasteners of adequate strength to withstand intended use.

.4 Ensure that Work will remain free of warping, buckling, opening of joints and seams, distortion, and permanent deformation.

.5 Drill drainage holes at metal fabrications to permit drainage of trapped moisture.

.6 Welding:

.1 Do welding work in accordance with CSA W59.2, as applicable, unless specified otherwise.

.2 Welding shall be done by qualified welders. No welding will be permitted on site.

.3 Provide continuous welds, where exposed to view unless otherwise indicated. Weld and grind welds to provide flat flush and finish to match adjacent finish, where exposed to view.

.7 Bolting:

.1 Bolt holes in 10mm or thinner material may be drilled or punched to finished size. In material thicker than 10mm, the holes shall be drilled to finished size or sub-punched smaller than the nominal diameter of the fastener and reamed to size. The finished diameter of holes shall not be more than seven percent greater than the nominal diameter of the fastener except:

.1 Slotted holes for expansion purposes shall be provided as required on the plans.

.2 Holes shall not be drilled in such a manner as to distort the metal, but holes only slightly misaligned may be reamed to render a reasonable fit.

.3 In all bolts the finished shank shall be long enough to provide full bearing and washers shall be used under the nuts to give full grip when the nuts are tightened.

.8 Cutting:

.1 Material 10mm thick or less may be sheared, sawn or cut with a router. Materials more than 10mm thick shall be sawn or routed.

.2 Cut edges shall be true and smooth, and free from excessive burrs or ragged breaks. Grind all exposed edges of touchable railing component edges smooth.

.3 Re-entrant cuts shall be avoided wherever possible. If used, they shall be filleted by drilling prior to cutting.

.9 Joinery intended to be "in plane" shall not vary from true alignment by more than 0.8mm.

.10 Mill joints to a tight, hairline fit. Cope or mitre corner joints. Form joints exposed to weather to exclude water penetration.

.11 Finish exposed surfaces to smooth, sharp, well-defined lines and arises.

3.4 Assembly

.1 Accurately cut, machine and fit joints, corners, copes and mitres so that junctions between components fit together tightly and in true planes.

.2 Fasten work with concealed methods unless otherwise indicated.

.3 Weld metal connections where possible, bolt where not possible, and cut off bolts flush with nuts. Countersink bolt heads, and incorporate method to prevent loosening of nuts. Ream holes drilled for fastenings.

.4 Grind welds smooth and polish to match metal being secured, where exposed to view.

.5 Provide for differential movements within assemblies and at junctions of assemblies with surrounding Work.

.6 Separate dissimilar materials with bushings, grommets or washers to prevent electrolytic corrosion.

.7 Cleanly and smoothly finish exposed edges of materials including holes. Ease 90° corners of exposed metals.

.8 Prefinish work at the factory, except where specified or indicated otherwise

.9 Incorporate holes and connections for work installed under other sections.

.10 End caps shall be fitted to all exposed ends of rails or posts.

3.5 Installation

.1 Place concrete footings as indicated on detail drawings. Set posts level and plumb in all directions.

.2 Install metal fabrications in accordance with reviewed shop drawings and to accommodate work of others.

.3 Install metal fabrications plumb, true, square, straight, level, and accurately and tightly fitted together and fit to surrounding work.

.4 Include in work of this section anchor bolts, high tensile bolts, washers and nuts, expansion bolts, toggles, straps, sleeves, brackets, clips, and other items necessary for secure installation as required by loading and jurisdictional authorities. Weld to CAN/CSA-S16.

.5 Countersink holes at wood screw locations where wood is attached to work of this section.

.6 Make field connections with bolts or weld as indicated to CAN/CSA-S16.

.7 Apply grout in accordance with manufacturer's instructions and recommendations.

3.6 Adjustment and cleaning

.1 Touch-up, repair or replace damaged products as directed by Consultant.

.2 Repair damaged factory-applied finish as directed by Consultant.

.3 Remove damaged, dented, defaced, defectively finished, or tool marked components and replace with new.

.4 Do not use abrasive cleaners.

3.7 Protection

.1 Maintain protection of Work of this Section from time of installation until final finishes are applied or to final cleanup.

END OF SECTION

Section 06 15 01
Timber and Woodwork

PART 1 GENERAL

1.1 Section includes

.1 This section includes requirements for the supply and installation of materials and components for wood privacy fencing.

1.2 Related requirements

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 05 50 00 - Metal Fabrications

1.3 Reference standards

.1 All referenced standards shall be the current edition or edition referenced by the Ontario Building Code currently in force.

.2 Ontario Provincial Standard Specifications (OPSS):

.1 OPSS 904, Concrete Structures

.3 CSA Group (CSA):

.1 CSA O86:19, Engineering design in wood

.2 CSA B111-1974, Wire Nails, Spikes and Staples

.3 CSA-O80 Series-15, Wood Preservation

.4 CSA O86-01, Engineering Design in Wood

.5 CSA O80-20-97, Fire-Retardant Treatment of Lumber by Pressure Processes

.6 CAN/CSA-S16-01, Limit States Design of Steel Structures

.7 CSA W59-18, Welded Steel Construction (Metal Arc Welding)

.8 CSA Z809:16, Sustainable forest management

.4 National Lumber Grades Authority (NLGA):

.1 NLGA Standard Grading Rules for Canadian Lumber, 2017.

.5 ASTM International(ASTM):

.1 ASTM A480/A480M-23b, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip

.2 ASTM A641/A641M-19, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

.3 ASTM D7612-21, Standard Practice for Categorizing Wood and Wood-Based Products According to Their Fiber Sources

.4 ASTM F593-22, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs

.6 Forest Stewardship Council (FSC):

.1 FSC-STD-01-001-v5-3, FSC Principle and Criteria for Forest Stewardship

.7 Architectural Woodwork Institute (AWI):

.1 Architectural Woodwork Standards, Current Edition.

1.4 Submittals

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

.2 Action Submittals: Submit the following submittals before starting any work of this Section:

.1 Product Data: Submit product data for each type of manufactured material and product indicated. Include product characteristics, performance criteria, physical size, finish and limitations in use.

.2 Shop Drawings: Submit electronic shop drawings for Consultant review, prior to fabrication.

.1 Shop drawings shall include plans, sections and large-scale details, and shall indicate components and methods of assembly, materials and their characteristics, fastenings, metal finishes, welds, and their structural characteristics relative to their purpose, and other fabrication information required.

.1 Shop Drawings for privacy fence shall be coordinated with and shall include all relevant details included in Section 05 50 00 - Metal Fabrications.

.2 Indicate locations and sizes of blocking and nailers.

.3 Indicate proposed site connections and methods.

.3 Samples for initial selection:

.1 Submit duplicate 300mm (12") long samples of wood fence slats, representing anticipated range to account for variations in wood materials.

.2 Submit sample of each type of fastener required.

.3 Informational Submittals: Submit the following submittals during the course of the Work:

.1 Mock-up:

.1 Submit one (1) complete bay of fence, completely fabricated, including fence posts and slats, and incorporating all elements and fastening components of final installation work and integrated work of other trades.

.2 Location of mock-up to be proposed by Contractor and accepted by Consultant on site. Acceptable mock-ups may become part or the completed work if undisturbed at time of Substantial Completion.

.3 When accepted, mock-up will demonstrate minimum standard for this work.

.4 Closeout Submittals:

.1 Operation and Maintenance Data: Include, in the operation and maintenance manual, manufacturer's maintenance instructions and recommended cleaning materials and methods.

1.5 Quality assurance

.1 General: Work of this section shall be executed only by a supplier who has adequate plant, equipment, and skilled tradespersons to perform work expeditiously, and is known to have been responsible for satisfactory installations similar to that required in the Work during a period of at least the immediate past 5 years.

.2 All materials, components and workmanship to conform to building and local by-laws. Contractor to obtain all necessary permits and approvals.

.3 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board. Provide industry standard acceptable written certification such as:

.1 Certificate of Inspection & Environmental Compliance.

.2 FSC Certification or similar approved.

.4 Reference Standards: unless otherwise indicated, carry out timber and woodwork in accordance with requirements of “Millwork Standards (latest issue) of the Architectural Woodwork Institute (AWI) “Premium Grade”.

1.6 Delivery, storage and handling

.1 Deliver and store materials on site in such a way as to prevent deterioration or loss or impairment of essential properties. Prevent excessive moisture gain of kiln-dried materials.

.2 Delivery and Acceptance Requirements:

.1 Deliver lumber identified by grade with a stamp of an agency certified by the Canadian Lumber Standards Accreditation Board.

.2 Deliver materials at least 2 weeks before installation. Allow for proper on-site acclimation.

.3 Protect materials to be left exposed in finished Work. Cover materials with waterproof covering. Maintain adequate air circulation and ventilation.

.3 Storage and Handling Requirements:

.1 Use padded, non-marring slings for handling wood sections.

.2 Protect corners with wood blocking.

.3 Store wood and protect from weather, block off ground and separate with stripping, so air may circulate around all faces of members.

.4 Cover wood with opaque moisture resistant membrane if stored outside.

.5 Include storage and handling instructions maintenance procedure for finishes or components requiring specific care, noting particularly those procedures or materials which will cause damage to finished surfaces.

.4 Make adequate provision for delivery and handling stresses.

1.7 Waste management and disposal

.1 Wood cut-offs are to be diverted from landfill by disposal into on-site wood recycling bin or at nearest wood recycling facility as accepted by Consultant.

.2 Reusable materials are to be diverted for reuse at nearest used building materials facility or similar type facility.

.3 Unused preservatives and fire retardant materials are to be diverted from landfill through disposal at a special wastes depot.

PART 2 PRODUCTS

2.1 Materials - general

.1 Unless detailed or specified otherwise, standard Products will be acceptable if construction details and installation meet intent of the drawings and specifications.

.2 Include materials, products, accessories, and supplementary parts necessary to complete assembly and installation of work of this section.

.3 Incorporate only materials that are free from defects that are visible, or that impair strength or durability. Install only new metals of best quality, and free from waves and buckles, and that are clean, straight, and with sharply defined profiles.

2.2 Wood fence materials

.1 Solid Wood: kiln dried vertical grain, Western Red Cedar; no cross grain. Exposed surfaces shall be free of splits, say stain, torn or raised grain, warp, knots and other defects.

.1 No.1 grade Western Red Cedar: selected mainly for good appearance. All members shall be free of wane and bark pockets. All torn grain shall be eliminated by sanding and planning. Members exhibiting moderate to heavy knots shall be well distributed throughout the site installation. Boards and dimension lumber shall be select (NLGA 204A). Posts shall be select structural post and timber (NLGA 131A).

.2 All wood to bear timber grading stamp.

.3 All exposed wood material to be left to weather naturally.

2.3 Metal fence posts and framing

.1 Metal posts and framing shall be galvanized and painted steel, in accordance with Section 05 50 00 – Metal Fabrications.

.2 Welding materials: to CAN/CSA W59.2.

2.4 Concrete footings

.1 Concrete placing, curing, and protection from the elements, in accordance with OPSS 904.

2.5 Accessories

.1 All exposed fasteners to be tamper-proof.

.2 Wood Fasteners:

.1 Driven fasteners, nails, lag bolts, spikes brads and staples: CSA B111-1974, stainless steel, hardened aluminium or hot dip galvanized steel.

.2 Screws, washers, nuts, bolts: Nickel-plated or stainless steel.

.3 Metal Fasteners:

.1 Metal fasteners shall be uniform to metal materials and components being anchored or of a metal which will not set-up a galvanic action causing damage to the fastening or metal component under moist conditions.

.2 Fasteners for pre-finished materials shall be of concealed type unless otherwise indicated, and when exposed finish is required, of matching pre-finishing materials.

.3 Metal fasteners and accessories shall be of same texture, colour, and finish as material on which they occur, as selected by the Consultant.

.4 Metal Fasteners, Hardware, Connectors, and Hangers: Galvanized steel in accordance with CSA O86 and manufacturer's recommendations.

.5 Where noted, anti-seize paste will be applied to fasteners.

PART 3 EXECUTION

3.1 Examination

.1 Verify condition and dimensions of previously installed work, related work, and conditions under which this work is to be performed.

.2 Notify Consultant in writing of all deficiencies and conditions detrimental to the proper completion of this work.

.3 Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work means Installer accepts substrate, previously installed work, and existing conditions.

3.2 Installation - general

.1 Coordinate installation with work of Section 05 50 00 – Metal Fabrications.

.2 Horizontal and Vertical Layout: Layout work accurately in accordance with reviewed shop drawings and to accommodate work of others.

.3 Grading: Remove debris and correct ground undulations along fenceline to obtain smooth uniform gradient between posts.

3.3 Installation of wood fence

.1 Do wood work in accordance with CSA O86 except where specified otherwise.

.2 All lumber sizes are actual sizes rather than nominal sizes.

.3 Place concrete footings as indicated on detail drawings. Set posts level and plumb in all directions.

.4 Install fence woodwork and metal components plumb, true, square, straight, level, accurately and tightly fitted together and fit to surrounding work.

.1 Cut and fit accurately. Scribe and closely fit components to irregularities of adjacent surfaces.

.2 Accurately fit joints in true plane, locate joints over bearing or supporting surfaces.

.3 Erect in position indicated. Align, level, square, plumb, and secure work permanently in place.

.4 Install rails, slats, boards uniformly spaced and in longest practical lengths; accumulation of short pieces not permitted. No edge grain shall be visible; mitre corners. Slope cut intermediate joints.

.5 Make field connections with bolts or weld as indicated to CAN/CSA-S16-01.

.6 Provide fastening devices and rough hardware such as nails, bolts, nuts, washers, screws, clips, and connectors required for complete installations.

.1 Unless permitted provide concealed fastening of components.

.2 Install fasteners in straight lines with no visual deviation – failure to comply with result in removal and re-installation.

.3 Exposed fasteners where permitted shall be laid out uniformly, evenly spaced and aligned in both directions. Drive all nail heads below surface of wood; no hammerhead marks will be allowed. Use sufficient size and quantity of nails to ensure a stable, secure structure.

.4 Screws with blown out threads after installation to be replaced. If screw installation results in thread being blown in bench support, bench support to be removed and new support installed.

.7 Bore holes true to line and to same size as bolts. Drive bolts into place for snug fit and use plates or washers for bolt head and nut bearings. Turn up bolts and lag screws tightly when installed, and again just before concealed by other work or at completion of work.

.8 Do not attach work by wood plugs or blocking in concrete or masonry.

.9 Do not regard nailers, blocking, and such other fastening provision indicated as exact or complete. Install required provisions for fastening, located and secured to suit site conditions, and adequate for intended support.

.10 Install rails, slats, boards uniformly spaced and in longest practical lengths; accumulation of short pieces not permitted. No edge grain shall be visible; mitre corners. Slope cut intermediate joints. Erect work plumb, in true planes, and fastened rigidly in place.

.11 Fasteners:

.1 Wood shall be pre-drilled for fasteners with countersunk bit.

.1 At concealed locations, set fasteners flush with finished face of wood.

.2 At exposed locations, countersink fasteners and conceal with glued hardwood dowels.

.2 Evenly space fasteners and align in both directions.

.3 Fasteners shall not bind or crush wood fibres.

3.4 Cleaning

.1 Remove tool marks, bruises, and scratches.

3.5 Protection

.1 After fence work is installed, it shall be the responsibility of the Contractor to protect it from damage until Substantial Performance.

END OF SECTION

Section 06 73 00
Composite Decking

PART 1 GENERAL

1.1 Section includes

.1 This section includes labour, materials, tools, and equipment, required to supply and install composite decking and fastening system.

1.2 Related sections

.1 Section 01 33 00 - Submittal Procedures

.2 Section 32 14 00 - Landscape Stone

.3 Section 32 33 00 - Exterior Site Furnishings

1.3 Reference standards

.1 All referenced standards shall be the current edition or edition referenced by the Ontario Building Code currently in force.

.2 Canadian Standards Association (CSA International):

.1 CSA O80 Series 21, Wood Preservation.

.2 CSA O86 19, Engineering Design in Wood.

.3 American Society for Testing and Materials (ASTM International):

.1 ASTM E84-22, Standard Test Method for Surface Burning Characteristics of Building Materials

.2 ASTM D5116 17, Standard Guide For Small Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.

.4 American Wood Preservers' Association (AWPA):

.1 AWPA A2 15, Standard Methods for Analysis of Water borne Preservatives and Fire Retardant Formulations.

.2 AWPA A3 15, Standard Methods for Determining Penetration of Preservatives and Fire Retardants.

.5 National Lumber Grades Authority:

.1 NLGA Standard Grading Rules for Canadian Lumber.

1.4 Design and Performance Requirements

.1 Structural Performance:

.1 Deck: Uniform Load – An allowable span of 16 in. on-center and 100 lbf/sq.ft.

.2 Tread of Stairs: Concentrated Load: An allowable span of 12 in. on-center, and 750 lbf-, and 1/8” max. deflection, with a concentrated load of 300 lbf on area of 4 sq. in.

.2 Fire-Test Response Characteristics per ASTM E84.

.1 Flame Spread Index– Class B.

1.5 Submittals

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

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit product data for all composite decking and decking fastening system components, including installation instructions.

.1 Submit range of colours and finishes for composite decking system for Consultant's initial selection and approval prior to ordering.

.2 Shop Drawings:

.1 Submit detailed shop drawings for each composite deck, including all fastenings, hardware, and accessories. Include plans, elevations, sections, and other required installation clearances, and details of anchorage, attachment and bracing.

.2 Shop drawings to be based on site verified measurements.

.3 Samples:

.1 Submit 600mm long sample of decking material, showing colour, finish and range of variation to be expected in appearance of decking, including surface texture.

.3 Informational Submittals: Provide the following submittals during the course of the Work:

.1 Mock-up:

.1 Do not begin decking work until mock-ups are reviewed and accepted by the Consultant. Accepted mock-up shall represent minimum standard of quality for project decking work.

.2 Submit 3m x 3m mock-up of composite decking, including joists, framing and other components, and demonstrating edge and corner conditions, deck board spacing including all fastenings, hardware, and accessories.

.3 Locate mock-up where directed by Consultant. Once accepted, mock-up can be incorporated into finished work.

1.6 Delivery, storage and handling

.1 Store materials under cover and protected from weather and contact with damp or wet surfaces.

.2 Store decking materials on a flat and level surface. Support bundles on supplied supports. Do not store directly on the ground.

.1 Stack materials flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

.3 Handle and store decking materials to comply with manufacturer's written instructions.

PART 2 PRODUCTS

2.1 Composite decking

.1 Composite decking system shall be Trex Transcend, as supplied by Trex Company Inc. (www.trex.com), or approved equivalent.

.1 Composite Decking consisting of recycled Linear Low Density Polyethylene (LLDPE) and recycled wood.

.2 Decking Standard: ICC-ES AC174.

.3 Decking Size: 0.94 x 5.5 inches (24 by 140 mm) actual

.4 Decking Length: 12, 16, and 20 feet. Layout as shown on Contract Drawings.

.5 Configuration: Provide product with grooved edges designed for fastening with concealed decking fasteners, and full profile.

.6 Color: Jasper. All colour selections to be confirmed by Consultant prior to ordering

.7 Physical and Mechanical Properties as follows:

Test	Test Method	Value
Flame Spread Index	ASTM E84	Class B
Thermal Expansion	ASTM D1037	1.9 x 10^{-5} inch/inch/degree F(Fastener used in testing: #8 x 2.5 in. approved Stainless Steel Screw)
Moisture Absorption	ASTM D1037	< 1%
Screw Head Pull-Through	ASTM D1761	161 lbf per screw**
Fungus Resistance	ASTM D1413	Rating - no decay
Termite Resistance	AWPA E1-72	Rating = 9.6

2.2 Decking fastening system

.1 Decking fastening system shall be Trex Universal Hideaway Hidden Fasteners, as supplied by Trex Company Inc. (www.trex.com), or approved equivalent.

.1 Fasteners: Stainless steel screws, minimum #7 size, in sufficient length to penetrate not less than 1-1/4 inches (31 mm) into wood framing substrate.

2.3 Deck joists, framing and accessories

.1 Pressure Preservative Treated Wood: in accordance with CSA O80 Series.

.2 Metal Fasteners, Hardware, Connectors, and Hangers: Galvanized steel in accordance with CSA O86 and manufacturer's recommendations.

.1 Driven fasteners: Nails, spikes, brads, and staples, Class I hot-dip galvanized according to ASTM A641/A641M.

PART 3 EXECUTION

3.1 Examination

.1 Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Preparation

.1 Clean substrates of projections and substances detrimental to application.

3.3 Installation

.1 Install according to manufacturer's instructions.

.2 Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.

.3 Install decking in accordance with manufacturer's written instructions.

.4 Secure decking to wood framing with concealed deck clips and screws.

.5 Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

.6 For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced and with adjacent rows staggered.

3.4 Cleaning

.1 Follow manufacturer's cleaning instructions.

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

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

END OF SECTION

Section 31 11 00
Clearing and Grubbing

PART 1 GENERAL

1.1 Section includes

.1 This section includes requirements for for clearing, close cut clearing, grubbing and clearing isolated trees.

1.2 Related requirements

.1 Section 01 33 00 - Submittal Procedures

.2 Section 02 41 13 – Selective Site Demolition

.3 Section 32 01 90 – Tree & Shrub Preservation

.4 Coordinate work of this section with erosion and sediment control , demolition, and grading drawings.

1.3 Reference standards

.1 All referenced standards shall be the current edition or edition referenced by the Ontario Building Code currently in force.

.2 City of Toronto Construction Standards

.1 City of Toronto Tree Protection Policy and Specifications for Construction Near Trees, July 2016

.3 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS 201, Clearing, Close Cut Clearing, Grubbing and Removal of Surface Boulders

.4 Government of Ontario

.1 Ontario Endangered Species Act (ESA), 2007.

.5 Department of Justice Canada (Jus)

.1 Canadian Environmental Protection Act (CEPA), 2012

.2 Federal Species at Risk Act (SARA), S.C. 2002, C.29.

.6 Reference Reports:

.1 Arborist Report and Tree Preservation Plan, as prepared by Kuntz Forestry Consulting Inc., dated 2023-01-24.

1.4 Definitions

.1 Clearing: Consists of cutting off trees and brush vegetative growth to not more than specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.

.1 Close-cut clearing: Consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.

.2 Clearing isolated trees: Consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.

.3 Underbrush clearing: Consists of removal from treed areas of undergrowth, deadwood, and trees smaller than 50 mm trunk diameter and disposing of fallen timber and surface debris.

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

.3 Emerald ash borer (EAB): A non-native, invasive beetle that is highly destructive to ash trees where it occurs.

.1 Woodchips in the context of EAB consist of untreated, raw bark and wood fragments broken or shredded from logs or branches. Woodchips are to be less than 2.5 cm in at least any two dimensions.

.2 Firewood in the context of EAB consists of non-manufactured, solid wood material, with or without bark, cut into sizes less than 1.2 metres long and less than 25 cm in diameter which may be handled manually.

.3 Logs in the context of EAB consist of untreated, raw wood greater than 1.2 metres in length and greater than 25 cm diameter.

.4 Enclosed vehicle in the context of EAB consist of any vehicle transporting regulated wood material that is equipped to prelude the loss of materials or the escape of EAB while in transit.

1.5 Delivery, storage, and handling

.1 Prevent damage to natural features, utility lines, site appurtenances, water courses, root systems of trees which are to remain.

.1 Repair damaged items to approval of Consultant Consultant.

.2 Replace any damaged trees designated to remain, as directed by Consultant.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 Nesting survey

.1 A nesting survey is required to be completed by a qualified avian biologist if clearing and grubbing work is planned to be undertaken between the dates of March 30 and July 23.

.1 The Contractor shall be responsible for retaining a qualified avian biologist to complete the nesting survey prior to the start of work.

.2 A copy of the nesting survey shall be delivered to the Consultant no later than two weeks before the commencement of clearing and grubbing work.

.3 If the nesting survey identifies that nesting bird(s) are present within the limits of clearing and grubbing work, the Contractor shall not proceed with clearing and grubbing the areas where nesting bird(s) are present. The setback from the breeding location to the permissible limits of clearing and grubbing work shall be in accordance with the recommendations of the Contractor's qualified avian biologist.

3.2 Preparation

.1 Inspect site and verify with Consultant, any items designated to remain.

.2 Locate and protect utility lines: Preserve in operating condition active utilities traversing site.

.1 Notify Consultant immediately of damage to or when unknown existing utility line(s) are encountered.

.2 When utility lines which are to be removed are encountered within area of operations, notify utility in ample time to minimize interruption of service.

.3 Notify utility authorities before starting clearing and grubbing.

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

3.3 Removal and disposal

.1 Remove cleared and grubbed materials from site and dispose of off-site at a location arranged by the Contractor. .

.2 There is limited additional pruning or branch removal permitted, at the discretion of the Consultant, for the purpose of aiding with construction methods which will be included as part of the Contractor's scope of work for clearing and grubbing.

.1 The Contractor shall use equipment as necessary to avoid physical impact to the existing tree canopy, trunks and/or root systems.

.3 Where tree removals are prescribed, the Contractor shall assume that all stumps and roots shall be removed as per OPSS 201.

.1 Existing stumps located within five meters of the existing bottom of bank may remain where directed by the Consultant.

.2 The Contractor shall complete a site walk through with the Consultant in advance of tree removals to confirm the location of stumps that are to remain.

3.4 Finished surface

.1 Leave ground surface in condition suitable for immediate grading operations to approval of Consultant.

3.5 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.

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

END OF SECTION

Section 31 22 13
Rough Grading

PART 1 GENERAL

1.1 Section includes

.1 This section includes requirements to grade the site within the tolerances for finished surfaces.

1.2 Related requirements

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 32 11 23 - Aggregate Base Courses

.3 Coordinate work of this section with erosion and sediment control , demolition, and grading drawings.

1.3 Reference standards

.1 All referenced standards shall be the current edition or edition referenced by the Ontario Building Code currently in force.

.2 City of Toronto Construction Standards:

.1 TS 5.10 - City of Toronto Construction Specification for Growing Medium

.2 TS 401 - City of Toronto Amendment to OPSS 401 – Construction Specification for Trenching, Backfilling and Compacting

.3 TS 403 - City of Toronto Amendment to OPSS 403 – Construction Specification for Rock Excavation for Pipelines, Utilities and Associated Structures in Open Cut

.3 Toronto Region conservation authority (TRCA)

.1 Erosion and Sediment Control Guide for Urban Construction (Toronto and Region Conservation Authority, 2019)

.4 Ontario Provincial Standard Specifications (OPSS):

.1 OPSS.MUNI 206, Construction Specification for Grading

.2 OPSS.MUNI 402, Construction Specification for Excavating, Backfilling, and Compacting for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers

.3 OPSS.MUNI 1004, Material Specification for Aggregates - Miscellaneous

.4 OPSS 1860, Material Specification for Geotextiles

.5 Ontario Ministry of the Environment, Conservation and Parks (MECP):

.1 Soil, ground water and sediment standards for use under Part XV.1 of the Environmental Protection Act, R.S.O. 1990, c. E.19

.2 O. Reg. 406/19: On-site and Excess Soil Management

.6 Department of Justice Canada (Jus):

.1 Canadian Environmental Protection Act (CEPA), 2012

.2 Federal Species at Risk Act (SARA), S.C. 2002, C.29

.7 ASTM International (ASTM):

.1 ASTM D698-12, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))

.2 ASTM D1557-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modi?ed Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))

.8 Reference Documents:

.1 Geotechnical Investigations Report for Proposed Bluffer's Park Pavilion, as prepared by Davroc Testing Laboratories Inc., dated 2023-04-13.

1.4 Quality assurance

.1 Qualifications:

.1 Testing Agencies: Testing laboratory certified by ULC will conduct the soil compaction test.

1.5 Existing conditions

.1 Examine all site-specific environmental and geotechnical reports which form part of the Contract Documents.

.2 The position of existing pole lines, conduits, watermains, sewers and other underground and aboveground utilities, structures and appurtenances are not necessarily shown on the Contract Drawings, and where shown, the accuracy of the position of such utilities and structure is not guaranteed. The Contractor is responsible for locating all existing services and protecting all utilities during construction. The Contractor is to assume all liability for damage to all utilities and structures during the course of construction.

.3 The Contractor is responsible for protecting, maintaining and/or supporting underground, aboveground, and overhead utilities. Appropriate equipment to be supplied by Contractor at his expense. Contractor must have qualified personnel on site at all times to operate any equipment to support utilities.

.4 When inactive services are encountered, remove in accordance with Section 02 41 13 – Selective Site Demolition.

.5 Where Work involves breaking into, connecting to, or disrupting existing services, maintain existing services in occupied areas by carrying out work at times directed by governing authorities, with minimum disturbance to pedestrian, vehicular traffic, and tenant and homeowner operations.

PART 2 PRODUCTS

2.1 Materials

.1 Imported fill is to be supplied by the Contractor and shall be in accordance with applicable Provincial and Federal regulation and in accordance with site-specific environmental reports.

.1 Fill material must meet the density requirements as outlined in the Geotechnical Report.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: Verify conditions of substrate previously installed under other Sections or Contracts are acceptable for rough grading.

.1 Examine soil for unsuitable conditions such as clods, rocks, snow, frost, frozen, muddy, large roots, litter, toxic substances, and unstable material.

.2 Proof roll the subgrade areas indicated on Drawings.

.1 Verify the subsoil is free of surface water and not frozen.

.3 Verify locations of all underground utilities.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with the Work after unacceptable conditions have been remedied.

3.2 Preparation

.1 Remove litter, unsatisfactory and unstable materials.

.2 Stake and flag locations of utilities.

.3 Protect existing underground and above head utilities.

.4 Notify utility companies to remove and relocate utilities as indicated on Drawings.

.5 Protect excavations from freezing.

.6 Keep excavations clean, free of standing water, and loose soil.

.7 Cover and protect excavations where soil is subject to significant volume change due to change in moisture content in accordance with Geotechnical Reports

.8 Protect and/or transplant existing fencing, trees, shrubs, vegetation, landscaping, natural features, benchmarks, buildings, pavement, surface or underground utility lines which are to remain using methods approved by the Consultant. If damaged, restore to original or better condition unless directed otherwise.

.9 Protect buried services that are required to remain undisturbed

.10 Ensure positive drainage to all stormwater collection basins. Provide temporary on-site swales, ditches, and culverts as required to ensure positive site drainage during construction.

.11 Conduct construction per occupational health and safety requirements in accordance with Health and Safety Plan.

.12 Blasting is not permitted.

.13 Maintain access roads to prevent accumulation of construction related debris on roads.

3.3 Grading

.1 Rough grade to levels, profiles, and contours indicated on the drawings allowing for surface treatment as indicated on the Contract drawings.

.2 Grade so that water drains away from buildings, walls and paved areas, to catch basins, ditch, swale and other disposal areas approved by the Consultant.

.1 Grade to be straight line interpolation between finished spot elevations shown on drawings.

.3 Prior to placing fill over existing ground, scarify surface as indicated in Contract Documents. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

.4 Fill material shall be in accordance with applicable Provincial and Federal regulation and in accordance with site-specific environmental reports.

.1 Fill material shall contain no frozen lumps, topsoil, organic materials or other objectionable matter.

.5 Place and compact imported material in low areas and fill to required subgrade elevations.

.6 For lateral support, maintain even levels of backfill around structures as work progresses, to equalize earth pressures.

.7 Compact filled and disturbed areas to 95% standard Proctor maximum dry density to ASTM D698, and in accordance with Geotechnical Reports

.8 Rough grading elevations to be achieved within a tolerance of 50mm. In addition, deviations from specified grades within the required tolerance to be random so that no surplus or deficit of material results. Provide certified as-built drawings of rough grading immediately following Work (sealed by a Professional Engineer or Ontario Land Surveyor).

.9 If the subgrade soil conditions are unsuitable, additional excavation may be required. Any excavated material not suitable, or not required, shall be hauled away from the site in accordance with applicable Provincial and Federal regulation and in accordance with site-specific environmental reports.

.10 Avoid disturbing soil within the areas of existing trees and shrubs indicated to remain, to maintain their stability and health.

3.4 Field quality control

.1 Testing of materials and compaction of backfill and fill is to be carried out by a testing laboratory designated by the Consultant.

.1 Should tests fail, the cost of subsequent testing shall be the responsibility of the Contractor.

.2 Do not begin backfilling or filling operations until material has been approved for use.

.3 Not less than 48 hours before backfilling or filling with approved material, notify Consultant so that compaction tests can be carried out by designated testing agency.

3.5 Cleaning

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

3.6 Protection

.1 Protect existing trees, natural features, bench marks, buildings, pavement, surface or underground utility lines as directed by the Consultant. If damaged, restore to original or better condition, unless directed otherwise.

.2 Maintain access roads to prevent accumulation of construction related debris on roads.

END OF SECTION

Section 32 01 90
Tree and Shrub Preservation

PART 1 GENERAL

1.1 Section includes

.1 This section includes requirements for materials and measures for tree protection, including the following:.

.1 Placement of tree protection barriers

.2 Root zone compaction protection

.3 Root sensitive excavation and root pruning

1.2 Related requirements

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 31 22 13 - Rough Grading

.3 Section 32 01 90.23- Pruning

1.3 Reference standards

.1 All referenced standards shall be the current edition or edition referenced by the Ontario Building Code currently in force.

.2 City of Toronto Construction Standards

.1 TS 5.00 - City of Toronto Construction Specification for Sodding

.2 TS 5.10 - City of Toronto Construction Specification for Growing Medium

.3 TS 5.30 - City of Toronto Construction Specification for Planting

.4 City of Toronto Tree Protection Policy and Specifications for Construction Near Trees, July 2016

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

.1 Canadian Landscape Standard (CLS), latest edition.

.2 Canadian Nursery Stock Standard (CNSS), latest edition.

.4 CSA Group (CSA)

.1 CSA G30.18- 09, Carbon Steel Bars for Concrete Reinforcement.

.5 Department of Justice Canada (Jus)

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

.2 Fertilizers Act (R.S. 1985, c. F-10).

.3 Fertilizers Regulations (C.R.C., c. 666).

.4 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

.6 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 ANSI A300 (Part 2)-1998, Tree Care Operations - Tree, Shrub, and Other Woody Plant Maintenance - Standard Practices - Part 2 - Fertilization.

.3 ANSI A300 (Part 3)-2000, Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance: Standard Practices - Part 3 - Tree Support Systems (a. Cabling, Bracing, and Guying) (supplement to ANSI A300-1995).

.7 Reference Documents:

.1 Arborist Report and Tree Preservation Plan, as prepared by Kuntz Forestry Consulting Inc., dated 2023-01-24.

1.4 Definitions

.1 For the purpose of this specification, the following definitions apply:

.1 Certified Arborist: Designated and regulated by the International Society of Arboriculture (ISA).

1.5 Quality assurance

.1 Qualifications: Provide proof of qualifications when requested by the Consultant.

.1 All reports and site work where required will be completed by a Certified Arborist with minimum 5 years experience, and shall be consulted for all work that impacts the tree preservation zone.

.2 All work of this Section shall be carried out in accordance with accepted arboricultural practices as defined in the latest version of ANSI A300.

.3 Comply with City of Toronto Tree Protection By-law and applicable standards.

.4 Comply with the requirements and recommendations of the Arborist Report and Tree Preservation Plan, as prepared by Kuntz Forestry Consulting Inc., dated 2023-01-24.

1.6 Scheduling of work

.1 A pre-construction meeting shall take place with the Arborist and the Contractor. The Contractor’s superintendent, truck drivers and equipment operators shall be in attendance. All equipment and trucks shall follow the designated entrances and exits to the work site.

PART 2 PRODUCTS

2.1 Materials

.1 All products and remedial care for protection of the trees as specified are to be as recommended by a qualified arborist, must comply with references above, with approval of the Consultant.

.2 Tree protection fence shall be as indicated on drawings and as follows:

.1 Plywood barriers: Unless otherwise noted, tree protection barriers shall be constructed as per the City of Toronto TPP detail TP-1, with a solid 2"x4" wood frame clad with plywood sheeting or approved equivalent. Height of barrier shall be up to 2.4m high and a minimum of 1.2m.

.2 Snow fence barriers: Where additional visibility must be maintained tree protection barriers shall be constructed as per the City of Toronto TPP detail TP-1, with orange plastic web snow fencing fastened to a wood frame consisting of 2"x4" wood posts, with continuous 2"x4" wood top rails. Height of barrier shall be min. of 1.2m.

.3 Trunk protection:

.1 Where indicated, trunk protection shall be 28 x 89mm wood planks, minimum 1500mm long, secured with two bands metal strapping

.4 Tree protection sign:

.1 Minimum of 40cm x 60cm and made of white corrugated plastic board or equivalent material.

.2 Signs to be posted on tree protection fence in frequency as required by tree protection by-laws, or as shown on drawings and directed by the Consultant.

.5 Provide tree protection barrier alternative where indicated on the drawings, and subject to the approval by Urban Forestry Services in accordance with TPP item 3.

PART 3 EXECUTION

3.1 Examination

.1 Examine site before commencement of work and inform Consultant if site conditions will not permit completion of site work performed by this Section and as indicated on Drawings.

3.2 General

.1 No groundbreaking activities or demolition should occur until all tree preservation requirements have been met. Of primary concern is the erection of proper hoarding to establish the tree protection zone.

.2 All contractors, trades people and suppliers shall be informed of the tree preservation measures and guidelines at a pre-construction meeting.

.3 Monitoring of the trees and the tree preservation zone should be conducted by a consulting arborist throughout the duration of the project.

.4 Tree protection barriers must remain in place and in good condition during demolition and construction and must not be altered or moved until authorized by the Consultant, or applicable authority.

3.3 Tree protection

.1 Protect trees to be preserved from damage during the construction period in accordance with the following specifications and make good any damage at no expense to Owner.

.2 Trees to be protected will be indicated on the Drawings and/or by the Consultant.

.3 The trees shall be fertilized with a deep root application of 30-8-8 fertilizer before construction commences on this project as well as a second fertilization in two years.

.4 The trees within the protection zones shall be pruned in accordance with Section 31 13 90.23.

.5 Tree roots are expected to extend beyond the minimum tree protection area. Tree protection hoarding to be installed and inspected by a certified arborist prior to construction activity. Exploratory excavation and, if required, root pruning to be undertaken during clearing and grabbing. All roots are to be inspected and pruned by a certified arborist prior to construction activity.

.1 The Arborist shall undertake proper root pruning when and if roots of retained trees are to be exposed, damaged or severed by construction activities.

.2 The Arborist shall supervise the excavation of soil where roots are to be cut.

.3 All roots are to be cut cleanly at the excavation zone and backfilled with an appropriate soil mix.

.4 Exposed roots shall be covered with soil or mulch as soon as possible to prevent further damage and desiccation. Root pruning prior to excavation will help prevent unnecessary damage to tree roots.

.6 In areas where mulch may remain following construction the trees shall have approximately three to four inches of mulch installed over the root system before construction starts. Mulch shall be spread evenly under the canopy to the dripline or to the limits of the protection fence.

.7 There shall be a source of water provided to ensure that the trees get adequate water during the dry periods. It will be the responsibility of the Arborist to monitor for moisture content in the soil for the duration of the construction.

.8 **The protection zone shall not be breached in any way. There shall be no material stored in the preservation zones, no grade changes and no parking.**

.9 Ensure all trees are protected from compaction of roots or damage to trunk or limbs prior to receipt of permits for removal or remedial care as recommended by Arborist.

.10 Obtain necessary permits, reports, and approvals.

.11 Proceed with execution of specified work, under direction of the Consultant.

.12 No rigging cables will be wrapped around or installed in trees. Do not burn waste near trees and do not flush concrete trucks or cement mixing machines over root system.

.13 The arborist shall supervise the excavation of soil where roots are to be cut. All roots are to be cut cleanly at the excavation zone and backfilled with an appropriate soil mix.

.14 The Contractor shall be held responsible for all trees that have been damaged or have died as a result of his own actions. The Contractor will be required to reimburse the Owner at his own expense for damage or dead trees in one of the following forms: trees up to 250mm caliper will be replaced with a specimen of similar species and size, trees greater than 250mm caliper shall be evaluated monetarily according to the standards set out by the Ontario Shade Tree Council.

3.4 Trunk protection

.1 Protect trunks of all deciduous trees within work zone that cannot be protected by snow fence with 38 x 89 x 1500mm wood planks secured with two bands of metal strapping.

.2 Place wood planks around base of trunk at 150mm maximum on centre or to provide full protection from impact and abrasion.

.3 Do not puncture or damage bark with wood planks or fasteners.

.4 Arrange wood planks around branches or other irregularities to provide protection without damaging tree.

.5 Maintain tree protection during construction operations. Remove only when risk of damage has passed and upon approval of Consultant.

3.5 Root zone compaction protection

.1 Unless otherwise noted, no construction activity including vehicular circulation or access of any kind is permitted within the area identified on the tree protection plan or site plan as a tree protection zone.

.2 Where traffic or access through the root zone is anticipated, a Root Zone Compaction Protection treatment shall be installed.

.1 Where limited non-vehicular access across the root zone is anticipated (e.g., occasional foot traffic, wheelbarrow), a Light Root Zone Compaction Protection specification should be implemented, as described below:

.1 Installation of medium-weight non-woven geotextile fabric or landscape cloth over affected area;

.2 Installation of 150 mm of wood chips over the fabric area;

.3 Installation of ½” plywood over wood chip mulch, and;

.4 Installation of appropriate covering material, if desired.

.2 Where moderate non-vehicular access across the root zone is anticipated (e.g., materials staging) a Moderate Root Zone Compaction Protection specification should be implemented, as described below:

.1 100 mm of granular clear stone lain over fabric area;

.2 Installation of medium-weight non-woven geotextile fabric or landscape cloth over the stone;

.3 Installation of 150 mm of wood chips over fabric area, and;

.4 Installation of ½" plywood over wood chip mulch.

.3 In areas where frequent non-vehicular access or longer-term materials storage in the root zone is anticipated, or in areas where additional measures must be implemented to ensure complete exclusion of excavation activity, a Horizontal Hoarding / Excavation Exclusion specification should be implemented, as described below:

.1 Installation of medium-weight non-woven geotextile fabric or landscape cloth over affected area;

.2 Installation of 3 stacked and joined courses of 4" x 4" timbers around the area to be protected (including cross-members or joists, as required to maintain structural integrity);

.3 Installation of wood chip mulch in entire protected area, and;

.4 Installation of 2 layers of ¾" plywood or 1 steel plate over the protected area.

.4 In areas where vehicular access or severe potential root zone compaction are anticipated, such as site access roads, temporary parking areas or heavy machine staging areas, a more robust Heavy Root Zone Compaction Protection specification should be developed and implemented on a site-specific basis. Key elements of such a specification may include multiple steel plates over load-dissipating materials, or modular geocellular systems such as Permavoid ArborRaft, or approved equivalent.

3.6 Root-sensitive excavation

.1 Unless otherwise noted, no construction activity including, grade changes, surface treatments or excavations of any kind is permitted within the area identified on the tree protection plan or site plan as a tree protection zone.

.1 Efforts should be made to exclude excavation or grade changes, including cutting or filling, from all tree protection zones. Where this is not possible, and unless otherwise specified, excavation shall utilize a root-sensitive methodology such as hand-digging, hydrovac or pneumatic (e.g., AirSpade) soil excavation, as specified in the arborist report.

.2 Root-sensitive excavation must be conducted in advance of excavation using conventional excavation machinery. The objective of root-sensitive excavation is threefold: 1) to determine whether roots will be present beneath areas to be excavated and therefore determine the likely extent of damage to trees to be retained; 2) to finalize decisions about trees for which removal/preservation decisions are contingent upon the extent of roots encountered, and 3) to enable proper root pruning, as described below.

.3 Unless otherwise specified, root-sensitive excavation shall entail creating a trench approximately 200-300 mm wide between the subject tree (e.g., outside the established tree protection zone) and the area to be excavated, without damaging existing significant roots. Unless otherwise specified, root-sensitive excavation should be undertaken to a minimum depth of 800 mm, unless excavation is proposed to a shallower final depth. If excavation is for exploratory reasons and root pruning is not anticipated, equipment utilized during root-sensitive excavation should be operated at reduced pressures to prevent damage to root bark.

3.7 Root pruning

.1 Root pruning should be undertaken in conjunction with root-sensitive excavation in advance of conventional excavation, or immediately afterwards if unexpected roots are encountered. Root pruning should only be undertaken by an Certified Arborist, and in the manner outlined below:

.1 Roots that are severed, exposed, or diseased and are greater than 2.0 cm in diameter should be properly pruned. All roots must be pruned with clean and sharp hand tools only. Shovels, picks or other construction tools shall not be used to prune roots. Wound dressings or pruning paint must not be used to cover the ends of any cut.

.2 Roots should be pruned in a similar fashion as branches, taking care to maintain the integrity of the root bark ridge. Root should be pruned back to native soil; root stubs must not be left upon completion of root pruning.

.3 Prolonged exposure of tree roots must be avoided – exposed roots should covered and kept moist with soil, mulch, irrigation, or at least moistened burlap if they are to be exposed for longer than 3 hours. All cut roots should be covered with soil or excavated trenches should be backfilled with native material as soon as possible following root pruning.

3.8 Trenching and tunneling for underground services

.1 Efforts should be made to route all underground utilities around the tree preservation zones.

.2 Perform excavation and backfilling activities in accordance with Section 31 23 33.01- Excavating, Trenching and Backfilling.

.3 Utilities should be bored or tunneled under the root zone of the trees at a minimum depth of 1.6 m. Installation of underground utilities (water, sewage or hydro) within the tree protection area should utilize a non-destructive methodology such as directional boring, Airspade technology or Hydrovac removal of soil.

.4 Where trenching is required, excavate manually within zone of root system. Do not sever roots greater than 40 mm diameter except at greater than 500 mm below existing grade. Protect roots, and cut roots cleanly with sharp disinfected tools.

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

3.9 Pruning

.1 Prune in accordance with Section 32 01 90.23- Pruning. Prune promptly broken or damaged limbs incurred as a result of excavation or construction with proper cuts by a Certified Arborist (CA) or Registered Consulting Arborist (RCA), Landscape Horticulturist Journeyperson or Landscape Industry Certified Technician with Ornamental Maintenance designation or equivalent.

3.10 Cleaning

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

END OF SECTION

Section 32 01 90.23
Pruning

PART 1 GENERAL

1.1 Section includes

.1 This section includes requirements for materials and procedures for all pruning to be carried out, including the following:

.1 Pruning of existing plant material.

.2 Pruning of new plant material.

1.2 Related requirements

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 31 11 00 - Clearing and Grubbing

.3 Section 32 01 90 - Tree and Shrub Preservation

1.3 Reference standards

.1 All referenced standards shall be the current edition or edition referenced by the Ontario Building Code currently in force.

.2 City of Toronto Construction Standards

.1 TS 5.30 - City of Toronto Construction Specification for Planting

.2 City of Toronto Tree Protection Policy and Specifications for Construction Near Trees, July 2016

.3 Ontario Ministry of Agriculture, Food and Rural Affairs

.1 Publication 483-2004, Pruning Ornamentals.

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

.1 Canadian Landscape Standard (CLS), latest edition.

.2 Canadian Nursery Stock Standard (CNSS), latest edition.

.5 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 ANSI A300 (Part 2)-1998, Tree Care Operations - Tree, Shrub, and Other Woody Plant Maintenance - Standard Practices - Part 2 - Fertilization.

.3 ANSI A300 (Part 3)-2000, Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance: Standard Practices - Part 3 - Tree Support Systems (a. Cabling, Bracing, and Guying) (supplement to ANSI A300-1995).

.6 Reference Reports:

.1 Arborist Report and Tree Preservation Plan, as prepared by Kuntz Forestry Consulting Inc., dated 2023-01-24.

1.4 Definitions

.1 For the purpose of this specification, the following definitions apply:

.1 Branch Collar: The swollen area at the base of a branch.

.2 Certified Arborist: Designated and regulated by the International Society of Arboriculture (ISA).

.3 Crown: The leaves and branches of a tree measured from the lowest branch on the trunk to the top of the tree.

.4 Girdling Root: A root that has become wrapped around the trunk of the plant that over time will inhibit the uptake of nutrients and produce structural failure, eventually leading to death of the plant.

.5 Leader: A dominant or co-dominant, upright stem.

.6 Limb: A large, prominent branch.

1.5 Quality assurance

.1 Qualifications:

.1 All pruning to be undertaken by a Certified Arborist, or equivalent, with minimum 5 years experience.

.2 Pruning to be undertaken in the presence of the Consultant.

.2 All pruning and related work of this Section shall be carried out in accordance with accepted arboricultural practices as defined in the latest version of ANSI A300, and as directed by a Certified Arborist.

.3 Comply with City of Toronto Tree Protection By-law and applicable standards.

.4 Comply with the requirements and recommendations of the Arborist Report and Tree Preservation Plan, as prepared by Kuntz Forestry Consulting Inc., dated 2023-01-24.

1.6 Pruning season

.1 Prune during plant dormant period except during heavy frost, 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.

.1 Prune heavy bleeders such as birch and hard maple when in full leaf.

.2 Prune American White Elm (Ulmus americana) only during periods of low or no bark beetle activity. Pruning to be done only before first signs of leaf break and after the first frost.

.3 Prune shrubs that flower on the previous year’s growth only after flowering.

1.7 Scheduling of work

.1 Prepare a schedule of tree pruning operations for review by Consultant.

.2 Notify Consultant at least 7 days in advance of starting operations.

.3 Review work with Consultant on site prior to starting work.

.4 Start no work until sample pruning has been completed to satisfaction of Consultant.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 General

.1 Carry out work under direct on-site supervision of the Consultant.

.2 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.

.3 Notify Consultant immediately upon discovery of conditions detrimental to health of plant material or operations.

.1 Report structural weakness, decayed trunk or branches, split crotches.

.2 Report girdling of roots.

.3 Notify Consultant of type of disease encountered and recommend remedial measures in writing.

.4 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.

3.2 Pruning

.1 Use clean sharp tools. Remove dead, dying, diseased, interfering, objectionable, and weak growth in order to promote healthy growth suitable to purpose for which plant material grown.

.2 Thin out crown of trees and/or shrubs without changing their natural shape or habitat. Do not damage lead branches or remove smaller twigs along main branches unless requested by Consultant.

.3 Remove live branches that:

.1 Interfere with healthy development and structural strength including branches crossed or rubbing more important branches.

.2 Are of weak structure including narrow crotches.

.3 Obstruct development of more important branches.

.4 Are broken.

.4 Remove live branches to re-establish natural species form including:

.1 One or more developing leaders.

.2 Multiple growth due to previous topping.

.3 Branches extending outward from natural form.

.4 Undesirable sucker growth.

.5 Remove loose branches, twigs and other debris lodged in tree.

.6 Remove vines where required, and directed by the Consultant.

.7 For branches under 50 mm in diameter:

.1 Locate branch bark ridge and make cuts smooth and flush with outer edge of branch collar to ensure retention of branch collar. Cut target area to bottom of branch collar at angle equal to that formed by line opposite to branch bark ridge.

.2 Make cuts on dead branches smooth and flush with swollen callus collar. Do not injure or remove callus collar.

.3 Do not cut lead branches unless directed by Certified Arborist.

.8 For branches greater than 50 mm in diameter:

.1 Make first cut on lower side of branch 305 mm from trunk, one third diameter of branch.

.2 Make second cut on upper side of branch 500 mm from trunk until branch falls off.

.3 Make final cut adjacent to and outside branch collar.

.9 All cuts shall be smooth and sloping to prevent accumulation of water. Do not leave projecting stumps on trunks or main branches.

.10 Cuts, bruises, or scars on the bark shall be traced back to living tissue and removed.

.11 Ensure that trunk bark and branch collar are not damaged or torn during limb removal.

.1 Repair areas which are damaged, or remove damaged area back to next branch collar.

.12 Remove additional growth designated by Certified Arborist.

.13 Prune transplanted trees, new trees and shrubs after planting to compensate for loss of roots suffered during transplanting. Postpone pruning of those plants where heavy bleeding may occur, until in full leaf. Trim out crown of trees and shrubs without changing their natural shape.

3.3 Cut back

.1 Eliminate narrow crotches as much as possible, avoid cutting back to small suckers. Remove smaller limbs and twigs to leave foliage evenly distributed.

.2 When reducing overall size, make symmetrical in appearance to maintain tree like form typical of species.

.3 When removing bottom branches for under clearance, maintain symmetrical appearance. Do not make large cuts which prevent normal sap flow.

.4 Do not remove more than one third of total branching at single operation.

3.4 Root girdling

.1 Treat girdling roots visible to eye as follows:

.1 Cut root at either end.

.2 For girdling roots one-quarter size of trunk diameter or larger, V-cut girdling root one-half way through at point where root is crossing.

.3 Remove exposed portion of girdling root as directed by Certified Arborist after cleanly cutting root flush with grade on each side of parent root. Do not injure bark or parent root.

3.5 Care of wounds

.1 Shape bark around wound to oblong configuration ensuring minimal increase in wound size. Retain peninsulas of existing live bark.

3.6 Clean-up

.1 Collect and dispose of pruned material daily.

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

END OF SECTION

Section 32 11 23
Aggregate Base Courses

PART 1 GENERAL

1.1 Section includes

.1 This section includes general requirements for supplying and processing of aggregates to be stockpiled or incorporated into work.

1.2 Related requirements

.1 Section 31 22 13 - Rough Grading

.2 Section 32 13 13 - Concrete Paving

.3 Section 32 14 15 - Concrete Unit Paving

.4 Section 32 14 40 - Landscape Stone

1.3 Reference standards

.1 All referenced standards shall be the current edition or edition referenced by the Ontario Building Code in force at the time of building permit application and noted on general notes of structural drawings.

.2 City of Toronto Construction Standards

.1 TS 501 - City of Toronto Amendment to OPSS.MUNI 501 (Nov 2014) – Construction Specification for Compaction

.2 TS 1010 - City of Toronto Amendment to OPSS.MUNI 1010 (Apr 2013) – Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material

.3 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS.MUNI 1001, Material Specification for Aggregates - General.

.2 OPSS.MUNI 1004, Material Specification for Aggregates - Miscellaneous

.3 OPSS 1010, Material Specification for Aggregates – Base, Subbase, Select Subgrade and Backfill Material

.4 Canadian General Standards Board (CGSB):

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

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

.5 ASTM International (ASTM):

.1 ASTM C117- 17, Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing

.2 ASTM C131/C131M- 20, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

.3 ASTM C136/C136M- 19, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

.4 ASTM D698- 12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft ^{3}) (600kN-m/m ^{3})

.5 ASTM D1557- 12, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft ^{3}) (2,700kN-m/m ^{3})

.6 ASTM D1883- 16, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils

.7 ASTM D4318- 17el, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils

1.4 Submittals

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

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: For each type of manufactured material and product indicated.

.2 Material Certificates: Provide copies of materials certificates signed by the material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements, at least two weeks prior to the start of work.

.3 Material Test Reports: From a CCIL accredited testing agency indicating and interpreting test results for compliance with requirements indicated, based on comprehensive testing of current materials.

.1 The source and quality of the coarse fill material must be approved by the Engineer prior to delivery of the material to the site and placement. The supplier must provide grain size analyses results for the coarse fill demonstrating that it meets the gradation requirements given above. These samples must be taken from both the quarry site stockpiles as well as from the Port Lands job site stockpiles to ensure consistency.

.4 Submit samples of imported materials for testing and evaluation and delivery slips.

.5 Manufacturing Quality Control test results shall be provided for all materials upon request.

1.5 Delivery, storage, and handling

.1 Stockpiling:

.1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Owner's Representative. Do not stockpile on completed pavement surfaces.

.2 Stockpile aggregates in sufficient quantities to meet Project schedules.

.3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.

.5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Contract Administrator within 48h of rejection.

.7 Stockpile materials in uniform layers of thickness as follows:

.1 Max 1.5 m for coarse aggregate and base course materials.

.2 Max 1.5 m for fine aggregate and sub-base materials.

.3 Max 1.5 m for other materials.

.8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

.9 Do not cone piles or spill material over edges of piles.

.10 Do not use conveying stackers.

.2 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

PART 2 PRODUCTS

2.1 Materials

.1 Granular ‘A’, conforming to OPSS 101 and 1010, latest edition.

.1 The compacted aggregate subbase/base material shall comprise well graded aggregates intended for use as granular base within the pavement structure as well as for and utility bedding/pipe cover .

.2 Thickness of compacted aggregate materials placement shall be as specified on the Construction Drawings and Specifications.

.3 Granular A material shall be compacted to minimum 985% SPMDD (or higher in pavement areas) as specified on the Construction Drawings.

.4 The source and quality of the aggregate material must be approved by the Engineer prior to delivery of the material to the site and placement. The supplier must provide grain size analyses results for the material demonstrating that it meets the gradation requirements given above.

.2 Granular B – Type 1 in accordance with OPSS 1001, OPSS 1010 and TS 1010, latest edition.

.1 The coarse fill materials shall be OPSS Granular B Type II material, conforming to OPSS.MUNI 1010. Granular B Type II material used as road subbase material shall be 100% crushed virgin aggregate material with no recycled content.

.2 It shall comprise of well graded aggregates intended for use as granular subbase within the pavement structure and where also called out in the Drawings.

.3 Thickness of coarse fill materials placement varies and shall be as specified on the Construction Drawings and Specifications.

.4 Granular B Type II material shall be compacted to minimum 98% SPMDD (as specified on the Construction Drawings. Placement water content to be within 2 percent of the materials optimum water content. Contractor to moisture-condition or dry the material to meet this moisture requirement.

.3 High Performance Bedding, (HPB), in accordance with OPSS.MUNI 1004, Table 2, latest edition

.1 6.25mm (1/4") crushed, clean, washed limestone, no fines.

.4 Crushed pit-run or screened stone, gravel or sand consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.5 Granular base material shall contain a minimum of 50% recycled content.

PART 3 EXECUTION

3.1 Placement and installation

.1 Place granular base after sub-base surface is inspected and approved in writing by Consultant.

.2 Placing:

.1 Construct granular base to depth and grade in areas indicated.

.2 Ensure no frozen material is placed.

.3 Place material only on clean unfrozen surface, free from snow and ice.

.4 Begin spreading base material on crown line or on high side of one-way slope.

.5 Place material using methods which do not lead to segregation or degradation of aggregate.

.6 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.

.7 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.

.1 Consultant may authorize thicker lifts (layers) if specified compaction can be achieved.

.8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.9 Remove and replace that portion of layer in which material becomes segregated during spreading.

.3 Compaction Equipment:

.1 Ensure compaction equipment is capable of obtaining required material densities.

.2 Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from Consultant before use.

.3 Equipped with device that records hours of actual work, not motor running hours.

.4 Compacting:

.1 Compact to density not less than 100 % corrected maximum dry density.

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

.3 Apply water as necessary during compacting to obtain specified density.

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

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

.5 Proof rolling:

.1 For proof rolling use standard roller of 45 400 kg gross mass with four pneumatic tires each carrying 11 350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm.

.2 Obtain written approval from Consultant to use non standard proof rolling equipment.

.3 Proof roll at level in granular base as indicated.

.4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

.5 Where proof rolling reveals areas of defective subgrade:

.1 Remove base, sub-base and subgrade material to depth and extent as directed by Consultant.

.2 Backfill excavated subgrade with sub-base material and compact in accordance with this Section.

.3 Replace base material and compact in accordance with this Section.

.6 Where proof rolling reveals defective base or sub-base, remove defective materials to depth and extent as directed by Consultant and replace with new materials at no extra cost.

3.2 Site tolerances

.1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.3 Protection

.1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Consultant.

END OF SECTION

Section 32 13 13
Concrete Paving

PART 1 GENERAL

1.1 Section includes

.1 This section includes requirements to supply and install concrete pavement, including the following:

.1 Walkways and sidewalks.

.2 Landscape concrete curbs.

.3 Decorative concrete texture and finishes.

1.2 Related sections

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 31 22 13 - Rough Grading

.3 Section 32 11 23 - Aggregate Base Courses

1.3 Reference standards

.1 All referenced standards shall be the current edition or edition referenced by the Ontario Building Code currently in force.

.2 City of Toronto Construction Standards

.1 TS 3.70 - City of Toronto Construction Specification for Concrete Sidewalk and Concrete Raised Median

.2 TS 501 - City of Toronto Amendment to OPSS.MUNI 501 (Nov 2014) – Construction Specification for Compaction

.3 TS 1010 - City of Toronto Amendment to OPSS.MUNI 1010 (Apr 2013) – Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material

.4 TS 1350 - City of Toronto Amendment to OPSS.MUNI 1350 – Material Specification for Concrete – Materials and Production

.3 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS.MUNI.351, Nov 2021 - Construction Specification for Concrete Sidewalk.

.2 OPSS 353, Nov 2016 - Construction Specification for Concrete Curb and Gutter Systems.

.3 OPSS.MUNI 1308, Nov 2019, Material Specification for Joint Filler in Concrete.

.4 OPSS 1315, Nov 2021, Material Specification for White Pigmented Curing Compounds for Concrete.

.5 OPSS.MUNI 1350, Nov 2021, Concrete - Materials and Production.

.6 OPSS.MUNI 1440, Nov 2016, Material Specification for Steel Reinforcement for Concrete

.4 CSA Group (CSA):

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

.2 CSA-A3000-13, Cementitious Materials Compendium.

.3 CSA G30.18-09, Carbon Steel Bars for Concrete Reinforcement.

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

.5 Design Codes:

.1 Canadian Highway Bridge Design Code.

.2 Accessibility for Ontarians with Disability Act (AODA).

.6 ASTM International

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

.2 ASTM C494/C494M-13, Standard Specification for Chemical Admixtures for Concrete.

.3 ASTM C666/C666M-03(2008), Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

.4 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3).

.5 ASTM D1751.Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types).

1.4 Submittals

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

.2 Action Submittals: Submit the following submittals before starting any work of this Section:

.1 Product Data: Submit product data for each type of manufactured material and product. Include product characteristics, performance criteria, physical size, finish and limitations in use.

.2 Manufacturer's Instructions: Submit manufacturer’s instructions, printed product literature and data sheets for each type of manufactured material and product indicated, including but not limited to the following:

.1 Formwork materials

.2 Expansion joint materials

.3 Concrete products

.4 Curing method and materials

.5 Sealants for expansion joints

.3 Shop Drawings:

.1 Submit reinforcement shop drawings and include setting plans and drawings or schedules showing details of fabrication of reinforcement and identifying the material for installation.

.1 Show main reinforcement, temperature reinforcement, and all accessories.

.2 Submit complete setting Drawings showing and identifying by mark or otherwise all bars to be incorporated in the Work.

.4 Submit proposed methods of protection of concrete when air temperatures are expected to be above 25°C or below 5°C.

.3 Informational Submittals: Submit the following submittals during the course of the work:

.1 Concrete Mix Design(s):

.1 Submit certified mix designs or each concrete pavement mix at least three (3) weeks prior to the beginning of work, for each class of concrete.

.2 Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

.2 Field quality-control reports, including but not limited to:

.1 Concrete test and inspection reports.

.2 Concrete delivery tickets for each load of concrete delivered to the site showing final mix design, time of loading and delivery and any deviations to the specifications

1.5 Quality assurance

.1 Manufacturer Qualifications:

.1 Manufacturer of ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment.

.2 Manufacturer with 10-years' experience in manufacture of specified products.

.2 Installer Qualifications:

.1 Contractor shall provide a foreman with a minimum of five (5) years' experience, competent and skilled in the work of this section to direct all of the work to be performed, and to be present at all times during the performance of the work.

.2 All concrete work must be executed by skilled tradesmen having at least five (5) years experience in this type of work.

.3 Certifications:

.1 Concrete supplier shall have a valid "Certificate of Ready Mixed Concrete Production Facilities" as issued by the Ready Mixed Concrete Association of Ontario.

.2 Submit certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA A23.1/A23.2, and that mix design is adjusted to prevent alkali aggregate reactivity problems.

.4 Source Limitations:

.1 Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

.2 Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout Project.

.5 Submit proposed quality control procedures for Consultant's approval, including, but not limited to, proposed methods of concrete protection during hot or cold weather conditions.

.6 Prior to pouring concrete obtain the approval of the Consultant of all form work, placement of reinforcing steel, consolidation of subgrade and placement and consolidation of granular base.

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

.8 Workmanship:

.1 The Contractor is responsible for correction of concrete work that does not conform to the specified requirements, including strength, tolerances, grading and finishes.

.2 Consultant shall have authority to reject or call for improvements in workmanship where he considers that concrete work falls below acceptable standard.

.3 Contractor shall be given one day notice that all concreting shall cease unless such improvements are made.

.9 Notification: Consultant shall be notified at least one (1) week before start of Work.

1.6 Quality control

.1 Testing:

.1 Submit the following for quality control:

.1 Concrete cylinder compression test results, at 7 and 28 days

.2 Concrete mix designs from the concrete plant.

.3 Delivery tickets for the concrete, showing final mix design being delivered to the site, time of loading and delivery, any deviations to the specifications.

.4 Slump Tests.

.5 Submit responses to all site review test reports stating that all reported defects and deficiency items were corrected or stating what action was taken.

.2 Additional Test: Testing and inspection agency shall make additional tests of concrete when test results indicate that lump, air entrainment, compressive strengths, or other requirements have not been met, as directed by consultant with costs paid by contractor.

.3 Minimum testing requirements for Contractor:

.1 Minimum compaction requirements for granular base is 100% MDD.

.2 Concrete curbs:

.1 1 location per day of construction of concrete curbs.

.2 Minimum 3 cylinders per location to break at 7 days and 28 days.

.3 Slump and air test at each sampling location.

.4 Conformity to OPSS MUNI 1350 except air to be 7% ± 1.5%.

.2 Inspection

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

.2 Work not approved before pouring concrete may be subject to replacement.

1.7 Delivery, storage and handling

.1 Deliver, store and handle materials in accordance with CSA A23.1/A23.2 and manufacturer's written instructions.

.2 Storage and Handling Requirements:

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

.1 Store reinforcing steel on racks or skids. Protect from contamination by dirt or other materials. Maintain steel in its fabricated form.

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

.3 Replace defective or damaged materials with new.

.2 All concrete is to be ready mixed at plant and transported to the site by truck in accordance with CSA A23.1/A23.2. Hand mixed concrete is not allowed unless approved in writing by the Consultant prior to starting any work.

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

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

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

.6 Do not allow concrete to be contaminated by foreign materials. Do not use re-tempered concrete unless approved in writing, by the Consultant.

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

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

1.8 Warranty

.1 Work of this shall be guaranteed for a period of two years in accordance with the General Conditions of the Contract.

PART 2 PRODUCTS

2.1 Subbase materials

.1 Granular A, in accordance with Section 32 11 23 - Aggregate Base Courses and TS 1010 - City of Toronto - Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material

2.2 Forms

.1 Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces. Forms to be of suitable size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removed.

.1 Use flexible spring steel forms or laminated boards or curved forms for all curves.

.2 Where possible, use recycled forms for initial placement and recycle forms used as work proceeds.

.2 Form release agent: Form-Release Agent: Colorless, non-staining and having no deleterious effects on the concrete, manufactured specifically for non-absorbent surfaces and for reducing surface voids. Use form release agent on all cast-in-place concrete.

.1 "Bio-Nox" Nox-Crete Chemicals, Inc., Omaha, NE, 800.669.2738. Canadian Supplier: Peri Formworks, Bolton, Ontario L7E 1K1, Canada, 905.951.5400, www.nox-crete.com.

.2 "Rheofinish"; Master Builders, Inc,.Brampton, Ontario L6T4M7, Canada, 800.387.5862, www.masterbuilders.com

.3 "Sealtight Duogard", WR Meadows of Canada, Milton, Ontario L9T 5C1, Canada, 905.878.4122, www.wrmeadows.com

.4 Or approved equal

2.3 Reinforcement materials

.1 Steel reinforcement material, in accordance with OPSS.MUNI 1440.

.2 Deformed Steel Bars: CAN/CSA-G30.18-M, Grade 400R except Grade 400W where welding is indicated or specified.

.1 Tolerances: Sheared Length: +/-25mm; Stirrups, Ties and Spirals: +/- 10 mm; Other Bends: +/- 25 mm.

.2 Use longest bar possible. Keep splices to a minimum and splice by lapping unless otherwise noted. Don not weld chairs, bolsters, bar supports or spacers to reinforcing bars.

.3 Supports for Reinforcement:

.1 Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place, fabricated from steel wire,

plastic, or precast concrete of greater compressive strength than concrete, shall conform to CSA A23.1.

.2 Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

.4 Tie wire: 1.6 mm diameter or heavier black annealed wire with nylon-, epoxy- or plastic-coating.

.5 Welded Wire Fabric/Reinforcement:

.1 152 x 152 – MW 13.3 x MW 13.3 welded steel wire fabric at 1.46 kilograms per square metres, in accordance with TS 1350.

.2 Furnish flat sheets only, rolled sheets are not permitted. For splices, comply with CSA A23.3-04 Clause 12.18 and 12.19.

.6 Dowels and Tie-Bars: Smooth or deformed bars, Grade 400, meeting requirements of CSA G30.18, and as follows:

.1 Paint a minimum of two-thirds of length from one end of each dowel with one coat of zinc chromate.

.2 Dowels for contraction joints shall be in rigid assemblies of required dimension and spacing and held in the middle of the slab depth to proper horizontal and vertical alignment.

2.4 Concrete material

.1 Portland cement: to CSA A3000.

.2 Water: to CSA A23.1/A23.2.

.3 Aggregates: to CSA A23.1/A23.2.

.1 Normal-Weight Aggregates: ASTM C 33/C 33M, Class 4S, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.

.1 Maximum Coarse-Aggregate Size: 19mm nominal.

.2 Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

.4 Admixtures:

.1 Use of concrete admixture will be approved only when specified mix requirements or workability cannot be achieved by proportioning of aggregates, water, cement and air entraining admixture.

.2 Contractor shall ensure that the chemical admixtures to be used are compatible with each other and that the performance of the concrete will not be negatively affected.

.3 Do not use accelerating cement setting admixtures, (e.g. calcium chloride). Do not use membrane curing compound or any other admixture on any concrete against which additional concrete or other material is to be bonded.

.4 Obtain written approval of Consultant before using admixtures. Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.

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

.2 Water-reducing admixture: to ASTM C494/C494M., Type A, and containing not more than 0.1% chloride ions.

.3 High range water reducing admixture: ASTM C494/C494M, Type F or G, and containing not more than 0.1% chloride ions.

.4 Chemical admixtures: to ASTM C494/C494M.

.5 Stainless Steel Pins: Series 316 Stainless Steel, 12mm diameter. Provide lengths as shown on the Drawings.

2.5 Expansion joint material

.1 Pre-formed recycled post-consumer with wax binder, cellulose fiber structural joint filler, 13mm thick, meeting ASTM D994 and ASTM D1751 for concrete paving applications as manufactured by:

.1 Homex 300 Expansion Joint Filler, Homasote Company, West Trenton, New Jersey, 800.257.9491.

.2 Or approved equal.

2.6 Concrete mixes

.1 Mix design requirements:

.1 Design the mix in accordance with CSA A23.1/A23.2 so that concrete will be homogeneous, uniformly workable, and readily placeable into corners and angles of forms and around reinforcement by the methods of placing and consolidation employed on the work, but without permitting materials to segregate or excessive free water to collect on the surface. The concrete, when hardened, shall have the qualities specified.

.2 Use ready mix concrete. Use water reducing agent in all concrete.

.3 Proportion normal density concrete in accordance with CSA A23.1/A23.2, to give following properties (unless noted otherwise on the drawings):

.1 Minimum compressive strength: and 32 MPa at 28 days.

.1 For 7-day concrete: minimum compressive strength 32MPa at 7 days.

.2 For 24-hour concrete: minimum compressive strength 32MPa at 24 hours.

.3 24-hour concrete can only be manufactured using high early strength hydraulic cement (HE).

.2 Class of exposure: to CSA-A23 and CSA-B651.

.3 Maximum nominal size of coarse aggregate: 19mm.

.4 Slump at time and point of discharge: to CSA A23.1/A23.2

.5 Air content: 6.5 ± 1.5% % exterior slabs.

.6 Maximum water/cementing materials ratio : 0.45

.7 Provide a corrosion inhibitor into the concrete mix per manufacturers specifications.

.8 With the exception of air entraining agents, other admixtures may only be used with the written approval of Consultant. The use of agents to lower the freezing point of the mix will not be permitted.

.4 Provide certification that mix proportions selected will produce concrete of specified quality yield and strength.

.5 Provide certification that plant, equipment and all materials to be used in concrete comply with requirements of CSA A23.1/A23.2,.

2.7 Other materials

.1 Curing Compound: to OPSS 1315.

.2 Curing Blanket: UltraCure Sun, manufactured by McTech Group Inc., and distributed by Geroquip Inc., Laval, Quebec, tel: 450.978.0200.

.3 Grout:

.1 Non-shrink grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents of pouring consistency with compressive strength of 40MPa at 28 days.

.1 Euco NS Grout by Euclid Admixture Canada

.2 Masterflow 713 by Chemrex (M.B.T.)

.3 V-3 Grout by W.R. Meadows of Canada

.4 Sikagrout 212 by Sika Canada

.5 M-Bed Standard by Sika Canada

.6 CPD Non-Shrink Grout by CPD

.7 Or approved equal.

.2 Dry pack grout: Use 1:2 mix of Portland cement and concrete sand. Add sufficient water for the mixture to retain its shape when made into a ball by hand.When thickness of grout exceeds 50mm, use 1:1½:2 mix of Portland cement, concrete sand and 10mm pea gravel instead. Compressive strength at 28 days to be 30 MPa.

.4 Drilled concrete expansion anchors:

.1 Kwik-Bolt III by Hilti

.2 Wedge Anchor by Ucan Fastening Products

.3 Or approved equal.

.5 Drilled concrete adhesive anchors:

.1 HVA Adhesive Anchor by Hilti

.2 ADH Adhesive Anchor by Ucan Fastening Products

.3 Or approved equal.

.6 Epoxy for bonding anchors and dowels into predrilled holes in concrete:

.1 HIT-HY-200 MAX by Hilti

.2 Epcon Ceramic 6 by ITW Construction Products

.3 Flo-Rok FR1-22 & FR3-22 by Ucan Fastening Products

.4 Or approved equal.

PART 3 EXECUTION

3.1 Project conditions

.1 Carry out work of this Section only when surfaces are at least 10°C. There shall be no concrete pouring in temperatures below 10°C. without written permission of the Consultant.

.1 Do not place concrete on frozen surface.

.2 When concrete has been placed in cold weather and the site temperature is expected to drop below 5 °C, insulating curing blankets or other suitable material shall be placed on the concrete pavement and weighted to prevent movement. Curing to continue until the cumulative number of days, or fraction thereof, during which the temperature of the concrete is above 10 °C, has totalled a minimum of 7 days. Alternatively, if compressive tests of cylinders cured under field conditions achieve at least 70% of the specified compressive strength, curing may be discontinued.

.3 Concrete pavement placed in cool weather shall experience a minimum of 30 day air-drying period, following final curing, before first application of de-icing salts.

.4 Suspend paving operation when temperature falls below specified minimum.

.2 Concrete placed when the ambient temperature is at or above 27 degrees C to be cured by continuous water curing from soaker hoses providing complete coverage of the pavement to minimize the temperature rise of the concrete.

.3 No concrete shall be placed during rain.

.1 When rain appears imminent paving operation should cease. Protect freshly laid concrete from rain damage and adverse weather condition and in accordance with CSA A23.1/A23.2. Extend protective coverings over edges of concrete and arrange so as not to bear on unprotected edges.

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

3.2 Allowable tolerances

.1 Finish surfaces to within 3mm in 3m as measured with 3m straightedge placed on surface.

.2 Horizontal deviations of slab edge from alignment of pavement not to exceed 10 mm.

3.3 Examination

.1 Prior to Work of this Section, carefully inspect the installed Work of other trades and verify that such Work is complete to the point where this installation may properly commence.

.2 Discrepancies:

.1 In the event of discrepancy, immediately notify the Consultant.

.2 Do not proceed with installation in areas of discrepancy until such discrepancies have been fully resolved.

3.4 Subgrade and subbase preparation

.1 Do grade preparation work in accordance with Sections 31 22 13 – Rough Grading.

.2 Place granular base material to lines, widths, and depths as indicated.

.3 Compact subgrade to a minimum 95% of maximum dry density.

.4 Soft, yielding materials or other portions of subgrade that will not compact to specification shall be removed and replaced with suitable material. Subgrade to be brought to a firm unyielding condition with a uniform density.

.5 Compact granular base in maximum 100 mm layers to at least 100% of maximum density to ASTM D698-.

.6 Repair damage to subbase resulting from hauling or equipment operations.

.7 Prior to placing concrete, subbase shall be thoroughly wetted. Wetting shall be carried out, such that standing water is not present on grade.

3.5 Form placement

.1 Coordinate the installation of forms with placement of reinforcement steel.

.2 Ensure accurate stepped slabs to receive inlayed stone or concrete unit paving and tree grates. Paver cutting will not be permitted to suit incorrect stepped slabs.

.3 Remove water, ice, laitance, curing compound, loose soil, and other debris and thoroughly clean form surfaces that will be in contact with concrete or that have been in contact with previously cast concrete, dirt, and other surface contaminants prior to coating surface.

.4 Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

.5 Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

.6 All concrete edges for all pavement, foundations, curbs and other below grade work shall be formed or contained to prevent over pouring of concrete. Excess concrete shall be removed as directed by the Consultant.

.7 Form placement and reinforcement to be accepted by Consultant prior to placement of concrete.

.1 Notify the Consultant at least 72 hours before placement of concrete for review of forms, form liners, and reinforcement.

.2 No concrete shall be placed without this review and acceptance.

3.6 Placing reinforcing steel and dowels

.1 Dowel bars shall be plain round bars of grade 300 or better conforming to CSA G40.20/G40.21 and be epoxy-coated to requirements of ASTM A775/A775M, also coated with bond breaker material.

.2 Steel for tie bars or tie bolts to comply to CSA G30.18 and be epoxy-coated to ASTM A775/A775M.

.3 Place sufficient number of joint dowel assemblies in advance of paver to avoid delay in concrete placement.

.4 Remove oil, grease, dirt and deleterious material from reinforcing bars before placing concrete.

.5 Steel placement to be approved by Consultant before placing concrete.

3.7 Joints

.1 General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

.1 When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

.2 Set joints as indicated on Drawings

.2 Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

.1 Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.

.2 Provide tie bars at sides of paving strips where indicated.

.3 Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

.4 Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 38mm into concrete.

.5 Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

.3 Expansion Joints: Form expansion and isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

.1 Locate expansion joints at intervals indicated on Drawings.

.2 Extend joint fillers full width and depth of joint.

.3 Terminate joint filler not less than 13mm or more than 25mm below finished surface if joint sealant is indicated.

.4 Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.

.5 Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.

.6 During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

.4 Control Joints: Form weakened-plane control/ contraction joints, sectioning concrete into areas as indicated on Drawings. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent concrete paving:

.1 Sawed Joints: Form control/ contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 3mm-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

.1 Tolerance: Ensure that sawed joints are within 75mm either way from centers of dowels.

.2 Ensure aggregate particles are not dislodged during sawcutting.

.2 Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

.5 Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 6mm radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.8 Concrete placement

.1 Place concrete in accordance with CSA A23.1/A23.2,

.2 Prior to placing of concrete obtain Consultant's approval of proposed method for protection of concrete during placing and curing in adverse weather.

.3 Prior to placing concrete for slabs on grade, verify that sub-grade and base courses have been compacted and tested.

.4 Prior to placing concrete in the forms, verify that all forms have met all requirements specified: that reinforcing steel, embedded materials are in place and securely anchored; that forms are absolutely clean; and that entire preparation has been approved by the Consultant.

.5 Cleaning Forms: Immediately prior to placing concrete, clean all form interiors free of foreign material and debris

.1 Force debris out of forms prior to closing the last section with a jet stream of compressed air and/or water. Where form openings are not available, collect debris with vacuum cleaners and heavy-duty magnets.

.2 Protect cleaned forms if placing does not commence immediately, covering openings with tarpaulins.

.3 Protect reinforcing steel so that there is no formation of rust. Coat reinforcing steel if necessary to prevent rust. Rusted reinforcement will be rejected and the Contractor shall replace at no additional cost to the Owner.

.6 Transport concrete from truck to place of final deposit as rapidly as practicable by means that prevent separation of ingredients

.7 Do not add water to concrete during delivery, at Project site, or during placement without approval from the Consultant and testing agency.

.8 Ensure reinforcement and inserts are not disturbed during concrete placement.

.9 Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place

.10 Place concrete to lines, grades and depths as indicated.

.11 Use hand placing where machine spreading is not feasible.

.12 Spread uniformly with approved equipment to thickness sufficient to allow for proper consolidation and finishing. Do not apply external tractive force to paver.

.13 Insert tie bars as indicated.

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

.1 Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.

.2 Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

.15 Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.

3.9 Concrete finishing

.1 General: Do not add water to concrete surfaces during finishing operations.

.2 Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations, and as follows:

.1 Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units.

.2 Finish surfaces to true planes.

.3 Cut down high spots and fill low spots.

.4 Refloat surface immediately to uniform granular texture.

.5 Fine-Textured Broom Finish:

.1 Draw a soft-bristle broom across float-finished concrete surface, as indicated on Drawings, to provide a uniform, fine-line texture.

.2 Eliminate edging tool marks on concrete surfaces by light brooming.

.6 Medium-Textured Broom Finish:

.1 Provide a coarse finish by striating float-finished concrete surface 2mm to 3mm deep with a stiff-bristled broom.

.2 After concrete has set sufficiently to prevent coarse aggregate from being torn from surface, but before it has completely set, brooms shall be drawn across the surface to produce a pattern of small parallel grooves.

.3 Broomed surface shall be uniform, continuous, with no smooth, unduly rough or porous spots, or other irregularities.

.4 Coarse aggregate shall not be dislodged by brooming operation.

.3 Formed surfaces exposed to view to CSA-A23.1.

.1 For curbs: Apply smooth wood float finish.

.2 For concrete paving (pedestrian and vehicular): Medium broom finish perpendicular to road curb or across direction of walking, with trowel edge, NO margins.

.3 For coloured concrete paving: Tinted concrete, and medium broom finish perpendicular to road curb or across direction of walking, with trowel edge, NO margins.

.4 Hand finish areas inaccessible to finishing machines to same quality and surface characteristics as machine finished surfaces.

.5 Finish concrete surface with approved float at proper time. Operate from edge to edge with wiping motion while advancing, with each succeeding pass overlapping previous one.

.6 Finish edges of slabs with edging tool to form a smooth radius with no margins.

.1 Typical radius to be 5mm unless otherwise noted.

.2 Do not patch with cement paste.

3.10 Expansion and contraction joints

.1 General:

.1 Construct joints plumb, straight and square to details indicated.

.2 Transverse joints to coincide with those in adjacent pavement unless indicated or directed otherwise.

.3 Install preformed joint filler at locations and to details indicated.

.4 Install isolation joints around structures and features that project through, into or against pavement.

.2 For sawn joints.

.1 Ensure joints are sawn straight. Install end stakes to ensure straight joint alignment across paved area. Mark joint alignment with chalk line or other suitable guide to approval of Consultant.

.2 Saw joints using approved equipment and methods to produce joint dimensions indicated.

.3 Restrict speed of saw cutting to ensure proper joint alignment and to avoid damage to concrete.

.4 Supply sufficient workers and equipment including standby equipment, to maintain satisfactory sawing schedule.

.5 Schedule sawing operations on 24 hours basis and consistent with concrete placing.

.6 Make initial saw cuts in progressive manner and as soon as concrete surface has hardened sufficiently to resist ravelling as cut is made and before shrinkage cracks occurs.

.7 If cracking occurs ahead of saw cut, stop sawing immediately. Move ahead several joints and cut one or more joints before returning to saw intermediate joints. Where cracking persists, make 1 m saw cut from one edge and complete sawing from opposite edge. Adjust sawing schedule accordingly.

.8 If uncontrolled cracking or other surface damage results from inadequate or improper sawing techniques suspend further concrete operations until situation is corrected and immediately remove and replace damaged slabs.

.9 Immediately on completion of sawing, flush joints with water to remove laitance.

.3 Joints in pavement:

.1 Install expansion joints and contraction joints as indicated in OPSS.MUNI.351 and OPSS 353.

.2 Expansion and contraction joints to align with jointing pattern as indicated on drawings. Tooled radius on expansion joints; NO margins.

.4 Joints in curbs:

.1 Sawcut control joints to be spaced as per drawing dimensions and layout shape as shown on drawings; tooled radius on expansion joints; NO margins.

.2 Provide expansion joints in accordance with CSA A23.1/A23.2 as shown on the drawings and between new concrete and all new or existing structures.

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

3.11 Joint fillers

.1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Consultant. When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.

.2 Locate and form isolation joints as indicated. Install joint filler.

.3 Use 10mm thick to separate slabs-on-grade from vertical surfaces or structures.

.4 Do not install joint filler between road curbs and pavements.

.5 Provide joint backing as required and caulking for expansion in all poured-in-place concrete work except for pavements. Caulking colour to match concrete.

3.12 Curing

.1 Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with CSA A23.1 recommendation for cold or hot weather protection during curing.

.2 Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

.3 Cure for minimum 7 days by one of following methods:

.1 Curing compound:

.1 Apply curing compound evenly to form continuous film, in accordance with manufacturer's written requirements.

.2 For hand application apply first coat immediately after texturing operations, second coat to be applied immediately after first coat in a perpendicular direction.

.3 For machine application curing compound to be applied in accordance with manufacturers' specifications.

.4 Spray slab edges immediately after removal of forms.

.5 Protect formed or sawed joints from evaporation during curing period.

.6 Respray areas where membrane is damaged during curing period.

.2 Curing Blankets:

.1 Method of curing and curing blanket shall be per manufacturers specification.

.2 Apply specified curing blanket immediately after surface finishing / texturing and as soon as concrete surface can bear weight without marking.

.3 Protect formed or sawed joints from evaporation during curing period.

.4 Cover sides and ends of slab with mats as soon as forms are removed.

.4 Curing method used shall be used consistently throughout the project.

3.13 Defective concrete

.1 Concrete is defective when:

.1 It contains: honeycombing, embedded debris, uncontrolled shrinkage cracking, or other surface defects.

.2 It is damaged by freezing.

.3 It is placed at too high temperature.

.4 Average 28 day strength of any three consecutive strength tests is less than specified minimum 28 day strength.

.5 Any 28 day strength test result is more than 3.5 MPa below the specified minimum 28 day strength.

.6 Standard deviation of 28 day strength test results exceeds CSA A23.1/A23.2 requirements.

3.14 Repair and restoration of defective concrete

.1 Repair of defective concrete work:

.2 Remove and replace defective concrete where directed by the Consultant.

.1 The full extent of defective pavement shall be removed to the nearest joints, as directed by the Consultant.

.2 Remove full panels of defective concrete by saw cutting at a joint as directed by the Consultant. Correction of defective concrete shall not result in additional joints.

.3 Protect adjacent surfaces during removals.

.4 Replace with new concrete to this specification.

.5 Construct contraction joint at boundary between sawn face of existing concrete and new concrete.

3.15 Protection of finished work

.1 Protect concrete from damage until final inspection by the Consultant and Substantial Performance of the Work.

.1 Exclude traffic from paving for at least 14 days after placement.

.2 When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

.2 Maintain concrete paving free of stains, discoloration, dirt, and other foreign material.

.3 Sweep paving not more than two days before date scheduled for Substantial Performance review.

3.16 Cleaning

.1 Progress Cleaning: Leave Work area clean at end of each day.

.2 Final cleaning: The Contractor shall remove all debris, construction equipment and scrap material from all areas within the limit of work prior to the final inspection and acceptance.

.3 The Contractor shall clean all stains from the surface of paving. Paving which cannot be cleaned shall be replaced. The Consultant shall be sole judge of whether staining is apparent and necessitates remediation.

END OF SECTION

Section 32 14 13
Precast Concrete Unit Paving

PART 1 GENERAL

1.1 Section includes

.1 This section includes requirements to supply and install precast concrete unit paving.

1.2 Related sections

.1 Section 01 33 00 - Submittal Procedures

.2 Section 05 50 00 – Metal Fabrications.

.3 Section 32 11 23 - Aggregate Base Courses

.4 Section 32 13 13 - Concrete Paving

1.3 Reference standards

.1 All referenced standards shall be the current edition or edition referenced by the Ontario Building Code currently in force.

.2 City of Toronto Construction Standards

.1 TS 3.80 - City of Toronto Construction Specification for Concrete Unit Pavers

.3 CSA Group (CSA)

.1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete

.2 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry

.3 CSA A231.1/A231.2:19, Precast Concrete Paving Slabs/Precast Concrete Pavers

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

.4 ASTM International (ASTM)

.1 ASTM C136-13, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

1.4 Submittals

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

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit product data for each type of precast concrete unit paver prior to commencing work.

.2 Submit manufacturer's instructions, printed product literature and data sheets for each type of precast concrete unit paver and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Submit manufacturer's instructions, printed product literature and data sheets for jointing sand and include product characteristics, colour selections performance criteria, physical size, finish and limitations.

.4 Samples:

.1 Submit full-size sample of each of type of paver, demonstrating size, colour, finish, and texture specified.

.2 Submit six (6) samples of unit paving blend demonstrating size, colour, finish, texture and pattern specified.

.3 Informational Submittals: Provide the following submittals during the course of the work:

.1 Mock-ups:

.1 Submit 3m x 3m mock-up of unit pavers demonstrating each paving pattern noted on drawings before the unit paving work is carried out.

.2 Mock-ups shall demonstrate paving layout, full range of anticipated variation in colour & colour distribution.

.3 Location of mock-up to be proposed by Contractor and approved by Consultant on site.

.1 Mock-up shall not form part of finished work without prior approval from the Consultant.

.2 For in-situ mock-ups, obtain approval from Consultant prior to installation of polymeric sand.

.4 Mock-up shall be revised as required until acceptance by the Consultant.

.5 The approved mock-up shall establish the standard by which all work shall be assessed. Work that fails to meet the standard set by the mock-up shall be replaced.

1.5 Quality assurance

.1 Qualifications:

.1 All unit paving work shall be carried out by an approved contractor having at least 5 years experience in in this type of work.

.2 Single-source manufacturing responsibility:

.1 All required pavers are to be supplied from the same production run and from a single supplier to ensure uniform colour throughout paved area.

.3 Unit pavers and unit paver installation shall be identical in form, colour and construction as approved samples and mock-ups.

.4 Before commencing work, visit site and become familiar with the specifications governing the work of others, particularly drainage, backfill, concrete, mechanical and electrical work.

.1 Commencement of work will denote acceptance of sub-surfaces and conditions.

.2 Subsequent failure of installed work of this Section due to sub-surface defects will be rectified at no cost to the Owner

1.6 Delivery, storage, and handling

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

.2 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations. Do not permit units to contact earth or other staining influences.

.2 Prevent damage to buildings, landscaping, curbs, sidewalks, and adjacent property. Make good any damage.

1.7 Warranty

.1 Work of this Section shall be guaranteed for a period of two years in accordance with the General Conditions of the Contract.

PART 2 PRODUCTS

2.1 Concrete pavers

.1 Concrete Pavers: To CSA A23.1/A23.2 and as follows:

.1 Vehicular concrete unit pavers shall be Eco-Promenade Pavers by Unilock (www.unilock.com), or approved equal.

.1 Size: 100mm x 300mm x 80mm thick
.2 Colour: Opal Blend
.3 Finish: Smooth Premier
.4 Joint Spacing: 7mm
.5 Pattern: As shown on drawings.
.6 Compressive Strength: >55 MPa.
.7 Water absorption <5%

.2 Pavers for multi-use trail buffer shall be Unigranite Pavers by Unilock (www.unilock.com), or approved equal.
.1 Size: 100mm x 100mm x 70mm thick
.2 Colour: Dark Charcoal
.3 Finish: Split top, washed
.4 Pattern: As shown on drawings.
.5 Compressive Strength: 50 MPa average.
.6 Water absorption 5% average - 7% maximum.

2.2 Bedding and joint material

.1 Granular Base Materials:
.1 Compacted Granular 'A' in accordance with Section 32 11 23 - Aggregate Base Courses.
.2 ASTM #8 stone in accordance with Section 32 11 23 - Aggregate Base Courses.

.2 Sand Setting Bed:
.1 Clean, non-plastic, free from deleterious or foreign matter, natural or manufactured from crushed rock or gravel. Do not use limestone screenings or stone dust.
.2 Gradation: To CSA A23.1/A23.2, Table 4 - Grading Limits for Fine Aggregate, and CAN/CSA-A179 as follows:
.1

Sieve Designation	% Passing
10mm	[100]
5mm	[95-100]
2.5 mm	[80-100]
1.25 mm	[50-90]
630 microns	[25-65]
315 microns	[10-35]
160 microns	[2-10]

.3 Joint Material:
.1 Polymeric sand by Unilock – or approved equal.
.1 Colour: Grey. Polymeric sand colour to be confirmed by Consultant prior to Ordering.

2.3 Edge restraints

.1 Heavy Duty Paver Edge:

.1 Galvanized steel angle, 6.4mm thick, as shown in drawings and in accordance with Section 05 50 00 – Metal Fabrications.

.2 Fasteners as shown on drawings.

PART 3 EXECUTION

3.1 Project conditions

.1 Carry out work of this Section only when surfaces are at least 5°C and the temperature is rising, or:

.2 Carry out the work of this Section involving mortar and grout only when temperature is at or above that recommended by manufacturer.

.3 Suspend paving operation when temperature falls below specified minimum.

3.2 Allowable tolerances

.1 Finish paving surfaces within 6mm of established elevations and 3mm of other surfaces at joints between other paving types, manholes and other features within paved areas; and within 3mm under a 3m long straightedge.

.2 Installation tolerances:

.1 Face width of joint: Nominal widths as indicated on drawings, to vary not more than +/- 1.5mm (1/16”).

.2 Joint taper: unit edges not out of parallel over 0.6 mm in 300 mm (1/40" per foot) but not more than 3 mm (1/8”) in total.

.3 Faces of adjacent pavers offset not more than 1.5 mm (1/16”).

.4 Edge alignment: alignment of panels edges not to exceed 1.5 mm (1/16”).

3.3 Examination

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

.1 Inform Consultant of unacceptable conditions immediately upon discovery.

3.4 Excavation and backfilling

.1 In accordance with Section 31 23 33.01– Excavating, Trenching & Backfilling.

3.5 Granular base

.1 Place granular base materials to thickness as indicated on detail drawings.

3.6 Installation of edge restraints

.1 Install restraints true to grade, in accordance with manufacturer's recommendations.

3.7 Sand setting bed

.1 Ensure bedding material is not saturated or frozen at all times until installation is complete.

.2 Spread and screed sand setting bed to compacted thickness as indicated on detail drawings.

.3 Ensure sand setting bed is dry (4-8% moisture content) prior to placement of unit pavers.

.4 Do not disturb screeded material. Do not use sand setting bedding material to fill depressions in granular or structural subsurface materials.

3.8 Installation of concrete pavers

.1 Install unit paving true to grade, in location, layout and pattern as indicated on detail drawings. Where required, document layout/ pattern of existing paving, replace pavers to match.

.2 Stake layout of unit paving for Contract Administrator to approve prior to commencing installation.

.3 Install edge restraint where pavers meet soft surfaces, per manufacturer's specifications.

.4 Where required, cut paving units accurately with a concrete saw. Do not damage edges or exposed surfaces.

.5 On tight radii, cut and fit pavers to maintain alignment. No pavers less than 50% of the original size shall be used.

.6 Chipped, blemished or defective units shall not be installed.

.7 Ensure that all grade transition zones are made gently and smoothly.

.8 Clean surfaces of unit paver and maintain free of abrasive and staining substances.

.9 All work within 1m of the laying face must be left fully compacted with sand-filled joints at the completion of each day.

.10 Unit pavers with sand joints.

.1 Install pavers with tight butt joints.

.2 Tamp down and level pavers with mechanical plate vibrator as recommended by the manufacturer until pavers are true to grade and free of movement.

.3 Inspect, remove, and replace chipped, broken and damaged pavers.

.4 Sweep dry joint sand material into joints.

.5 Spread, fill and simultaneously vibrate the sand in the joints. Continue to spread joint sand and tamp down pavers with vibrating plate compactor until joints are completely filled. The vibrating plate compactor must not be used closer than 1 m from the edge of unsecured pavers.

.6 Complete installation to within 1 m of laying face, with sand-filled joints, at completion of each work day.

.7 Pass mechanical plate vibrator on sand cushion over surface course to achieve compaction of sand in joints.

.8 Surface of finished pavement: free from depressions exceeding 3 mm as measured with 3 m straight edge.

.9 The paved surface should exceed by 3 to 4 mm above catch basin grates, drainage channels and adjacent concrete sleeves.

.10 Sweep surface course clean.

.11 After construction traffic is re-established, continue to fill joints for several days to compensate for any settling and further compaction of sand in joints.

.12 Ensure conformance of final elevations.

3.9 Cleaning

.1 Carry out cleaning at times and conditions recommended by manufacturer of cleaning compound , immediately before sealing and as directed by Consultant.

.2 Remove and dispose of loose, extraneous materials from surfaces to be cleaned.

.3 Apply cleaning compounds appropriate for removal of various contaminants encountered in accordance with manufacturer's recommendations.

.4 Final surface to be free of contamination.

3.10 Adjustment and Replacement

.1 At time of final acceptance at Project completion, and again at termination of warranty period, Work of this Section will be inspected by Consultant, and adjustments and replacements shall be made under Work of this Section.

.2 The warranty period begins after receipt of written acceptance of work of this Section by the Consultant.

.3 Adjustment and replacement work shall be performed as specified in this Section with materials of same size, variety and quality of material replaced.

.4 Replacement work shall be done under an additional warranty of the same length and conditions as described in this Specification. It shall date from time of Consultant's approval of replacement work.

END OF SECTION

Section 32 14 40
Landscape Stone

PART 1 GENERAL

1.1 Section includes

.1 This section includes requirements for supply and installation of landscape stone, including the following:

.1 Granite stone.

.2 Granite slabs.

.3 Granite Riverstone.

1.2 Related sections

.1 Section 01 33 00 - Submittal Procedures

.2 Section 32 11 23 - Aggregate Base Courses

1.3 Reference standards

.1 All referenced standards shall be the current edition or edition referenced by the Ontario Building Code currently in force.

.2 City of Toronto Construction Standards:

.1 TS 501 - City of Toronto Amendment to OPSS.MUNI 501 (Nov 2014) – Construction Specification for Compaction

.2 TS 1010 - City of Toronto Amendment to OPSS.MUNI 1010 (Apr 2013) – Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material

.3 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS.MUNI 1001, Material Specification for Aggregates - General.

.2 OPSS.MUNI 1004, Material Specification for Aggregates - Miscellaneous

.3 OPSS 1010, Material Specification for Aggregates – Base, Subbase, Select Subgrade and Backfill Material

.4 CSA Group (CSA):

.1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete

.2 CAN/CSA-A179-04, Mortar and Grout for Unit Masonry

.5 ASTM International

.1 ASTM C241/C241M-15e1, Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic

.2 ASTM C1107/C1107M-20, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

1.4 Submittals

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

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Provide quarry certification that all stone supplied conforms to this specification.

.2 Product data:

.1 Data to include product characteristics, performance criteria, physical size, finish and limitations in use.

.2 Submit manufacturer's instructions, printed product literature and data sheets for each type of manufactured material and product indicated, including but not limited to the following:

.1 Mortar and grout materials, including manufacturer's color charts showing full range of colors available.

.2 Geotextile materials.

.3 Shop drawings:

.1 Submit shop drawings for all dimensional stone work, indicating layout, dimensions connections, finishes, and site-specific details.

.4 Samples for initial selection:

.1 Submit samples of each stone type for Consultant's selection and approval prior to ordering and supplying stone to the site.

.2 Submit samples of stone at various sizes, showing finishes and colour specified along with the name and location of the proposed supplier. Stone samples shall fully demonstrate the full range of anticipated variation in colour, shade, veining, texture and finish.

.3 Submit the following samples:

.1 Submit sample of all Granite boulder finishes (natural, split / quarry finish and sawn)

.3 Informational Submittals: Provide the following submittals during the course of the Work:

.1 Mock-up:

.1 Submit mock-up of Granite stone outcropping

.2 Construct mock-up to meet project requirements. Select stone units to represent maximum texture and colour variations.

.3 Do not begin stone work until mock-up section are approved by Consultant. Approved sample shall represent minimum standard of quality for project stone work.

1.5 Quality assurance

.1 Single-source manufacturing responsibility: For each stone colour/type, all required stone units are to be supplied from the same production run or quarry and from a single supplier to ensure uniform colour throughout the Work. Stones of different colours/types may come from different sources.

.1 The quarry shall have adequate capacity and facilities to meet the specified requirements.

.2 Stone colour, texture, and finish shall be within the range of samples approved by the Consultant.

.3 Installer qualifications:

.1 Work of this section to be executed by a skilled stone mason with a minimum of five years experience in similar satisfactory installations, supervised by a foreman experienced in the type of work specified.

.4 Provide adequate, acceptable equipment and labour forces to carry out the work expeditiously.

.5 Stone shall be supplied by a source approved by the Consultant.

.6 Stone shall be standard grade, sound and uniform in quality, texture, and strength, and shall free of flaws, reeds, rifts, laminations, cracks, seams, starts, or other defects which may impair its strength, durability, or appearance. Exposed surfaces shall be free from spots, spalls, chips, stains, discolouration, or other defects which would affect its appearance.

1.6 Delivery, storage and handling

.1 Handling:

.1 Pack and load stone units for shipment and unloading at site in a manner to prevent damage.

.2 Use no material for backing of packaging that would stain or discolour exposed surfaces of the stone.

.3 Isolate stone from contact with ground and other materials until laid in final location, to prevent staining.

.4 Transport, handle and store units to prevent staining, chipping, cracking, spalling, distortion, warping or other physical damage.

.5 Lift stone with proper and sufficiently long slings or forks with protection provided so they are not damaged.

.6 Protect edges and corners to prevent damage.

.7 Protect naturally weathered surfaces to prevent damage, marking or gouging.

.2 Storage:

.1 Stack stone on timbers or platforms at least 80mm above grade.

.2 Do not permit units to contact earth or other staining influences or to rest on corners.

.3 Provide necessary means to prevent staining of stone during storage.

.4 Place polystyrene or other plastic film between wood and other finished surfaces of stone when stored for an extended period of time.

.5 Cover stored stone units if exposed to the weather for an extended period of time.

.6 Do not use salt to thaw ice formed on surface of stone units.

1.7 Warranty

.1 Work shall be guaranteed for a period of two years in accordance with the General Conditions of the Contract.

PART 2 PRODUCTS

2.1 Materials - General

.1 New stone: units to thickness, length and width dimensions on the drawings. Finish face, sides and rear of stone as shown on the drawings.

.2 Prior to purchasing and supplying stone to the site, the Contractor shall provide samples for the Consultant’s review and approval, along with the name and location of the proposed supplier.

.3 Stone hardness testing will be ordered by the Contractor as required by the Consultant to confirm stone quality.

.4 Use only one source and geological area for each type of granite throughout the entire Work.

2.2 Granite stones for seating and outcrops

.1 Stone shall be St. Sebastian, as supplied by Polycor (www.polycor.com), ASL Stone (www.aslstone.com), or approved equivalent.

.1 Stones are to be inspected and selected by the Consultant at the quarry prior to supply. Make arrangements for approval by the Consultant at a time mutually agreed upon.

.2 Stones shall have a minimum ASTM C241 Abrasive Hardness Value of 10. Softer materials such as sandstone, quartzite and slate shall not be allowed, nor will marble or limestone.

.3 Size/shapes/weight ranges are as follows:

.1 Large stones (5-7 tonnes).

.2 Width to height ratio shall be approximately 3:1.

.3 Stones to be selected at the quarry by the Consultant.

.4 Finish:

.1 Granite seating boulder finish shall be as follows:

.1 Irregular stones with natural, split / quarry finish and sawn faces with tooled and honed finishes, as indicated on drawings.

.2 All stones to have a sawn bottom.

.2 Granite stone outcrop finish shall be as follows:

.1 Sawn on all sides. Honed finish on top and sides.

.5 All sharp edges are to be removed to the approval of the Consultant.

2.3 Granite slabs at dry swales

.1 Stone shall be White Mount Airy Granite, as supplied by Polycor (www.polycor.com), or approved equivalent.

.1 Stones shall have a minimum ASTM C241 Abrasive Hardness Value of 10. Softer materials such as sandstone, quartzite and slate shall not be allowed, nor will marble or limestone.

.2 Size: 300mm x 300 x 100mm thick.

.3 Finish: Sawn top and bottom (large faces). Split sides.

.4 All sharp edges are to be removed to the approval of the Consultant.

2.4 Granite riverstone at bioswale

.1 Stones shall be grey granite, light grey in colour, with a minimum ASTM C241 Abrasive Hardness Value of 10. Softer materials such as sandstone, quartzite, slate, marble or limestone shall not be allowed.

.2 Stone shall be unpolished, smooth cleaned river-washed, round shaped, free of cracks, cut edges, mechanical abrasions and foreign material.

.3 Size/shapes/weight ranges are as follows:

.1 Small stones shall range in size from 75mm to 125mm diameter with the smallest specified diameter to be across the smallest dimension of the stone.

.2 Medium to large stones shall range in size from 300mm to 600mm dia.with the smallest specified diameter to be across the smallest dimension of the stone.

.4 Prior to supplying stone to the site, the Contractor shall provide samples for the Consultant's review and approval along with the name and location of the proposed supplier. Stone hardness testing will be ordered by the Consultant as required to confirm stone quality.

2.5 Bedding material

.1 Granular Base Materials:

.1 Compacted Granular 'A' and Granular 'B' in accordance with Section 32 11 23 - Aggregate Base Courses.

.2 ASTM #8 stone in accordance with with Section 32 11 23 - Aggregate Base Courses.

.2 Dry-Pack Mortar Setting Bed:

.1 Non-shrink cementitious material with freeze-thaw durability and resistance to chlorides, CAN/CSA A23.1/A23.2-04, C-2 exposure classification.

.2 C1157 (hydraulic cement) in combination with either hydrated lime complying with ASTM C207, Type S, or lime putty complying with ASTM C1489

2.6 Geotextile

.1 Terrafix 270R or approved equivalent.

PART 3 EXECUTION

3.1 Fabrication

.1 Size and Dimension: Stone shall be of the sizes and dimensions indicated on the Contract Documents and approved Shop Drawings.

.2 Finish exposed surfaces as specified and by approved sample.

.3 Slightly ease or round exposed surfaces to prevent chipping and remove all sharp edges to the approval of the Consultant.

.4 Dimensional tolerances for cut sone:

.1 Thickness: -0, + 6 mm (1/4”).

.2 Face dimension: ±1.5 mm (1/16").

.3 Face variation from rectangular: ±1.5 mm (1/16").

.4 Maximum Bow in 1220 mm (4'-0"): ±1.5 mm (1/16").

.5 Flatness tolerances for cut stone:

.1 Variation from true plane, or flat surfaces, shall be determined by a 1220 mm (4'-0”) dimension in any direction on the surface.

.2 Such variations on polish, hone, and fine rubbed surfaces shall not exceed tolerances listed below or 1/3 of the specified joint width, whichever is greater. On surfaces having other finishes, the maximum variation from true plane shall not exceed the tolerance listed below or 1/2 of the specified joint width, whichever is greater.

.6 Finishes: as indicated.

.1 Polished, honed or fine rubbed finishes: 1.5 mm (1/16").

.2 Sawn, 4-cut, 6-cut, and 8-cut finishes: 3 mm (1/8").

.3 Thermal and coarse stippled finishes: 4.8 mm (3/16”).

.4 Pointed or other rough cut finishes: 25.4 mm (1").

.5 Split face: +/- 6 mm or half joint width.

.7 Bottom of pieces over shallow structural slabs; locations for each as indicated:

.1 Bottom of stone pieces shall be sawn to approximately true planes.

.2 Bottom of stone pieces may be either rough or natural quarry split to provide surfaces which vary not more than 25 mm in 305 mm (1" in 12") from true plane and not more than 50 mm (2") from their specified thickness.

.8 Incidental Cutting and Drilling:

.1 Panels in excess of 45 kg (100 pounds) may include lifting clamp dimples, Lewis holes, or other provisions as required to accommodate the lifting device(s) utilized by the installer. Lifting holes in shall not be exposed in finished installation and shall be filled with non-expanding grout or high-modulus elastomeric sealant after installation and final alignment.

3.2 Examination

.1 Examine areas and conditions for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 Installation

.1 Lay stone in accordance with good practice, CSA A371-94, as accepted in mock-up sample and approved shop drawings.

.2 Installation shall meet or exceed workmanship of accepted samples and mock-ups.

.3 Verify dimensions on site and make minor adjustments to suit site conditions and to Consultant's approval.

.4 Clean stone before setting by scrubbing with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh fillers or abrasives.

.1 Do not clean stones with any abrasive tools, high-pressure washers, chemicals or cleaning compounds. Use water only as needed to remove loose surface dirt and debris.

.2 Before being set all stone to be clean and free of ice and frost.

.5 Do not set stone on surfaces or with materials containing frost when ambient temperatures are below 5 degrees C.

.6 Set stone in accordance with drawings and final mock-ups and shop drawings and as directed on site by Consultant. Provide anchors, supports, fasteners, and other attachments shown, specified or necessary to secure stonework in place in accordance with the best practices of the trade. Shim and adjust accessories as required for proper setting of stone. Completely fill holes, slots and other sinkages for anchors, dowels, fasteners, and supports with non shrinking, non staining mortar during setting of stones.

.7 Mixing and blending:

.1 Place stones which fit and match well with adjacent stones and allow for on-site adjustment as directed by the Contract Administrator.

.2 Where specified, mix stone to ensure uniform blend of colour and texture. Distribute stone units of varying textures to avoid spotty appearance over surfaces exposed to view. Do not use units which contrast too greatly with overall range.

.8 Do not allow any petroleum-based fillers or sealants to come into contact with stonework.

3.4 Protection

.1 The Contractor shall obtain, from the installer, advice on the proper procedures required to protect the stonework from deterioration, discoloration or damage during construction and until acceptance of the work. Contractor shall implement all necessary procedures required to protect completed stonework from damage.

.2 Work in progress shall be protected at all times during construction by use of a suitable strong, impervious film or fabric securely held in place.

.3 Protect until inspection, approval and acceptance of entire project work.

.4 Make good any settlement that may occur and be responsible for the repair of all damages.

.5 Protect corners and edges of stone units that are vulnerable to damage by continuing construction. Protect them by means of wood or other rugged materials secured in a manner that will not damage or stain finished surfaces.

.6 Remove protection when risk of damage is no longer present and without damage to stone.

3.5 Cleaning

.1 Adjustment and Cleaning:

.1 Upon completion, clean all exposed-to-view surfaces of markings, dust, dirt, finger prints, excessive mortar and grout, grease and other contamination.

.2 Replace all damaged or marred material and work as directed at no cost to the Owner.

END OF SECTION

Section 32 17 23
Pavement Markings

PART 1 GENERAL

1.1 Section includes

.1 This section includes requirements to supply and install pavement markings.

1.2 Related requirements

.1 Section 01 33 00 - Submittal Procedures

1.3 Reference standards

.1 All referenced standards shall be the current edition or edition referenced by the Ontario Building Code currently in force.

.2 City of Toronto Construction Standards

.1 TS 1003 - City of Toronto Material Specification for Aggregates Hot Mixed, Hot Laid Asphaltic Concrete

.2 TS 1101 - City of Toronto Amendment to OPSS.MUNI 1101 (Nov 2016) – Material Specification for Performance Graded Asphalt Cement

.3 TS 1151 - City of Toronto Material Specification for Superpave, Stone Mastic and Warm Mix Asphalt

.3 Government of Ontario

.1 Ontario Traffic Manual (OTM) Book 11, latest edition.

.4 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS.MUNI 710, Specification for Pavement Marking.

.2 OPSS.MUNI 1712, Material Specification for Organic Solvent Based Traffic Paint.

.3 OPSS.MUNI 1713, Material Specification for Thermoplastic Pavement Marking Materials.

.4 OPSS.MUNI 1714, Material Specification for Field Reacted Polymeric Pavement Marking Materials.

1.4 Submittals

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

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit manufacturer's printed product literature and data sheets for pavement markings and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit Methodology Statement for the installation of each product type

.3 Samples:

.1 Submit samples or paint draw-downs for each material and colour specified herein. Samples to be no larger than 8.5” x 11”.

.2 Submit 0.5kg sample of grass beads.

.3 Mark samples with name of project, its location, paint manufacturers name and address, name of paint, CGSB specification number and formulation and batch number.

.3 Closeout Submittals:

.1 Submit information on materials relative to work of this Section for inclusion in operations and maintenance manual.

1.5 Delivery, storage and handling

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

.2 Storage and Handling Requirements:

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

1.6 Site conditions

.1 Do not apply pavement markings if the air temperature is below 8°C, with no rain forecast within next 4 hours, or if the weather or pavement conditions are considered unsuitable by the Consultant.

PART 2 PRODUCTS

2.1 Field reacted polymeric pavement markings

.1 Multi-use trail centre line and stop bars:

.1 As per the requirements of OPSS 710 and in conformance with Contract Documents.

.2 All pavement markings shall be field reacted polymeric pavement markings in accordance with OPSS 1714.

.3 The field reacted polymeric pavement markings shall have a minimum skid resistance of 45 British Pendulum Number (BPN) Units.

.4 Colour:

.1 White: as per OPSS 1714

.2 Green: Pantone 361

.1 Base b66y37
1 gallon formula
L1 – 2y32
Y1 – 2y

.3 Blue:

.1 Base 8000-02712
5 gallon formula
PB-15y

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify conditions of substrates and surfaces to receive pavement markings acceptable for product installation prior to pavement markings application.

.2 Pavement surface: dry, free from water, frost, ice, dust, oil, grease and other deleterious materials.

.3 Proceed with Work only after unacceptable conditions rectified.

3.2 Application

.1 Pre-mark centerline and location of stop bars for review by the Consultant, prior to the start of pavement marking Work.

.2 Pavement markings shall be per the requirements of OPSS 710 and in conformance with the Contract Documents.

.1 Symbols and letters to dimensions indicated.

.1 Width of centre-line stripe: 100 mm.

.2 Thoroughly clean the distributer tank before refilling with paint of a different colour.

.3 Evenly apply paint at a rate which results in a uniform thickness as identified in OPSS 710.

.4 Paint lines of uniform colour and density with sharp edges.

.3 Thoroughly clean distributor tank before refilling with paint of different colour.

.4 Where required, apply glass beads at rate of 0.5 kg/L of painted area immediately after application of paint.

3.3 Cleaning

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

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

3.4 Protection

.1 Protect pavement markings until dry.

.2 Repair damage to adjacent materials caused by pavement marking application.

END OF SECTION

Section 32 33 00
Exterior Site Furnishings

PART 1 GENERAL

1.1 Section includes

.1 This section includes labour, materials, tools, and equipment, required to supply and install all site furnishings including:

.1 Seating.

.2 Outdoor showers.

.3 Drinking fountain and bottle filling station.

.4 Bicycle rings.

1.2 Related requirements

.1 Section 01 33 00 - Submittal Procedures

.2 Section 06 73 00 - Composite Decking

.3 Section 32 14 13 - Concrete Paving

.4 Section 32 14 13 - Precast Concrete Unit Paving

1.3 Submittals

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

.2 Action Submittals: Submit the following submittals before starting any work of this Section:

.1 Product Data: Submit product data for each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, field-assembly requirements, and installation details.

.2 Submit manufacturer's available range of colours and finishes for each furnishing item specified.

.3 Shop Drawings:

.1 Submit shop drawings indicating dimensions, sizes, assembly, anchorage and installation details for each furnishing item specified.

.3 Closeout Submittals:

.1 Submit maintenance data for care and cleaning of site furnishings, including Include recommended methods for repairing damage to the finish.

1.4 Quality assurance

.1 Installer Qualifications: An experienced installer who has completed installation of identified products similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.

.2 Manufacturer Qualifications: A firm experienced in manufacturing identified products similar to those required for this project and with a record of successful in-service performance.

.3 Source Limitations: Obtain each color, finish, shape and type of bicycle rack from a single source with resources to provide components of consistent quality in appearance and physical properties.

.4 Product Options: Drawings indicate size, shape and dimensional requirements and are based on the specific systems indicated.

1.5 Delivery, storage and handling

.1 Deliver, store and handle materials in accordance with Manufacturer's recommendations.

.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 dry location and 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.

PART 2 PRODUCTS

2.1 Bench

.1 Drifter Bench as supplied by Streetlife (www.streetlife.com), or approved equivalent.

.1 Contact:

.1 Streetlife Canada
1-484-496-8281
1-800-461-6635
canada@streetlife.com

.2 Model:

.1 Bench: DB-L2-200-CT - Untreated reclaimed wood (100% FSC Recycled hardwood) 2 beams, ea. 30x30cm (12x12")

.2 Backrests: Model: DB-T-BR1-120-TT - Untreated reclaimed wood (100% FSC Recycled hardwood) 1 beam, ea. 120 x 15 x 38 cm (47 x 6 x 15") LxHxD

.3 Armrests: Model: ARM-UNI, stainless steel with glass bead blasted finish, 2 per bench unless otherwise noted.

.3 Materials / finish: Mounting brackets / supports: CorTen Steel (weathering steel)

.4 Installation as per manufacturer’s instructions.

.5 Quantity: Three (3).

2.2 Lounge chair

.1 Lounge chair, as supplied by Equiparc (www.equiparc.com), or approved equivalent.

.1 Contact:

.1 Equiparc
1001 James-Brodie
Saint-Jean-sur-Richelieu, QC J2X 0C1
1-800-363-9264
info@equiparc.com

.2 Model:

.1 Single Lounge chair: EP 1974

.2 Double Lounge Chair: EP 1974-DOUBLE

.3 Materials: Galvanized and painted frame with Ipe wood slats

.4 Colour / Finish: mid-grey colour RAL 7016 “Anthracite Grey". All colour selections to be confirmed by Consultant prior to ordering.

.5 Installation as per manufacturer’s instructions.

.6 Quantity: Eight (8) Single Lounge Chairs, and Ten (10) Double Lounge Chairs.

2.3 Outdoor shower

.1 Double-sided accessible outdoor shower, as supplied by by MDF Fountains Inc. (www.mostdependable.com), or approved equivalent.

.1 Contact:

.1 MDF Fountains Inc.
5705 Commander Drive,
Arlington, TN 38002.
1-901-867-0039

.2 Model: 564 SMSS.

.3 Colour: Black. All colour selections to be confirmed by Consultant prior to ordering.

.4 Installation as per manufacturer's instructions.

.5 Quantity: Seven (7).

2.4 Drinking fountain and bottle-filling station

.1 Drinking fountain with pet fountain and bottle filling station, as supplied by MDF Fountains Inc. (www.mostdependable.com), or approved equivalent.

.1 Contact:

.1 MDF Fountains Inc.
5705 Commander Drive,
Arlington, TN 38002.
1-901-867-0039

.2 Model:

.1 Drinking Fountain and Bottle Filling: Model: 10140 SMSS with pet fountain

.3 Colour: Black.

.4 Installation as per manufacturer's instructions.

.5 Quantity: One (1).

2.5 Bicycle rings

.1 City of Toronto standard cast aluminum encapsulated bike ring with galvanized steel post as supplied by Toronto Fabricating & Mfg. Co., or approved equivalent.

.1 Contact:

.1 Toronto Fabricating & Mfg. Co.,
1021 Rangeview Rd.,
Mississauga, Ontario, L5E 1H2

.2 Model: TFMC Style #939-DB

.3 Finish: Standard - Galvanized

.4 Mounting: In-ground. Extended buried post to accommodate concrete unit paver thickness as required.

.5 Quantity: As indicated on drawings.

PART 3 EXECUTION

3.1 Examination

.1 Examine areas and conditions for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

.1 Assemble and install site furnishings in accordance with manufacturer's written installation instructions.

.2 Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings, per manufacturer’s specifications.

3.3 Cleaning

.1 After completing site furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

3.4 Protection

.1 Protect installed products and components from damage during construction.

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

END OF SECTION

Section 32 92 19
Seeding

PART 1 GENERAL

1.1 Section includes

.1 This section includes requirements for the application of seeding and growing medium through Terraseeding methods and includes the following:

.1 Requirements for application equipment.

.2 Seed mixes and application rates.

.3 Performance measures for acceptance.

.4 Regular maintenance of plants for duration of warranty period.

1.2 Related requirements

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 31 22 13 - Rough Grading

1.3 Reference standards

.1 All referenced standards shall be the current edition or edition referenced by the Ontario Building Code currently in force.

.2 City of Toronto Construction Standards

.1 TS 5.10 - City of Toronto Construction Specification for Growing Medium

.3 Canadian Food Inspection Agency (CFIA)

.1 Canada Seeds Act and Regulations, Weed Seeds Order, 2016.

.4 Toronto Region Conservation Authority (TRCA)

.1 Seed Mix Guideline V.2.0 January 2022

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

.1 Canadian Landscape Standard, latest edition.

.2 Canadian Nursery Stock Standard, latest edition.

1.4 Submittals

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

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Submit the name, contact information and qualifications of the Installer for approval by the Consultant. Submittal shall include the names and contact information of a minimum of five project references that best represent the firm's qualifications. All representative work shall have been completed within the previous five years.

.2 Submit, for approval by the Consultant, the names and contact information of all seed sources. If seeds are to be obtained from a re-wholesale supplier, the name and contact information of the original grower shall be included.

.3 Seed Analysis Certificate:

.1 A legible, valid Seed Analysis Certificate from a Seed Testing Laboratory approved by the Canadian Food Inspection Agency (CFIA) for all single seed species and all seed mixtures shall be provided to the Consultant 24 hours prior to any seeding operations.

.2 Test results shall meet or exceed the value for the various seed mixes as specified by the consultant.

.3 Certificate shall include the following information:

.1 The name and address of the seed supplier.

.2 The seed species, or the name of the seed mix and the various individual seed species that comprise the seed mix and the percentage by mass.

.3 Name of the grade of seed or seed mix

.4 The supplier's lot designation number, corresponding to the Seed Analysis Certificate.

.5 Germination percentage.

.6 Purity analysis of seed mixture: percentage of pure seed, variety and weed

.7 Year of production

.8 Net weight in kilograms [mass]

.9 The inoculant type, strain and expiry date (only required for seed mixes containing Crown Vetch or Birdsfoot Trefoil).

.4 Seed Mixes:

.1 Labeling shall conform to the requirements of the Canada Seeds Act and Regulations. Each package shall be labeled to show.

.1 The name and address of the seed supplier.

.2 The seed species, or the name of the seed mix and the various individual seed species that comprise the seed mix and the percentage by mass.

.3 Name of the grade of seed or seed mix

.4 The supplier's lot designation number, corresponding to the Seed Analysis Certificate.

.5 Germination percentage

.6 Purity analysis of seed mixture: percentage of pure seed, variety and weed

.7 Year of production

.8 Net weight in kilograms [mass]

.9 The inoculant type, strain and expiry date (only required for seed mixes containing Crown Vetch or Birdsfoot Trefoil).

.3 Closeout Submittals:

.1 Maintenance Instructions: Submit instructions on maintenance procedures to be followed after end of specified maintenance period.

1.5 Quality assurance

.1 Installer Qualifications: All work shall be performed by an experienced contractor who has completed work similar in method and scale to that indicated for this project and with a record of successful landscape establishment.

.1 Terraseeding installer: The installation contractor shall have a minimum of 3 years of experience in the application of Terraseeding using a pneumatic blower truck:

.1 Equipment used for integrated growing medium/seed application shall be purpose-built, with a pneumatic blower unit and computer-calibrated seed injection system capable of simultaneously applying growing medium and seed uniformly over the whole area without significant variation in the mix.

.2 The equipment shall be capable of uniformly applying materials and seed at a rate greater than 0.25 cubic meters of material per minute.

.3 The equipment shall be equipped with an application hose capable of extended 90 meters from the blower truck unit.

1.6 Planting Season

.1 Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.

.1 Spring Planting: May – June

.2 Fall Planting: September – October.

.2 Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favourable weather conditions according to manufacturer's written instructions.

1.7 Delivery, storage and handling

.1 All seeds shall be packed and delivered in original containers in accordance with the Canada Seeds Act and Regulations.

.2 All seed and inoculant shall be stored in cool, dry location until use.

1.8 Warranty

.1 Seeding shall be guaranteed for a period of two years following written acceptance of the work by the Consultant in accordance with the General Conditions of the Contract and as modified by this section, and shall be alive and in vigorous growth at the end of the warranty period as determined by the Consultant.

PART 2 PRODUCTS

2.1 Seed

.1 All seed, supplied either as single seed species, or as a seed mix shall comply with the provisions of the Canada Seeds Act and Regulations and the grade standards for that particular seed kind.

2.2 Seed mixes

.1 Seed Mix A: Ontario Meadow Seed mic (TRCS-SW-6)]

.1 Composition:

Seeding

Botanical name	**Common name**	**%**
Asclepias incarnata	*Swamp milkweed*	*2.0%*
Symphyotrichum ericoides	*Heath aster*	2.0%
Symphyotrichum novae-angliae	*New England aster*	1.0%
Symphyotrichum pilosum	*Hairy aster*	*2.0%*
Symphyotrichum puniceum	*Swamp aster*	*2.0%*
Doellingeria umbellata	*Flat-topped aster*	*1.0%*
Bromus ciliatus	*Fringed Brome*	2.0%
Carex bebbii	Bebb's sedge*	1.0%
Carex stipata	Awl-fruited sedge	1.0%
Carex vulpinoidea	Fox sedge	5.0%
Elymus riparius	Riverbank rye	10.0%
Elymus virginicus	Virginia Wlid Rye	10.0%
Eupatorium maculatum	Joe-pye weed	3.0%
Eupatorium perfoliatum	Boneset	2.0%
Glyceria striata	Fowl manna grass	3.0%
Juncus articulatus	Jointed rush	2.0%
Juncus balticus	Baltic rush	1.0%
Juncus effusus	Soft rush	1.0%
Juncus tenuis	Path rush	2.0%
Juncus torreyi	Torrey's Rush*	1.0%
Liatris spicata	Dense blazing star	1.0%
Lobelia cardinalis	Cardinal flower	1.0%
Lobelia siphilitica	Blue lobelia	1.0%
Mimulus ringens	Monkey flower	1.0%
Monarda fistulosa	Wild bergamont	3.0%
Oenothera biennis	Evening primrose	2.0%
Panicum virigatum	Switch grass	10.0%
Penstemon digitalis	Foxglove beardtongue	2.0%
Physostegia virginiana ssp. virginiana	False dragonhead or Obedient plant	2.0%
Rudbeckia hirta	Black eyed Susan	5.0%
Rudbeckia laciniata	Green coneflower*	1.0%
Scirpus atrovirens	Green bulrush	3.0%
Scirpus cyperinus	Woolgrass bulrush	3.0%
Solidago graminifolia	Lance-leaved goldenrod*	1.0%

Sorghastrum nutans	Indian grass	7.0%
Verbena hastata	Blue vervain	3.0%
TOTAL		**100%**

.1 *If supply issues arise, replace species with a reasonable substitute from theis mix.

.2 Seeding rate: 21.59 kg/ha

.3 Suitable seeding timing windows:

.1 Late spring (April to mid-June) is ideal seeding time during drier conditions.

.2 Fall (September to November) is best for dormant wildflower seeds.

.3 If seeding occurs after September 30th, additional erosion and sediment control measures may be required to minimize sediment transport off-site and seed loss due to runoff.

.4 Seeding shall not be executed during the drought-prone season (i.e. mid-June through mid-August).

.5 Seeding occurring during the late fall and winter months (November 1st to March 30th) shall specify interim soil stabilization measures to secure the site during the spring freshet. Seeding might be required in the following growing season, at the discretion of the Consultant.

.6 All disturbed areas shall be seeded as soon as possible following the completion of works in each area to minimize the extend and duration of exposed soils. Erosion controls shall remain in place until seeding has sufficiently stabilized the site (80% cover).

.7 If germination is not anticipated during the same growing season when seeding was carried out, additional erosion control measures (e.g. rolled erosion control products) are required to provide interim stabilization until vegetation is visible.

.4 Location: As indicated on drawings.

2.3 Annual nurse crop seed

.1 Nurse crop seed shall Virginia Wild Rye (Elymus virginicus) unless otherwise approved by the Consultant.

.1 Seeding rate: 30 kg/ha

2.4 Fertilizer

.1 Fertilization is not recommended unless the soil conditions are very poor. Supplemental fertilizer only encourages weeds.

.2 If required, fertilizer shall comply with the provisions of the Canada Fertilizers Act and Fertilizer Regulations. Fertilizer shall be supplied in original bags bearing the manufacturer’s original label indicating mass and analysis.

2.5 Growing medium - Terraseed

.1 Growing medium shall consist of a suitable and approved homogenous blend of sand and composted organic components.

.2 Composted organics shall be pre-mixed and shall consist of a minimum 70% compost material. The composted organics may be amended. Amendments shall be added at the discretion of the Contractor to ensure that the composted organics meets the material specification and is suited for distribution by a pneumatic blower.

.1 Compost material shall be derived from well composted green waste organic matter produced by a composting site that meets the requirements of the Canadian Council of Ministers of the Environment, Guidelines for Compost Quality definition for Type “A” Compost.

.3 Once mixed, composted organic material shall consist of particles where 100% of the material is able to pass through a 25 mm sieve.

2.6 Pneumatic blower truck

.1 The pneumatic blower truck shall be a custom manufactured, fully integrated, truck-mounted unit. The blower truck shall be equipped with a computer-calibrated seed injection system and shall be capable of uniformly applying materials and seed at a rate greater than 0.25 cubic meters of material per minute. The blower truck shall also be equipped with an application hose capable of extended 90 meters from the blower truck unit.

2.7 Mulch

.1 Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

.2 Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

.3 Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.8 Water

.1 Water shall be free of any contaminants or impurities that would adversely affect the germination and growth of vegetation.

PART 3 EXECUTION

3.1 Project conditions

.1 Installation of Work of this Section shall be performed under weather conditions and in suitable growth season, and as approved by Consultant.

3.2 Scheduling

.1 Seeding operation shall not commence until the Consultant has approved the surface preparation and the layout of seed mixes.

.2 Seeding application and/or re-application shall not be carried out under adverse field conditions such as high wind, frozen soil or soil covered with snow, ice or in areas of standing water or a concentrated flow of water.

.3 The surface to be seeded shall be prepared not more than 7 calendar days before the seeding operation.

.4 All seeding operations to be completed minimum 60 days before end of growing season.

3.3 Surface preparation

.1 At the time of seeding, all surface areas designated for seeding shall be free of erosion and shall have a fine graded uniform surface and shall not have surface stones greater than 50 mm in diameter, weeds or other unwanted vegetation.

.2 Soil to be loose, friable and appropriate for easy root penetration of the seeded species.

3.4 Layout

.1 The locations of the different seed mixes shall be staked out on the ground surface in accordance with the contract drawings, for approval by Consultant.

.2 Stakes shall be used to indicate the limits of each type of seed mix.

3.5 Terraseed application

.1 Prior to application of growing medium and seed, the pneumatic blower shall be calibrated to provide the specified amounts and proportions of growing medium and seed.

.2 Growing medium/seed mix shall be applied to a uniform depth over the approved area.

.3 Depending on slope gradation, depth of application shall be as follows unless otherwise indicated on plans:

.1 3:1 slopes and less – 25mm minimum application

.2 3:1 - 2:1 slopes – 35mm minimum application

.3 2:1 slopes and greater – 50mm minimum application

.4 Except where otherwise specified or instructed, the growing medium and seed shall cover the entire area and overlap adjoining ground by 300mm.

.5 Existing site equipment, roadways, landscaping, reference points, monuments, markers and structures shall be protected from over-spray damage.

.6 Over-spray or damage that occurs during Terraseeding shall be documented, reported and promptly rectified.

3.6 Maintenance prior to acceptance

.1 Maintenance for seeded areas shall begin immediately after seeding has been completed and shall continue for two years (24 months) until final acceptance by the Consultant.

.2 Maintenance shall include all measures necessary to establish and maintain perennials, grasses and forbs in a vigorous growing condition, including, but not limited to the following:

.1 Regrading and re-seeding shall be carried out when necessary to restore damaged or failing seeded areas.

.2 Watering shall be scheduled and carried out when required and with sufficient quantities to prevent seeds and underlying growing media from drying out.

.3 Mow the area to 150mm (6”) 2-4 times per year in the first 3 years to keep weeds in check. The first mowing shall not be attempted until:

.4 All seed has germinated, and new growth has reached a mowing height of a minimum 75mm-90mm.

.3 Fertilization is not recommended unless the soil conditions are very poor.

3.7 Conditions for acceptance

.1 Performance Measure of all areas by the Consultant to ensure compliance with this specification at thirty (30), sixty (60) and ninety (90) day periods following the seeding operation:

.1 At the thirty (30) days:

.1 Growing media shall be visually intact and shall form a uniform cohesive mat.

.2 Germination of the nurse crop shall be visually evident.

.2 At the sixty (60) days:

.1 The nurse crop shall be evident at mature height in an evenly dispersed, uniform cover.

.2 Germination of the specified, permanent seed species shall be visually evident in an evenly dispersed uniform cover.

.3 There shall not be any significant bare areas, both in terms of quantity and size.

.4 Non-seeded, non-specified vegetation shall not exceed 20% of the seeded earth area.

.3 At the ninety (90) days:

.1 The permanent seed species shall be at an average height of 50mm in an evenly dispersed, uniform cover; representative of the specified, permanent seed mixes.

.2 There shall not be any significant bare areas, both in terms of quantity and size.

.3 Non-seeded, non-specified vegetation shall not exceed 20% of the seeded earth area.

.4 No site reviews will be held during the winter dormant period or when site conditions prohibit a visual field inspection. The timing intervals between reviews will be suspended during the winter dormant period.

.2 If the completed work does not meet the Performance Measure after the thirty-day review, the Consultant shall document the failure areas, notify the Contractor of those areas, and review at the sixty day benchmark.

.3 If the completed work does not meet the Performance Measure after the sixty or ninety day review, the Consultant shall notify the Contractor in writing. The Contractor shall re-apply the specified materials in accordance with this specification within 14 calendar days of receiving the notification.

.4 Acceptance of seeded areas by the Consultant should be undertaken only when the following conditions exist:

.1 Growing medium quality, fertility levels, depths and surface conditions are as set out in this Standard or specification, unless specified otherwise.

.2 Plants are uniformly established and conforming to the Performance Measure standards at ninety days.

3.8 Cleaning

.1 All materials and other debris resulting from seeding operations shall be removed promptly from the job site upon completion of each phase of the project.

.2 Clean water shall be used to immediately wash seed or cover materials that have been applied to the foliage of trees, shrubs or other plant materials.

3.9 Protection

.1 Temporary wire or twine fencing, barriers, barricades, signage or other appropriate means shall be provided and maintained to protect newly seeded areas from damage, including but not limited to erosion, pedestrian and vehicular traffic, or wildlife.

.2 Protective fencing shall be maintained in good condition until the seeded areas has been established or until acceptance.

.3 Remove protection devices as directed by Consultant.

END OF SECTION