# TECHNICAL SPECIFICATIONS

## MACKIN PARK BALLFIELD

Coquitlam, BC

Issued for Tender | January 26th, 2026

CONSULTANT:

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## TABLE OF CONTENTS – CIVIL ENGINEERING SPECIFICATIONS

The Civil Engineering Drawings that are Issued for Tender are to be read in conjunction with the specification portion of the Master Municipal Construction Documents, Platinum Edition.

The following sections are directly required to be read with the Contract Documents. Please note that these sections may refer to other sections which may be relevant to the project.

# PART 1: **GENERAL**

## 1.1 GENERAL REQUIREMENTS

.1 Refer to Division 1, General Requirements.

.2 This section of the specification forms an integral part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

## 1.2 DESCRIPTION

.1 Supply all products, labor, equipment, and services necessary to install reinforcing steel as indicated in the contract documents.

## 1.3 RELATED WORK

| | | |
|---|---|---|
| .1 | Excavating and Backfill | Section 31 23 10 |
| .2 | Cast in Place Concrete | Section 03 30 00 |

## 1.4 REFERENCE STANDARDS

.1 Except as stated otherwise, all work shall conform to the following:

.1 B.C. Building Code (newest edition).
.2 CAN/CSA-A23.1 Concrete Materials and Methods of Concrete Construction
.3 CAN/CSA-A23.2 Methods of Tests for Concrete
.4 CAN/CSA-A23.3 Code for the Design of Concrete Structures for Buildings.
.5 CAN/CSA G30.18-09 (R2014) Carbon steel bars for concrete reinforcement
.6 CAN/CSA W186–M Welding of Reinforcement Bars in Reinforced Concrete Construction.
.7 ACI manual of Standard Practice for Detailing

.2 Where the standard is referred to in this specification it shall mean the documents specified in this clause and their referenced documents.

## 1.5 INSPECTION

.1 The Contractor shall notify the Owner's Representative at least 48 hours before any concrete is placed.

.2 Forms and reinforcing steel must be inspected by the designer before concrete is placed.

### 1.6 TESTING AND APPROVALS

.1 As per MMCD Section 03110 - Concrete/Reinforcement Testing.

### 1.7 SUBMITTALS

.1 At the designer's discretion, rebar mill certificates shall be provided.

## PART 2: PRODUCTS

### 2.1 GENERAL

.1 Products shall satisfy the requirements of the standard unless otherwise specified herein or on the drawings.

.2 Substitution of different size bars/wires permitted only upon written approval of Owner's Representative.

### 2.2 MATERIALS

.1 Use clean new deformed reinforcing bars conforming to CAN/CSA G30.18-09 (R2014), grade 400W unless noted. Welded wire fabrics to CAN/CSA G30.18-09 (R2014).

.2 Welded wire fabric for slabs will be delivered in flat sheets only.

.3 All reinforcing steel to be secured in final position before concrete is placed. Support reinforcing steel on approved supports, spacers, or hangers provided. Maximum free end of reinforcing bars to be 1220mm. Where concrete surfaces are to be exposed, only non-corrosive type reinforcing chairs shall be used to support reinforcing.

.4 Use non-staining supports for architectural concrete.

.5 Reinforcing not in accordance with the above standards shall not be used.

## PART 3: EXECUTION

### 3.1 GENERAL

.1 All phases of concrete reinforcement work shall be in accordance with the standard unless otherwise specified herein or on the drawings. Workers who are skilled and experienced in

their trade shall do the work.

.2 Ship bundles of bar reinforcement clearly identified in accordance with the bar list.

## 3.2 FABRICATION

.1 Fabricate and perform work to CAN/CSA A23.1-14/A23.2-14.

.2 Reinforcing bars will be cold bent. Bars will not be straightened or re-bent.

.3 Hooks shown are to be CSA standard hooks, unless otherwise noted.

## 3.3 PLACING

.1 Reinforcing of size and shapes shown on the Contract Documents will be accurately placed in accordance with the drawings and the requirements of the standard.

.2 Unless otherwise noted, clear cover for reinforcing to be:

.1 Footings: Top & Sides - 50mm
.2 Footings: Bottom - 75mm
.3 Walls: Exposed surfaces - 50mm
.4 Slabs under 125mm: Centered
.5 Slabs 125mm and greater: Bottom - 75mm

.3 All concrete to be reinforced. Reinforce unspecified slab areas with 10m @ 400mm O.C. each way bottom. Minimum wall reinforcing (including planters, sumps, pits, trenches, architectural walls, etc.) unless noted otherwise:

.1 150mm wall - 10M @ 450 Each Way.
.2 200mm wall - 15M @ 500 Each Way.
.3 250mm wall - 15M @ 400 Each Way.
.4 300mm wall - 15M @ 500 Each Way/Each Face.

.4 Embedded material shall be free from grease, scale, and other coatings.

.5 All walls and columns shall be dowelled into footings, walls, beams, or slabs with bars of the same size and spacing as the bars above.

.6 Unless noted, provide corner bars (2' x 2'), to match horizontal wall reinforcement at all wall intersections.

.7 When dowelling into existing concrete structures, provide a 150mm embedment depth unless otherwise noted in the standards or on the Contract Documents, installed with Hilti HY200 V3 adhesive.

.8 Splice reinforcement as follows (unless otherwise noted on drawings).

.1 10m Bar Size – 460mm
.2 15m Bar Size – 610mm
.3 20m Bar Size – 770mm
.4 25m Bar Size – 1220mm
.5 30m Bar Size – 1430mm

.9 Welded wire mesh shall be spliced a minimum of 300mm.

3.4 **WELDING**

.1 Any welding of reinforcing steel shall be in accordance with CAN/CSA W186.

.2 Copies of the Canadian Welding Bureau approved welding procedure and certificate of current operator qualification shall be submitted to the Owner's Representative prior to commencement of welding.

**END OF SECTION 03 20 00**

# PART 1: **GENERAL**

## 1.1 GENERAL REQUIREMENTS

.1 Refer to Division 1, General Requirements.

.2 This section of the specification forms an integral part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

## 1.2 DESCRIPTION

.1 Section Includes:

.1 Concrete Flatwork
.2 Stairs
.3 Planter Walls/Retaining Walls

.2 Furnish labour, materials, equipment, and services necessary for supplying, placing, curing, finishing, and patching all site cast concrete shown on drawings and/or specified herein.

.3 The work of this section shall also include but shall not necessarily be limited to the following:

.1 Supply and installation of expansion joints and control joints where shown and as detailed.
.2 Supply of all testing services.
.3 Supply and installation of all concrete.

## 1.3 RELATED WORK

| | | |
|---|---|---|
| .1 | Excavating, Trenching and Backfill | Section 31 23 01 |
| .2 | Concrete Reinforcing | Section 03 20 00 |
| .3 | Landscape Aggregates | Section 32 15 40 |

## 1.4 SAMPLES

.1 At least two (2) weeks before beginning work, construct 2m x 2m samples of specialty finishing for concrete. Confirm with Owner's Representative for the location and size prior to constructing samples. Construct additional samples as necessary until a sample is approved by the Owner's Representative.

.2 Samples shall be reviewed and approved by the Owner's Representative prior to commencing concrete work. Any concrete placed prior to sample approvals may be rejected.

.3 Protect approved samples until acceptance of all concrete paving. Approved samples shall be the basis for evaluation of finish and installation quality.

## 1.5 PROTECTION

.1 Protect this work from inclement weather, sun or other injury which would impair the finish durability or strength specified.

## 1.6 REFERENCE STANDARDS

.1 Provide concrete and perform work to CAN/CSA A23.1-14/A23.2-14 and most recent BCBC for mixing, transporting, and placing.

.2 No admixtures are permitted without the Owner's Representative's approval.

.3 Minimum compressive strength at 28 days.

.1 Below grade foundation & footings.....25MPa; Exp Class F2.
.2 Walls.....25MPa; Exp Class F2.
.3 Exterior Slab-On-Grade.....32MPa; Exp Class C2.

## 1.7 PRODUCT DELIVERY

.1 Concrete shall be delivered from a plant approved by the Owner's Representative.

## 1.8 APPROVED EQUALS

.1 All items as specified or pre-approved equals. Contractor to submit equivalents at least 14 days prior to the mobilization of work under this section.

## 1.9 ACCEPTANCE OF FINISHES

.1 All finishes shall be compared to the approved samples on site for compliance.

.2 Rejected horizontal concrete surfaces (i.e. all slab paving) shall be removed to the nearest control and/or expansion joint in all directions and the rejected panel shall be replaced. Patching of horizontal concrete surfaces will not be accepted.

.3 All work required to replace rejected finishes shall be at the Contractors expense and no claim for delay or extra costs will be accepted.

## 1.10 INSPECTION AND TESTING

.1 A qualified testing agency paid by the Contractor and approved by Owner's Representative shall be appointed to prepare mix designs, perform field quality tests and test and report on concrete strength. A minimum of 4 test cylinders shall be cast for each 100 cm. or each day's pour, whichever is less. Test 2 cylinders at 7 days and 2 cylinders at 28 days. One of the cylinders tested at 7 days shall be field cured. Copies of all concrete test results to be sent to the designer.

.2 Provide storage facility on site for the initial 24-hour curing of test cylinders.

.3 Do not place concrete until reinforcing has been inspected by the Owner's Representative. Inform the Inspector a minimum of 48 hours prior to placing.

.4 Field tests for concrete quality shall be in accordance with CAN3 A23.1 and CAN3 A23.2.

.5 All testing to be completed prior to substantial completion.

## PART 2: **PRODUCTS**

### 2.1 **MATERIALS**

.1 Portland Cement: to CAN/CSA-A5

.2 Concrete Forms:

.1 Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

.3 Reinforcing Steel: Refer to Section 03 20 00 Concrete Reinforcing for standards and requirements and Contract Drawings.

.4 Aggregate base: Refer to MMCD and Section 32 15 40 Landscape Aggregate for standards and requirements. Place and compact aggregate base as per Contract Drawings.

.5 Form Ties: Noncorrosive snap type c/w water seal washer (Delta Snap tie or equal). Fiberglass Loop Tie or approved other for Board Form Concrete Walls.

.6 Water: potable to CAN/CSA-A23.

.7 Expansion Joints: Bituminous impregnated fiber board to ASTM D1751-83 (1991) (AASHTOM213-74). No joint material protruding at surface of slabs. Recess joint material min. 25mm from top of slab and fill joint with flexible joint compound – Sika 1A or equivalent. No Bituminous fiber board material shall be visible at top of slab.

.8 Use non-staining supports for architectural concrete.

### 2.2 **MIX DESIGN**

.1 Submit proposed mix designs to consultant for review 2 weeks prior to first pour and provide written confirmation to consultant that the proposed mix designs meet project specifications.

.2 Concrete temperatures as delivered shall comply with Table 14 of CAN/CSA A23.1-14.

.3 For concrete in contact with sulphate type soils, include requirements of Table 3 and Section 4.1.1.6 of CAN/CSA A23.1-14.

.4 Flat work and Vertical Elements (Reinforced)

.1 Slump 80 +/- 20 max.
.2 Maximum size of coarse aggregate 19mm.
.3 Air content 5% to 8%.
.4 Use water reducing agents throughout.

2.3 **BONDING AGENT:** Formulated for bonding new concrete to cured concrete. Acceptable materials include but are not limited to:

.1 Daraweld C, Grace Construction Materials

.2 Polymer Bonding Agent, Target

.3 MasterEmaco ADH 326, Master Builders

2.4 **NON-SHRINK GROUT FOR PATCHING:** Acceptable materials include but are not limited to:

.1 MasterFlow Mortar, Master Builders

.2 Fast- Set Patching Concrete, Target

2.5 **CURING COMPOUND:** To requirements of ASTM C309 spray applied liquid containing a fugitive dye to be applied in accordance with manufacturers written instructions.

.1 Curing compounds shall be compatible with other specified floor hardeners, covering adhesives and waterproofing compounds.

.2 The use of other curing methods including the use of burlap and sheet materials shall be at the discretion of the Owner's Representative.

2.6 **ANTI-GRAFFITI COATING:** All walls exceeding a height of 0.40m shall be protected with an Anti-Graffiti Coating. Acceptable suppliers and proprietary products include;

.1 CBR 501-AG Anti-Graffiti Coating by Broda Stains and Coatings, as supplied by CBR Products, 102-876 Cordova, Vancouver BC. (604) 254.3325.

.2 Pre-approved equal

## PART 3: **EXECUTION**

### 3.1 SUBBASE PREPARATION AND BUILD-UP ON GRADE

.1 Excavate subgrade to remove all organics.

.2 Compact soil subgrade uniformly to standard set out in Contract Drawings.

.3 Proof-roll prepared subgrade surface below concrete paving locations to identify soft pockets and areas of excess yield.

.4 Place aggregate base and compact by tamping with plate vibrator, and screed to depth indicated in Contract Drawings.

.5 Remove loose material from compacted subbase surface immediately before placing concrete.

## 3.2 FOOTINGS ON GRADE

.1 Bottom of exterior footings to be minimum 450mm below final finished grade for frost cover.

.2 Protect footings from frost damage, where necessary, until permanent construction provides such protection.

.3 Footing elevations and sizes are subject to revision where site conditions differ from anticipated soil conditions.

.4 Do not undermine footings by excavations for pits, trenches, etc. Footings may need to be lowered to accommodate mechanical/electrical services.

.5 All footings to bear on firm, undisturbed material. Grass, roots, topsoil, etc., are to be removed from the foundation area. Bearing surfaces must be protected from freezing before and after concrete placement.

.6 Footings or slab-on-grade bearing on compacted, granular structural fill shall be compacted to a standard proctor as outlined in the geotechnical engineer's report. Standard proctor value to be verified by compaction testing and results to be submitted to the engineer.

.7 All footings shall be centered below walls and columns unless detailed otherwise.

.8 Inspection of foundation drainage, waterproofing, excavation and shoring is the responsibility of others.

## 3.3 FORMWORK

.1 The contractor shall be responsible for the design of all formwork. Forms shall be built of sufficient strength and rigidity to carry the weight or fluid pressure of the concrete and additionally all construction loads including those due to wind, equipment. The forms shall be clean and free of any accumulation of debris. All water shall be removed from the place of concrete deposit.

.2 Form lumber shall be free from defects.

.3 The strength and rigidity of forms shall be such that they will not deflect or leak. Bulges or deflection in vertical surfaces may be cause for rejection.

.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 Form ties shall be min. 6” below top of concrete wall and installed in a uniform way vertically and horizontally. Removal of form ties shall be done carefully to avoid marking concrete. Patch and grind tie holes after removal.

.6 All exposed corners and edges shall be as detailed.

## 3.4 REINFORCING STEEL

.1 Refer to section 03 20 00 Concrete Reinforcing.

## 3.5 JOINTS

.1 General: Form construction, expansion, and control 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.

.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 expansion joints. Form concrete flatwork in a “leap-frog” panel pattern if the area is larger than 300m².

.3 Expansion Joints: Form expansion joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed vertical objects, and where indicated. Joint compound to be flush or below elevation of adjacent slab. Fill remaining open void with flexible epoxy or joint sealant of Sikaflex 1A or similar. Set expansion joint at a spacing of no more than 9m or confirm with Owner’s Representative. Expansion joints are only to be provided on flat work.

.4 Control Joints: Form weakened-plane control joints, sectioning concrete into areas as indicated. Set control joint at a spacing of no more than 3m or confirm with Owner’s Representative. Construct control joints for a depth equal to at least one-fourth of the concrete thickness.

.1 Saw Cuts: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/4-inch (6-mm) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. All saw cuts to CAN3-A23.1-M77. On horizontal surfaces, attempt to match saw cut spacing to path width unless otherwise noted on contract drawings.

.2 Tooled Joints: Form control joints after initial floating by grooving and finishing each edge to a radius of 1/8-inch (3-mm). Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

.5 Vertical Joints: Form 3/4"x3/4" reveal with 1/8" bevel 2 sides on exposed surfaces of any wall or bench at a spacing of no more than 3m or confirm with Owner's Representative. Vertical joint shall be equally spaced between two ends. Coordinate vertical joints with any recessed light or construction joints.

.6 Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/8-inch (3-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

## 3.6 PLACING

.1 Obtain Owner's Representative approval at least forty-eight (48) hours prior to placing concrete. At the time of placing, all formwork shall have been thoroughly washed and shall be clean and free from all dirt and debris. Formwork shall be wetted down to eliminate suction as far as practical and wash water shall be drained away.

.2 Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

.3 Concrete shall be deposited as near as practical to its final position to avoid segregation and flowing. It shall be well tamped into position, into corners and around embedded items without displacing the reinforced steel.

.4 Handling, transporting, and placing of concrete must be done in a manner to maintain uniformity of concrete and avoid segregation.

.5 Concrete shall not be allowed to drop freely more than 1.5m.

.6 Concrete shall be compacted with appropriately sized vibrators and finishing machines to allow movement between all reinforcing steel.

.7 Vibrators shall not be allowed to come in contact with formwork for exposed concrete.

.8 The method, sequence, and interruption where necessary of pours shall be determined to achieve the best interest of the design.

.9 The surface of concrete at all joints shall be thoroughly cleaned and latency shall be removed.

.10 When applicable, the cold weather requirements of CAN3 A23.1 shall be followed.

.11 Slabs shall be screeded in two passes with a high frequency mechanically vibrating screed which is chamfered to eliminate concaving of the finished slab.

## 3.7 SURFACES

.1 Screeds shall be installed securely, true to grade shown.

.2 After concrete has been placed to screeds, strike off concrete level and flush with screeds with true, wooden, strike off bar.

.3 Immediately after striking off concrete, level it and consolidate it with wooden bull float, or in limited access areas, with wooden darby. Complete levelling and consolidation before free moisture rises to surface (bleeding).

.4 Tolerances: Finished surfaces shall be true to intended grades and levels set out in Contract Drawings and shall be free from trowel marks and “washboard” chatters.

.5 Exposed corners and edges shall be as detailed. Surfaces at tooled edges shall be trowelled and sand blasted to remove tool edge marks.

## 3.8 FINISHING OF CONCRETE SURFACES

.1 After final floating, apply surface finishes as per Contract Drawings

.2 Notify the Owner’s representative at least 48 hours in advance to establish a standard finish for subsequent work.

.3 Form Finish:

.1 Rough Form Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed surface irregularities.

.2 Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

.4 Smooth Steel Trowel Finish

.1 Trowel tops of walls to smooth, true, dense, surface, flat and level or sloped as shown. Uniformity shall be equal to or better than existing tops of walls on site.

.5 Board Form Finish

.1 Contractor to provide board formed plank samples for Owner’s Representative’s approval.

.2 Board formed planks to be 2x lumber, random size, and placement (3½”, 5½” and 7¼”) with 1/8” joints between planks. Some planks may need to be ripped to allow for proper coursing at significant joint locations. Ripped planks shall be between 3½” and 7¼” wide.

.3 Form ties to be fiberglass, located within the horizontal joints and uniformly spaced.

.4 Contractor to provide mock-up for Owner’s Representative’s approval.

.6 Broom Finish

.1 Finish surface of concrete to smooth surface with magnesium or wood float trowel and

brush or broom to provide uniform “light broom finish” non-skid surface to match approved sample.

.2 Broom or brush at right angles to edges or as otherwise required to match adjacent finish or as directed by Owner’s Representative. Pattern shall be consistent over entire slab. Consult with Landscape architect for complex slab areas that may require coordination of broom pattern direction.

.3 Install expansion joints and make saw cut control joints as shown on the Contract Drawings or as directed by Owner’s Representative.

.4 Care must be taken to not push a broom finish on a slab panel greater than 3m. Install construction joint to isolate 3m sections so that broom finish can be consistent, and straight for all work.

.5 Owner’s Representative will not accept any concrete which has been overworked by trowelling, dusted with dry cement, or finished with a mortar coat.

## 3.9 PAVING TOLERANCES

.1 Comply with tolerances in ACI 117 (ACI 117M) and as follows:

.1 Elevation: 1/4 inch (6 mm).
.2 Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
.3 Surface: Gap below 10-feet- (3-m-) long; unleveled straightedge not to exceed 1/2 inch (13 mm).
.4 Joint Spacing: 3 inches (75 mm).
.5 Control Joint Depth: Plus 1/4 inch (6 mm), no minus.
.6 Joint Width: Plus 1/8 inch (3 mm), no minus.

## 3.10 PATCHING AND REPAIRS

.1 All repairable defective areas shall be patched immediately after form removal.

.2 No patching of defective horizontal surfaces shall be permitted. See item 1.9.

.3 All honeycombed and other defective concrete shall be removed down to sound concrete. The area to be patched and an area of at least 150mm wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. A bonding grout shall be prepared using a mix of approximately 1-part cement to 1-part fine sand passing a no. 30 mesh metric size sieve and shall be mixed to the consistency of thick cream and shall then be well brushed into the surface.

.4 Fins and other projections in exposed areas shall be removed by grinding.

.5 All cracked or chipped concrete to be replaced to nearest cold joint or saw cut. Contractor to ensure finish matches adjacent concrete work.

.6 Contractor to removal all debris from concrete surface to ensure uniform finish.

## 3.11 INSERTS AND OPENINGS

.1 Install all embedded steel connections, anchorages, inserts, anchor bolts, angles, sleeves, expansion joint covers, reglets and other embedded items shown or called for on the

drawings, specified, or required for other sections.

## 3.12 CURING

.1 Concrete shall be cured in accordance with requirements of CAN3 A23.1.

.2 Cure trowelled surfaces with burlap kept constantly wet. Do not use burlap which has been used for sugar bags. Use old burlap from which sizing has been completely removed. Begin curing immediately after trowelling. Other fabric materials may be acceptable – consult with Owners Representative.

.3 Paving shall be cured for a period of not less than ten (10) days by an approved method. Walls shall be cured by approved means for at least (5) days after pour. During this curing period no part of the concrete shall be permitted to become dry even for a short while. The curing medium shall be applied to prevent cracking of the surface of the concrete immediately after placing, and it shall be maintained to prevent loss of water from the concrete for the duration of the entire curing period.

.4 Fresh concrete shall be protected from heavy rains, flowing water, mechanical injury, and injurious action of the sun.

.5 Other finishes may be cured by any of the methods specified in CAN3 A23.1 - M77, if required.

.6 Place and protect concrete in accordance with CAN/CSA A23.1-14/A23.2-14.

.7 Do not remove forms for footings and walls until a minimum of 48 hours after placing concrete and after the concrete has attained a strength of at least 10 MPA.

## 3.13 ADJUST AND CLEAN

.1 Surplus material shall be cleared away and removed from the work site.

## 3.14 APPLICATION OF ANTI-GRAFFITI COATING

.1 Surface preparation and application in strict accordance with the manufacturer’s technical data and application instruction sheet.

**END OF SECTION 03 30 00**

## Part 1 GENERAL

1.1 Summary

1. This section covers the fabrication and installation of Monkey Bars and other Parkour bar and post elements, post anchors and handrails submitted from suppliers.

1.2 Related Requirements:

1. Section 10 14 00 – Signage.
2. City of Coquitlam Specifications:
   - .1 Section 03300 – Cast-in-place Concrete.

1.3 Administrative Requirements

1. Pre-Installation Meetings: convene pre-installation meeting a min. of 5 business days prior to beginning on-site installation, with contractor's representative, and Consultant:
   - .1 Verify project requirements.
   - .2 Review installation and substrate conditions.
   - .3 Coordination with other subtrades.
   - .4 Review manufacturer's installation instructions and warranty requirements.

1.4 Action and Informational Submittals

1. Architectural Signage Manufacturer:
   - .1 Product Data:
     - .1 Submit manufacturer's instructions, printed product literature and data sheets for metal lettering and include product characteristics, performance criteria, physical size, finish, and limitations.
2. Metal Shop / Fabricator:
   - .1 Shop Drawings:
     - .1 Indicate details of construction, profiles, jointing, fastening and other related details.
     - .2 Indicate materials, thicknesses, finishes and hardware.
3. Samples:
   - .1 Sample of fabricated work and finishes is to be submitted for approval.
   - .2 Allow 5 business days for inspection of samples by Consultant before proceeding with Work.
   - .3 When accepted, samples will demonstrate minimum standard for Work.
   - .4 Do not proceed with work prior to receipt of written acceptance of sample by Consultant.
   - .5 Accepted samples shall be retained by Owner for reuse, as needed.

1.5 Informational Submittals

1. Product Data:
   - .1 Submit manufacturer's printed product literature panel signage or components, specifications and datasheet and include product characteristics, performance criteria, physical size, finish, and limitations.
2. Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.6 Quality Assurance

1. Welding work to conform to CSA Standard W59 and shall only be performed by organizations and operators qualified under CSA Welding Qualification Code, CSA W47.
2. Electrodes to conform to CSA Standard W48.
3. Finishes: Material finish as specified on drawings or approved equal.

1.7 Delivery

1. All miscellaneous metal items delivered to the site shall be tagged and supplied with sufficient information for identification and fixing in correct location.
2. Arrange delivery in such sequence and manner to permit the most efficient and economical performance of this section of work.

1.8 Protection

1. Protect miscellaneous metal before, during, and after installation until Final Acceptance.
2. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Consultant and City Representative at the Contractor's cost.

1.9 Cooperation

1. Cooperate with all other trades and subconsultants in the installation of the work of this section.

**Part 2 PRODUCTS**

2.1 Materials

1. Horizontal Bars:
   - .1 Metal:
     - .1 Aluminum
     - .2 1 ½" Diameter, 1.9" O.D.
     - .3 Iron Pipe Size XS, Schedule 80S
     - .4 Powder coat colour black
     - .5 Exception – Vertical Bar on Wall #4 to match these specs.

2. Vertical Posts
   - .1 Metal:
     - .1 Aluminum
     - .2 4.5" Diameter
     - .3 Iron Pipe Size STD
     - .4 Schedule 40S
     - .5 Powder coat colour black
     - .6 Wall Thickness 0.237"

3. Diagonal Stabilizing Bar
   - .1 Metal:
     - .1 Stainless Steel (Grade 304 or 316).
     - .2 1 ¼" Diameter, 1.66" O.D.
     - .3 Iron Pipe Size XS
     - .4 Schedule 40S

4. Plate Steel
   - .1 Metal:
     - .1 Stainless Steel (Grade 304 or 316)
     - .2 Thickness: As per drawing details

**Part 3 EXECUTION**

3.1 Examination

1. Examine all details of the work as related to this section and other sections. Ensure that all conditions are suitable to provide a complete and satisfactory installation or be responsible for any additional costs involved.

2. Carefully inspect all surfaces and the work of other trades as it relates to the work of this Section for defects and discrepancies and report same to the Consultant and City representative.

3.2 Fabrication

1. Verify all dimensions on site prior to proceeding with shop fabrication.
2. Fabricate all work in accordance with details shown on drawings and reviewed/stamped shop drawings.
3. Fabricate items from steel unless otherwise noted.
4. Where possible, fit and shop assemble work, ready for erection. This includes the majority of the monkey bar set. Due to overall dimensions some on-site welding may be required.
5. Fabricate and assemble miscellaneous metal items true, square, and free from warpage or other defects.
6. Items to be fixed to or set in concrete as per plans unless approved otherwise.
7. Design, fabrication, and workmanship shall conform to CAN3-S16.1-M94.
8. Welding shall conform to CSA W59-M89.
9. Grind smooth all exposed welds, sharp edges, angles, and corners.
10. Ensure exposed welds are continuous for length of each joint.
11. Provide smooth exposed surfaces with all fastenings and connections hidden where possible.
12. Curved work shall be true to radii shown.
13. All welding to occur in a controlled environment.

3.3 Erection

1. Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
2. Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor chips, bar anchors, expansion bolts and shields, and toggles. Ensure that items cast into concrete or built into masonry are given to the appropriate trades together with setting templates.
3. Execute all metal work in a thorough manner according to best shop practices. Material cut from stock to be sheared or parted straight and all debarred. Where cuts are burned, grind off clean and true to line. Exposed welding or welding in fitted surfaces to be ground smooth or fileted as required. Fabricate all items accurately, true to line and dimension.
4. Make field connections with bolts to CAN3-S16.1-M84, or weld.
5. Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.
6. Fastenings shall be concealed where possible, sizes and spacing as indicated on the drawings, and shall conform to local municipal requirements, CSA Specifications, and best trade practices to give permanent stability and good appearance. Avoid staining, scratches, damage, and distortion of materials.
7. Fix in place with epoxy grout where applicable. Remove excess epoxy grout by approved means, leaving the surface around each handrail base smooth and clean.

3.4 Installation

1. Horizontal and Vertical Bars: Set in concrete as per plans and details.
2. Handrails. Surface mount to concrete as per plans.

3.5 Site Maintenance/Clean-Up

1. The job site shall be kept in a neat, clean, and orderly condition at all times during the installation process.
2. Erection/installation of all miscellaneous metal shall be continuous so that the amount of exposed/unprotected/incomplete work at the end of each workday is minimized. Any unsafe conditions created by work of this Section shall be barricaded and marked with high visibility

marking tape to current Worker's Compensation Board requirements.

3. Any damage to paving, planting or any other site element due to work of this Section shall be immediately repaired at the Contractor's expense to satisfaction of Consultant.
4. Remove and dispose of all surplus material, excess excavated materials, trash, debris, residue, and waste material from the work of this Section as per local code.

**END OF SECTION 05 55 00**

# PART 1: **GENERAL**

## 1.1 GENERAL REQUIREMENTS

.1 Refer to Division 1, General Requirements.

.2 This section of the specification forms an integral part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

## 1.2 DESCRIPTION

.1 Supply all products, labour, equipment, and services necessary to protect existing trees on site, adjacent properties, and on adjacent road right-of-way and sites as indicated in the contract documents, including but not limited to:

.1 Survey and layout for locations of protective barriers.
.2 Installation, maintenance, adjustment during construction, and final removal of protective barriers and signs.
.3 Pruning as approved by Project Arborist including hand excavation and root pruning.
.4 Watering, fertilizing, and all other measures directed by Project Arborist as required to maximize the health and prospects for survival of the trees.

## 1.3 RELATED WORK

| | | |
|---|---|---|
| .1 | Clearing and Grubbing | Section 31 11 01 |
| .2 | Growing Medium | Section 32 91 13 |

## 1.4 REFERENCE STANDARD

.1 International Society of Arboriculture standards.

.2 ANSI A300 Tree Pruning Guidelines

## 1.5 DEFINITIONS

.1 A No Build Zone shall be established on site under the direction of the Project Arborist. It must be demarcated on site and fenced off from all impacts of construction. Refer to Municipal Tree Bylaw or Arborist Report for No Build Zone information. Minor adjustments may be required to meet site species/specific conditions. Confirm on site with Project Arborist.

.2 Excavation, soil stabilizing measures, shoring (if necessary) and related work shall be planned and executed such that no excavation or other construction activities occur within the No Build Zone. A variance may be obtained from the Municipality provided that the location,

materials and methods are approved and supervised by Project Arborist.

.3 No Project Arborist approvals for root pruning beyond the limits of No Build Zone are required. All severed or fractured roots over 2cm in diameter outside the zone are to be neatly cut back a min of 5 cm above damage with a clean, sharp tree pruning saw.

### 1.6 QUALIFICATIONS

.1 All pruning operations shall be carried out or under the direction of an I.S.A. Certified Arborist using clean sharp pruning tools.

### 1.7 QUALITY ASSURANCE

.1 Inspection: The Contractor shall give at least forty-eight (48) hours' notice to Project Arborist of the timing for root pruning, branch pruning, installation of protective barrier, and all other tree protection measures. The protective barrier shall be accurately located on site, prior to starting any hand excavation or root pruning. No activity can occur within the No Build Zone without supervision of Project Arborist.

.2 Where requested, all root pruning and branch pruning shall be done to recognized arboriculture industry standards by Project Arborist or Tree Surgeon under direct supervision of Project Arborist.

## PART 2: PRODUCTS

### 2.1 PROTECTIVE BARRIER

.1 Protective Barrier shall be a 1.2m high fence to be securely installed, plumb, and securely fixed in the approved positions. 2"x4" wood post, top and bottom rails and cross-bracing. Corners shall be firmly fastened and staked into ground with no floating. Refer to Municipal Tree Protection Bylaw for requirements and spacing between posts.

.2 Orange plastic web snow fencing, 1.2m high "Tenax" or pre-approved equal.

### 2.2 TREE PROTECTION AREA SIGNS

.1 Tree Protection Area signs shall be signs at least 900mm x 450mm, on painted plywood or other acceptable weather resistant material.

.2 Refer to Municipal Specification for sign content and requirements. If no specification is found, state the following on the sign:

TREE PROTECTION AREA, DO NOT REMOVE OR RELOCATE FENCE DURING CONSTRUCTION:
No Dumping No Burning
No Storage No Cutting
No Machinery No Toxic Substances (paint, solvents, fuel, oils)

### 2.3 WATER, FERTILIZERS, MISCILLANEOUS

.1 Water, fertilizers and miscellaneous materials shall be as specified in other sections of the specification and as directed by Project Arborist.

### 2.4 STAKES AND FASTENERS

.1 Wood Stakes: 2”x4” wood stakes.

.2 Zip Straps: 140mm (5.5”) long, black, nylon lock straps.

.3 Drain Tile: 150mm (6”) diameter Schedule 40 PVC (polyvinyl chloride) perforated pipe conforming to ASTM D 1784.

.4 Burlap: 10 ounce, untreated, woven, natural jute-based burlap.

### 2.5 FILL MATERIALS

.1 Approved premixed growing medium per Section 32 91 13 Growing Medium or specified as per Arborist Report or directed by Project Arborist.

## PART 3: EXECUTION

### 3.1 PROTECTIVE BARRIER FENCE ERECTION

.1 Before starting site work, install a clearly visible continuous protective barrier fence at the approved lines for the No Build Zone (locations as shown on Tree Management Plan). Maintain this barrier until Substantial Performance and remove from the site at that time. Support snow fencing on posts driven vertically into the ground, at the spacing detailed in Municipal Tree Protection Bylaw, or as otherwise approved by the Project Arborist.

### 3.2 TREE PROTECTION AREA SIGNS

.1 Install Tree Protection Area signs as specified on the protective barrier fence. For large areas, install a minimum of four signs, one each side of the No Build Zone. Signs shall be well secured by ‘Zap Strap’ or similar method and shall be maintained in place until Substantial Performance.

.2 Take all measures necessary to prevent the following activities within No Build Zone except as authorized by Project Arborist.

.1 Storage of materials or equipment.
.2 Stockpiling of soil or excavated materials.
.3 Burning of any kind.
.4 Excavation or trenching.
.5 Cutting of roots or branches.
.6 Travel of equipment or vehicles.
.7 Disposal or spillage of toxic matter.

## 3.3 ROOT PRUNING

.1 Before the start of any machine excavation, hand excavate along the established limit of excavation and prune all roots along the line. Cuts shall be clean, using approved arboriculture practice using clean, sharp pruning tools.

.2 Trees to be transplanted shall be root pruned as directed by Project Arborist.

## 3.4 BRANCH PRUNING

.1 Do not prune any retained tree to compensate for reduction of roots unless specifically instructed by Project Arborist.

## 3.5 WATERING AND FERTILIZING

.1 Retained trees shall be watered thoroughly and deeply, as necessary to supplement rainfall to maintain plant turgidity without prolonged saturation of the root zone. The method, amount and frequency of watering shall be as recommended by Project Arborist. Suggested Summer Watering Schedule: The No Build Zone is to be watered via sprinkler, soaker hose, or by tank with a watering wand at least three times per week during June, July, August, and September or as directed by Project Arborist.

.2 Fertilize Retained Trees to stimulate regeneration of lost roots and foliage. Fertilization program only as recommended by Project Arborist.

## 3.6 EXCAVATION AROUND TREES AND SHRUBS

.1 Excavation within drip line of trees shall be in strict accordance with those areas indicated on the contract documents or as directed by Project Arborist.

.2 Excavation for new construction within Drip Line of Tree(s):

.1 Hand excavate to minimize damage to root systems.
.2 Use narrow tine spading forks to probe and comb soil to expose roots.
.3 Relocate roots into backfill areas whenever possible. If large, main lateral roots are

encountered, expose beyond excavation limits as required to bend and relocate without breaking.

.3 Utility trenching Within the Drip Line of a Tree(s):

.1 Tunnel under and around roots by hand digging.
.2 Do not cut main lateral roots.
.3 Cutting of smaller roots that interfere with installation of new work shall be done with clean, sharp pruning tools.

.4 Roots encountered immediately adjacent to the location of new construction that are not readily maneuverer to beyond the excavation area shall be cut 150mm (6") back from new construction.

.5 Protection of Exposed Roots: Do not allow exposed roots to dry out prior to placement of permanent cover. Provide one of the following temporary remedial measures:

.1 Provide temporary earth cover using fill material specified in 2.5.
.2 Pack with four (4) layers of wet, untreated burlap. Maintain dampness.

.6 Temporarily support and protect exposed roots from damage until permanently relocated and covered with backfill. Water backfill around roots to eliminate voids and air pockets.

.7 When directed by Project Arborist, pruning operations may include the removal of limbs to restore natural shape or reduce the area of the crown of the tree(s) or shrub(s). No crown pruning shall be undertaken without the consent of Project Arborist.

.8 Trees and shrubs to remain are to be thoroughly watered as required to maintain a healthy condition throughout the construction period. Contractor to document all watering operations and submit to Project Arborist one (1) copy of documentation at Substantial Performance.

## 3.7 RAISING GRADE AROUND EXISTING TREES

.1 DO NOT RAISE GRADES within or adjacent to the No Build Zone unless authorized by Project Arborist.

.2 Drain Tile Installation:

.1 Layout drain tile in a spoke like arrangement consisting of eight (8) horizontal lines radiating out from the trunk of the tree to the limit of branch spread. Horizontal line to be approximately 150 mm (6") from base of trunk.
.2 Slope drain tile at a minimum of 1% away from trunk of the tree to the limit of branch spread. Connect ends of each of the spokes laterally around the perimeter of the tree to form a continuous, uninterrupted circle.
.3 Install vertical drain tile at each end of each spoke. Vertical drain tile to extend to proposed finished grade (vertical drain tile provides a means of aeration and watering).
.4 Project Arborist to review drain tile installation prior to backfill operation.

.3 Drain Tile Backfill:

.1 Place a minimum of 150mm (6") cover of 19mm clear crush around perimeter of drain tile.
.2 Fill growing medium to proposed grades.
.3 Fill vertical drain tiles with 19mm clear crush. Ensure clear crush is flush with top of drain tile.
.4 Wrap filter fabric between clear crush and growing medium.

## 3.8 LOWERING GRADE AROUND EXISTING TREES

.1 DO NOT LOWER GRADES within or adjacent to the No Build Zone unless authorized by Project Arborist.

.2 Lowering Grade:

.1 Carefully excavate by hand from limit of drip line of branch spread to proposed grade until the specified gradient has been achieved.
.2 Re-bury or prune and remove roots as instructed by Project Arborist
.3 Construct a growing medium dike at dripline to retain water. Dike to be constructed at each individual tree location unless instructed otherwise by Project Arborist.

.3 Excavation Through Root Area: If excavation through root area is required, excavate around roots by hand.

## 3.9 SURPLUS MATERIAL

.1 Remove surplus material from site and dispose of at approved disposal area.

**END OF SECTION 32 01 56**

# PART 1: **GENERAL**

## 1.1 GENERAL REQUIREMENTS

.1 Refer to Division 1, General Requirements.

.2 This section of the specification forms an integral part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

.3 Maintain landscape area to Level 2 “Groomed’ as per the Canadian Landscape Standard, Current Edition.

## 1.2 DESCRIPTION

.1 Supply all products, labour, equipment, and services necessary to maintain the entire landscape area indicated in the contract documents for one (1) full year, beginning on the date of Substantial Completion of the entire landscape area.

## 1.3 RELATED WORK

| | | |
|---|---|---|
| .1 | Growing Medium | Section 32 91 13 |
| .2 | Plants and Planting | Section 32 93 10 |
| .3 | Sod | Section 32 92 23 |
| .4 | Irrigation System | Section 32 80 00 |
| .5 | Design Build Irrigation | Section 32 84 00 |

## 1.4 REFERENCE STANDARDS

.1 All materials and work shall conform to the latest edition of the following standards or as otherwise specified:

.1 CNTA (Landscape Canada) Canadian Standards for Nursery Stock – Current Edition
.2 BCLNA Standard for Container Grown plants – Current Edition
.3 Canadian Landscape Standard – Current Edition
.4 Perennial Plant Association Standards for herbaceous perennial plants
.5 ANSI A-300 Tree Pruning Guidelines
.6 Urban Tree Foundation/ISA Guideline Specifications For Nursery Tree Quality, current version

## 1.5 QUALIFICATIONS

.1 All work of this Section shall be carried out by fully experienced and licensed maintenance

contractors with current membership standing in the British Columbia Landscape & Nursery Association (BCLNA). Contractor is to have at least 5 years minimum experience working on projects of similar size and scope. Written proof of experience may be requested by the Owner or Owner's Representative for submission.

.2 Pesticide/Herbicide/Fungicide and other chemical handling and application shall be done only by applicators holding current certification under the B.C. Pesticide Control Act.

1.6 **WORK INCLUDED**

.1 Maintaining the planted areas and the entire landscape area in a weed free condition.

.2 Fertilizing as specified in this Section.

.3 Disease and insect control as required to maintain plants in a disease and insect free condition.

.4 Pruning as specified in this Section.

.5 Replacement of dead or diseased plants.

.6 Watering as specified in this Section.

.7 Turf management: Lawn mowing, edging and trimming (aeration, topdressing and power raking) as specified in this Section.

.8 Protection of the landscape area as necessary.

.9 Litter removal from the entire landscape and paved areas.

.10 Soil testing as required to determine fertilizer requirements.

.11 Planting of seasonal annuals and bulbs.

.12 Maintain all pedestrian paved surfaces in a clean condition.

.13 Fall winterization/Spring Start-up of the automatic irrigation system.

.14 Minor repairs to irrigation system.

1.7 **WORK NOT INCLUDED**

.1 Sweeping and cleaning of roadways and parking lots (except for leaves and landscape debris).

1.8 **WARRANTY**

.1 The work of this Section is intended to provide conditions under which the Warranty

requirements of Section 32 93 10 Plants and Planting, can be met through the proper care of grass, plants and planted areas. The requirements of the Warranty shall be the responsibility of this Contractor.

.2 The warranty period starts on the date of Substantial Performance and is in effect for 12-months. Deficient items repaired during this time are subject to an additional 12-month warranty period. Refer to Section 32 93 10 Plants and Planting for the Substantial Performance date definition.

.3 The Contractor shall continue such replacement and warranty of plant material until Owner's Representative has determined that the 'Conditions for Final Acceptance' have been met. Refer to Section 32 93 10 Plants and Planting for the conditions.

1.9 **EQUIPMENT**

.1 Equipment shall be suited to the work at hand and shall be in good working condition. All appropriate safety devices shall be in place and functioning to current WorkSafeBC requirements.

.2 All equipment shall be kept clean to prevent spread of diseases. Cutting equipment shall be kept sharp and well adjusted. Following any cuts to plants identified as diseased, pruning equipment to be sanitized.

1.10 **DOCUMENTATION**

.1 The contractor shall maintain a logbook of all establishment maintenance operations carried out and shall make the logbook available to the Owner, Inspector for inspection upon request, as may be reasonably required. This is to include the identification of any invasive species and Integrated Pest Management (IPM) program details such as application of pesticides and records of scouting for pests. Lack of information shall infer non-compliance with the work of this Section and payment(s) will be adjusted accordingly by the Owner.

.2 The Contractor shall submit with each monthly invoice for Work of this Section, a report stating the dates when maintenance staff were on site, the operations carried out and documentation of any conditions requiring attention beyond the scope of this Section. A sample landscape maintenance report is included at the end of this Section.

1.11 **PROTECTION AND PRESERVATION**

.1 Take all precautions necessary to protect all trees, shrubs and other plant material; underground and above ground site services, curbs, paving and other services including the

irrigation system on and surrounding the contract site against any damage resulting from the work of this Section. Reinstate or replace to original condition if damaged by the Contractor, his employees, suppliers, sub-trades or equipment throughout the duration of the contract.

1.12 **CODES AND REGULATIONS**

.1 All fertilizers shall comply with the Canadian Fertilizer Code.

.2 All chemicals shall comply with and be used as stated under the appropriate Government Code(s), Law(s) and/or Regulation(s).

1.13 **INSPECTION/ NOTIFICATION**

.1 The Contractor or their authorized representative shall be present during all required inspections.

.2 Inspections are required at least four times during the year, at times designated by the Owner.

.3 A written request for final inspection shall be made ten (10) workings days prior to the end of the one-year establishment maintenance period.

.4 At the time of final inspection, all plants and planted areas shall be in the condition specified, all remedial work or replacements shall be complete, and all plants shall be healthy and vigorous.

.5 Notify the Consultant of any physical changes and or discrepancies which may affect the implementation of the contract as specified herein or which may endanger any employee of the Contractor, City or any member of the general public.

.6 Provide a minimum of three (3) days notification in writing prior to the application of any chemical vegetation or pest controls. Ensure notices are posted for public safety in the entire area of application three (3) days prior to and for five (5) days after. The format of notice must comply with local regulations.

.7 Refer to Canadian Landscape Standard for a sample inspection form.

1.14 **SCHEDULING**

.1 Schedule work on site in accordance with weather, soil and plant conditions and use of the site.

.2 In general, execution involves weekly inspections by Contractor at least during the growing period (May 1 to October 15) and at least monthly inspections during the remainder of the year, with maintenance operations scheduled on the basis of conditions observed at each

inspection.

.3 Maintenance personnel shall attend the site during the morning of the first normal working day of each week during the maintenance period. Work at this time shall include litter pick up and disposal, monitoring of moisture in growing medium, and reporting of any damage, deterioration or other conditions requiring attention.

1.15 **PAYMENT**

.1 Payment shall consist of equal monthly instalments over the 12-month maintenance period.

.2 Labour shall be designated separately from materials. All billing for plants, mulch, fertilizer, sand, or other materials shall be submitted with receipts of original purchase.

.3 An up-to-date logbook will be submitted of work done, indicating areas of work, materials used and dates of performance in support of the monthly billing. The logbook shall document the development and condition of plant material as well as preventative and/or corrective measures required which are clearly outside the Contractor's present scope/responsibility. Failure to submit the logbook in support of the billing will result in a failure to process the payment and may result in non-payment if work cannot be substantiated by the Owner.

## PART 2: **PRODUCTS**

2.1 **GENERAL**

.1 Product Handling

.1 Delivery and storage shall be as required such that materials are protected against deterioration or damage as required and such that delivery and storage do not interfere with normal use of the site.

2.2 **PLANT MATERIAL**

.1 Plant material shall meet the requirements of Section 32 93 10 Plants and Planting except that new plants supplied under this Section shall be sized to match existing plants of the same variety at the time of installation of new plants.

.2 Sod or grass seed shall match the varieties installed under Section 32 92 23 Sod.

2.3 **WATER**

.1 Water will be available at no cost to the contractor. The water source will be determined at the time of construction. Contact municipality project manager.

2.4 **FERTILIZERS AND LIMES**

.1 Shall be the following fertilizers and limes with the following guarantee of analysis and used as directed under PART 3 - EXECUTION.

.1 Fertilizer to meet recommendations of soil analysis provided by Construction Contract.
.2 Dolomite Granular lime (Agrico Spread Easy Dolomite).

2.5 **WEED CONTROL AND ERADICANT CHEMICALS**

.1 Do not use any chemical method of insect or disease control without prior written approval from the Owner. The type of herbicide and application methodology to be submitted in writing to the Owner for review and approval.

.2 Use of herbicides, fungicides and insecticides shall conform to all current Municipal, Provincial and Federal Government regulations and codes.

## PART 3: **EXECUTION**

3.1 **PLANT MATERIAL**

.1 Watering:

.1 Ensure the irrigation system is operating properly. Water as required to keep plants and sod in vigorous healthy condition.
.2 Apply at least 25-40mm (1 to 1-1/2") of water during each application.
.3 If no irrigation system has been installed, water trees by hand, by soaking the root zone once a week during dry periods. The water source will be as outlined in 2.3.1
.4 If gator bags are used, follow a fill schedule recommended by the manufacturer or fill water as needed.

.2 Weed Control:

.1 Maintain all areas in a weed free condition. Ensure weed roots are removed.
.2 Inspect landscape areas for weed growth once per week during the growing season and remove all weeds within one week of observing weed growth. Remove weeds prior to them going to seed.
.3 Weed control procedures shall have no detrimental effect on the growth of desired plants. Confirm with the Owner if chemical or other means are to be utilized. Do not use any chemical method of weed control without prior written approval of the Owner.
.4 Mechanically cut out all grass from around tree pits/saucers to a minimum 600mm dia. to protect all trunks from damage by mowers or trimming equipment.

.3 Cultivating:

.1 In the spring, before beginning watering, cultivate the soil surface of all planted areas including the base of all trees as shallowly as necessary to ensure penetration of water and air into the soil. Repeat as necessary for weed control and soil permeability. In addition, this operation shall be carried out at least twice per month to prevent caking of

surface soil or mulch. Where and when applicable mulch should be replaced annually or when required by erosion, decay, cultivation, or vandalism.

.2 Avoid cultivating into the root zone of plants, particularly shallow-rooted ground covers and rhododendrons.

.4 Pruning:

.1 Deciduous Shrubs: Remove all dead, weak, crossing or diseased wood. Do not clip or shape shrubs - allow the shrub to develop a natural appearance.

.2 Broadleaf Evergreens: Shear after flowering, removing new growth and not cutting into old wood. Shearing of blocks of shrubs to following design intent as directed by the Owner or per Contract Drawings.

.3 Trees: Remove dead branches only. All other tree pruning shall be carried out under the direction of the Owner. Trees improperly pruned and/or not pruned as directed by the Owner shall be considered as having died and shall be replaced with the same species by the Contractor at no cost to the Owner.

.4 Herbaceous Perennials and Deciduous Grasses: Cut back either late Fall or early Spring prior to new growth emerging. Leave 50mm (2”) of growth and stem to ensure rhizomes are not damaged.

.5 Lavender: Shear following flowering, cut back succulent growth only, do not cut into hardwood.

.5 Pest & Disease Control:

.1 Do not use any chemical method of insect or disease control without prior written approval of the Owner.

.2 Follow a program of IPM using a combination of physical (hosing), cultural, biological and chemical methods chosen for the most effective, safe and economical control of pests and diseases. Minimize pesticide use except where irreversible damage would result from pest and disease infestation.

.3 Inspect all plants for signs of pest or disease once per week during the growing season and report any such conditions in the monthly report.

.4 Begin treatment for pests or diseases following damage beyond treatment threshold. If chemical controls are required, pesticides shall be chosen on the basis of highest effectiveness and selectivity, and least hazard to the environment.

.5 Pest and disease control shall be carried out by skilled operators, using methods approved under current laws and regulations.

.6 Use the recommended type of equipment and method of application for each chemical as recommended by the chemical manufacturer.

.7 All chemicals shall be mixed and applied as stated on the label of the manufacturer.

.8 Be extremely cautious in the mixing, handling and application of all chemicals as they may be harmful (if misused) to humans, plants, animals, etc.

.9 The Contractor shall be liable for any damage caused through the misuse of any plant disease and/or plant insect control method.

.6 Fertilizing:

.1 Two - three (2-3) months after the installation and initial fertilizing of plants or when directed by the Owner, apply one application of fertilizer appropriate for the time of application and specific for lawns or planting areas at the rates recommended by an approved soil testing laboratory, based on soil test results. Apply a minimum of three applications of fertilizer per annum for all lawn areas - April, June and August. Apply a

minimum of two applications of fertilizer per annum for all planting areas - March and May. Follow manufacturer's recommended application rates, if soils test are not taken. Use Granular slow-release fertilizers only.

.2 Work the fertilizer thoroughly into the top 50mm (2") of soil.

.3 Soil Testing - examine the site to determine if there are any areas where the plant material or lawn is performing poorly. If required and as directed by the Owner take soil samples from the affected area(s) to an approved soil testing laboratory for soils testing. Costs for such testing shall be borne by the Contractor. Determine the problem. Correct deficiencies to the soil such as poor texture, chemical residues or nutrient level or organic matter deficiencies by appropriate means as recommended by soils testing laboratory. Correct the situation at the appropriate time of year and as coordinated with the Owner.

.7 Liming:

.1 In January within the first year after installation, lime all exterior planting and sod areas with application of dolomite granular lime at a rate of 10 lbs per 1000 square feet of soil surface, or as otherwise recommended by the soil testing laboratory.

.8 Tree Protections:

.1 All trees shall be protected against wind and snow damage by adequate staking, guying, tying, or wrapping as conditions require. Guys, wire ties and stakes shall conform with Section 32 93 10 Plants and Planting and shall be examined at frequent intervals with adjustments or replacements made to prevent any abrasions, cuts or other damage to the plants.

## 3.2 MOWING AND TRIMMING

.1 Mow all lawns with a sharp reel or rotary mower when the grass reaches a height of 60mm (2-1/2"). Mow to a height of 40mm (1-1/2"); the height of the lawn between cuttings shall not exceed 60mm (2-1/2 inches). Mow and trim a minimum of 32 times per annum; weekly from April -September, three times in October, twice each in March and November. Cut as required in December, January and February.

.2 Trim all edges of walks, curbs, mowing strips or planting beds at each mowing with a nylon line type power trimmer to ensure a clean straight edge.

.3 Remove all excess grass clippings from the grass and planted areas after each mowing, sweep all paving and other surfaces clear of clippings.

## 3.3 LAWN REMEDIATION

.1 Examine the site. Correct all thin areas or bare patches caused by poor maintenance practices (or other reasons), such as improper watering, lack of fertilizer, incorrect cutting height, chemical or mechanical damage. Examination shall include review for compacted or thin areas resulting from pedestrian traffic. If required and as directed by the Owner start an immediate program to rectify the problem(s). Remediation shall include but not be limited to

the following: aeration, sanding/soiling, over seeding and fertilization.

.2 Remove any grass encroaching from lawn to adjoining granular path(s). Granular material shall be temporarily moved away to ensure grass roots are removed. Place granular back to the path afterwards and compact or refill as needed.

## 3.4 CLEANING OF PAVED SURFACES

.1 Maintain all pedestrian paved surfaces of the project in a clean condition. Sweep or hose off all paved surfaces after completing maintenance operations.

.2 Maintain any sports court surfaces on a weekly basis or as required and directed to ensure that leaves or other debris are removed from the court surfaces without damaging any paint or other special surfacing.

.3 Hose or power wash the surfaces to remove any spills/staining which have occurred on an annual basis. Ensure that any chemicals or stripping/stain removal agents have been reviewed and approved by the Owner prior to commencing with this work**.**

## 3.5 CLEAN-UP/LITTER REMOVAL

.1 Remove debris, equipment, materials, and waste due to work of this Section at the end of each day of work from all landscape and pedestrian areas.

.2 Keep paved surfaces clear and swept clean of debris, materials and waste from landscaping operations as required throughout the year.

.3 Remove leaves and landscape debris from all paved vehicular roadways and parking lots.

.4 SPRING CLEAN-UP - remove all debris from lawn areas, shrub and flower beds including vegetative debris or growing medium from all pedestrian paved surfaces. Place order for summer annuals as directed by the Owner (if applicable). Cultivate all planting beds and tree pits to requirements of 3.1.3.

.5 FALL CLEAN-UP - Fall clean-up includes the same operations as specified for the Spring plus disposal of leaves from the entire site. Review the site weekly through the Fall and ensure operations are completed by end of November (or as dictated by the Owner). Continue to inspect and clean the site as required at least once per month during December, January, and February.

## 3.6 IRRIGATION SYSTEM

.1 Coordinate with requirements of Section 32 80 00 Irrigation System/32 84 00 Design Build

Irrigation.

.2 Maintain the irrigation system in good operating condition. Check the system once per week during the operation season. Clean and adjust all sprinklers, valves, controllers, and other special components. Inspect the municipal connection details and backflow prevention devices annually as required by the Owner. Repair all damaged heads and/or other components resulting from the Contractors operations.

.3 Test the irrigation system, flush all lateral lines and adjust heads as required for good coverage at the beginning of the growing season. Set and adjust the timing of zones several times during the season to ensure that all areas receive adequate water to supplement the natural rainfall without over watering or creating excess run-off. Adjust controller times as required to accommodate for seasonal changes in time, fertilizer application or other specifics as dictated by the Owner.

.4 Winterize the system by blowing out all water in the irrigation system with an air compressor at the end of the growing season. Confirm exact date with the Owner. Ensure all controls/power are shut-off and all pop-up type heads are in the down position.

.5 Failure of irrigation components due to normal wear and tear, vandalism and damage by others shall be reported immediately to the Owner with an estimation of cost to repair or an instruction to contact the original irrigation subtrade to provide such a quote. Shut-off water system as required to prevent erosion damage from run-off. Water manually all landscape areas affected by loss of irrigation system until repairs have been completed Coordinate repairs to the irrigation system immediately after damage or deterioration is noticed and the quote to repair has been approved by the Owner.

## 3.7 REMOVAL OF INVASIVES

.1 Identify invasive plant species present and document in the report. Design manage program to target those species and report to the Owner.

.2 Refer to https://bcinvasives.ca/ for a list of invasive species and Best Management Practices.

.3 Remove any invasive not planted intentionally on site. Roots, seedlings and suckers from those plants shall be removed by the Contractor.

.1 Cultural/mechanical/physical methods will be used as the first choice. Cut or pull invasive using hand operated equipment where possible.

.2 Herbicides may be employed by Contractor as a last resort. Refer to 2.5 for conditions of use.

3.8 **SAMPLE LANDSCAPE MAINTENANCE REPORT**

.1 Contractor to provide landscape maintenance report including date, time, company providing the services, services provide, and any issues arising from maintenance if requested by Owner or Owner's Representative.

.2 Refer to Canadian Landscape Standard for a sample monthly report.

**LANDSCAPE MAINTENANCE MONTHLY REPORT (sample)**

Project Name/Contract No.:_____
Owner's Representative _____
Date: _____ Time: _____
Weather_____
Contractor Foreman _____
Month: _____ Size of Crew:
_____

| *Elements* | *Work completed* | *Problems requiring attention* |
|---|---|---|
| **BEDDING PLANTS**<br>-cultivation/weeding<br>-fertilization<br>-moisture content<br>-seasonal change | | |
| **SHRUBS & GROUNDCOVERS**<br>-cultivation/weeding<br>-pest and disease<br>-fertilization<br>-replace dead/dying material<br>-weed control<br>-pruning/moisture content | | |
| **TREES/**<br>**MAJOR PLANTS**<br>-pruning dead/broken branches<br>-fertilization | | |

| | | |
|---|---|---|
| -replace dead/dying material<br>-check/adjust guying/stakes<br>-weed control<br>-moisture content | | |
| **LAWN AREAS**<br>-mowing/edge trimming<br>-moisture content<br>-fertilization<br>-weed control | | |
| **PAVED/GRAVELED/ BARE AREAS**<br>-general review<br>-special maintenance/cleaning req'd. | | |
| **GENERAL COMMENTS/OTHER OBSERVATIONS**<br>-irrigation system component check<br>-irrigation winterization/start-up<br>-overly dry or too wet conditions | | |

**END OF SECTION 32 01 90**

# PART 1 - GENERAL

## 1.1 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.
2. Hot-applied joint sealants.
3. Joint-sealant backer materials.
4. Primers.

## 1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **Mackin Park Ballfield** or via phone/online if appropriate. To be decided by City of Coquitlam and according to their health and safety measures.

## 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each kind and color of joint sealant required.

C. Paving-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

## 1.4 INFORMATIONAL SUBMITTALS

A. Product certificates.

# PART 2 - PRODUCTS

## 2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Nonsag, Silicone Joint Sealant: ASTM D 5893/D 5893M, Type NS.

B. Single-Component, Self-Leveling, Silicone Joint Sealant: ASTM D 5893/D 5893M, Type SL.

C. Multicomponent, Nonsag, Urethane, Elastomeric Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use T.

D. Single Component, Pourable, Urethane, Elastomeric Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Use T.

E. Multicomponent, Pourable, Urethane, Elastomeric Joint Sealant: ASTM C 920, Type M, Grade P, Class 25, for Use T.

2.3 HOT-APPLIED JOINT SEALANTS

Classifications of sealants in this article are based on ASTM D 6690. Type I is for moderate climates and tested down to zero deg F (minus 18 deg C) with 50 percent extension. Type II and Type III are for most climates and tested down to minus 20 deg F (minus 29 deg C) with 50 percent extension. Type IV is for very cold climates and tested down to minus 20 deg F (minus 29 deg C) with 200 percent extension.

A. Hot-Applied, Single-Component Joint Sealant: ASTM D 6690, Type I.

2.4 JOINT-SEALANT BACKER MATERIALS

A. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

C. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.5 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.1 INSTALLATION OF JOINT SEALANTS

A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Cleaning of Joints: Clean out joints immediately to comply with joint-sealant manufacturer's written instructions.

C. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer.

D. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.

E. Install joint-sealant backings to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backings.
2. Do not stretch, twist, puncture, or tear joint-sealant backings.
3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

F. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:

1. Place joint sealants so they fully contact joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:

1. Remove excess joint sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

H. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

I. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.

END OF SECTION 321373

# PART 1: **GENERAL**

## 1.1 GENERAL REQUIREMENTS

.1 Refer to Division 1, General Requirements.

.2 This section of the specification forms an integral part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

## 1.2 DESCRIPTION

.1 Supply all products, labour, equipment, and services necessary to install aggregate material as indicated on the Contract Drawings

.2 Section includes:

.1 Drain Rock
.2 Granular Base under hardscape
.3 Crushed Granular Paving
.4 Edge Restraint

## 1.3 RELATED WORK

| | | |
|---|---|---|
| .1 | Cast in Place Concrete | Section 03 30 00 |
| .2 | Growing Medium | Section 32 91 13 |
| .3 | Sub Surface Drainage Systems | Section 33 46 16 |

## 1.4 SAMPLES

.1 Provide one (1) litre sample of each type of aggregate to Owner's Representative at least seven (7) days before beginning work for approval.

## 1.5 INFORMATION SUBMITTALS

.1 Product Data: For each type of product to be used.

## 1.6 QUALITY ASSURANCE

.1 Prior to the start of construction, provide a stake layout or line painting of all edges of bio-swale, dry creek for review by Owner's Representative. Stake spacing to be such that the shapes and forms of the landscape aggregate areas can be clearly seen.

.2 Protect all work from damage and protect all property from damage arising from this contract. Take every precaution necessary to avoid damage to drainage and irrigation systems, adjacent growing medium and planting.

1.7 **SITE CONDITIONS**

.1 The Contractor shall be responsible for repair of any utilities damaged in the course of work of this section.

.2 The Contractor shall coordinate all work that crosses crushed granular paving areas to ensure that appropriate sleeves are installed prior to the start of work of this section.

1.8 **APPROVED EQUALS**

.1 All items as specified or pre-approved equals. Contractor to submit equivalents at least fourteen (14) days prior to the mobilization of work under this section.

## PART 2: **PRODUCTS**

2.1 **MATERIALS**

.1 Drain Rock

.1 Size: 19mm Minus or torpedo gravel
.2 Clear crushed rock or round stone. Refer to MMCD Section 31 05 17 Aggregates and Granular Materials, for materials and execution.

.2 Granular Base under hardscape

.1 Size: 19mm Minus
.2 Clear crushed granite. Refer to MMCD Section 31 05 17 Aggregates and Granular Materials, Section 32 11 23 Granular Base for materials and execution.

.1 Crushed Granular Paving

.1 Size: 9mm Minus or torpedo gravel
.2 Shall consist of sound, durable stone particles free from clay, organic material or other deleterious matter as per ASTM C 136.

2.2 **EDGE RESTRAINT**

.1 Recycled Plastic

.1 Shall be manufactured from 100% recycled material, UV stable and capable of retaining curved or straight precast concrete unit paver installations.
.2 Acceptable Products Include:
EdgePro One by Abbotsford Concrete Products
B.E.A.S.T. by Brickstop
1”x6” Perma-Deck Plastic Lumber by Wishbone Site Furnishings
Or approved equal
.3 Edge Restraint Spike
.1 As per Edge Restraint Suppliers Specifications
.2 If Edge Restraint Supplier does not specify an acceptable spike, 300mm (12”) long, galvanized metal spikes shall be used.

## PART 3: **EXECUTION**

### 3.1 **INSPECTION**

.1 Areas of work to receive crushed granular paving shall be examined and unsatisfactory conditions reported to Owner's Representative. Commencement of work shall imply acceptance of conditions.

.2 The subgrade shall be well drained.

.3 Verify the gradients and elevations of the subgrade and base are correct to allow installation as per the details and meet the intended finished grades. Notify Owner's Representative of any discrepancies prior to proceeding with installation.

### 3.2 **SUBBASE PREPARATION ON GRADE**

.1 Excavate soft and unstable areas of subgrade that cannot be compacted to standard noted, fill and compact with approved granular material.

.2 Water heavily to full depth at a rate of 95-150 litres per 900 kg (25 – 40 gallons per ton). Randomly test for water saturation during application.

.3 Let saturated material stand for at least six (6) hours. Compact to 95% MPD using a 900 – 1,800 kg (2-4 ton) double drum roller or 450kg (1,000lbs) single drum roller.

.4 Ensure subbase is true to line and grade and allows for sufficient depth to ensure finish grade can be established as noted on plans.

.5 Place drainage geotextile over compacted subbase, overlapping ends and edges at least 300mm (12").

### 3.3 **AGGREGATES**

.1 Owner's Representative shall review site preparation prior to the placement of aggregates.

.2 Place aggregate material to lines and grades indicated on the Contract Drawings.

.3 Place aggregate material to full width in uniform layers not exceeding 150mm (6") compacted thickness. Owner's representative may authorize thicker lifts (layers) if specified compaction can be achieved.

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

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

.6 Compact to 95% MPD using plate tamping equipment. For any area that is over 3m wide, use rollers.

.7 Before compacting, the trade shall provide information about the weight, centrifugal force, and plate area of the proposed compactor. Plate compactor operator shall ensure compactor continuously moves forward at design speed, compactor shall not be permitted to operate in one spot.

.8 Compact to 95% MPD using plate tamping equipment that produces centrifugal forces 90 psi maximum (Roofstar Guarantee) over the plate area. Vibratory rollers, jumping jacks, or small hand tampers are not acceptable.

.9 Landscape boulders shall always be set on the compact base or anchored by concrete haunching, firm and steady.

.10 Ensure surface material remains moist by applying a light mist of water as required. Randomly test for water drainage during application.

## 3.4 EDGE RESTRAINT

.1 Install edge restraint to the lines and grades indicated on the Contract Drawings. Ensure straight lines are consistent and true and curved lines are continuous (faceted shapes are not acceptable).

## 3.5 CLEANING

.1 All paved areas or adjacent surfaces shall be brushed clean and excess materials shall be removed from the work site and disposed of in an approved dump location.

.2 If cracks appear in stabilized surfaces, sweep fines into crack, and tamp in place.

**END OF SECTION 32 15 40**

# PART 1: GENERAL

## 1.1 GENERAL REQUIREMENTS

.1 Refer to Division 1, General Requirements.

.2 This section of the specification forms an integral part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

## 1.2 DESCRIPTION

.1 Supply all products, labour, equipment, and services necessary to install chain link fencing as indicated in the contract documents.

.2 Description of the work:

.1 The work involves the supply and installation of chain link fencing, including but not limited to concrete, posts, rails, fabric, person gates, vehicle gates, and backstops, as per the drawings and specifications provided herein. All mesh to be galvanized and vinyl coated and to be black in colour. All other items must be powder coated black. Any item that cannot be powder coated or any exposed metal resulting from welding or other installation procedures must be painted black with a purpose suited high gloss Galvicon rust-proof coating with a minimum of two coats.

.2 The supply and install of fencing accessories including signage incorporated into the fencing and backstops.

.3 Accurate surveying and layout of the specified work program as per the specifications and drawings herein. Verify field dimensions on site prior to shipping materials.

.4 The provision of all Samples and Submittals as described in Section 1.5 herein.

.5 All work to conform to the drawings and specifications of this contract.

.7 Complete site clean-up is required upon completion of the Work.

## 1.3 RELATED WORK

| | | |
|---|---|---|
| .1 | Concrete Reinforcing | Section 03 20 01 |
| .2 | Cast in Place Concrete | Section 03 30 53 |

## 1.4 QUALIFICATIONS

.1. The prime contractor shall have a minimum of five (5) years proven record of satisfactory performance of similar size projects in the welding trade and shall show proof before commencement of work that they will maintain a crew of competent and trades qualified welders. Minimum “C” level welding ticket. When requested the Contractor shall provide a list of three comparable jobs, including name and location, specifying authority/Project Manager, start and completion dates and cost amount of the welding work.

.2 Contractor (applications) bidding work shall be approved by fencing materials manufacturer or their designate.

.3 Only competent and trade qualified welders who have a provincial or interprovincial welding certificate of qualification and who are thoroughly experienced with the material and methods specified may perform welding work. Registered apprentices may be employed provided they work under the direct supervision of a skilled trades qualified welder in accordance with trade regulations.

.4 General labour type activities may be performed by labourers and trades helpers who are thoroughly experienced with preparation procedures provided they work under the direction of a skilled trades qualified welder.

.5 Individual trade certification and apprentice registration numbers are to be presented to the Welding Inspector or their designated inspector upon request. A skilled trades qualified welder must always be present during the execution of the work.

.6 The contractor shall employ and keep on the job a qualified Charge Hand or Foreperson who is fully experienced in all aspects of chain link fence installation to industry standards. He shall also have a provincial or interprovincial welding certificate of qualification. They shall be responsible for all work and receive instructions from the Board’s representative during the absence of the contractor. This Foreperson or Charge Hand shall not be changed whilst work is in progress without the written permission of the Board or unless said Foreperson leaves the employ of the contractor.

## 1.5 SAMPLES AND SUBMITTALS

.1. Fourteen (14) days prior to the start of the work, submit a 300mm long powder-coated pipe sample that will be representative of the quality of the powder-coating for all powder-coated fencing materials installed as part of the Work.

### 1.6 Testing

.1. The surface of the posts and rails will be scratch tested to ensure the finish does not flake. Finishes that flake when scratched will be rejected.

### 1.7 REFERENCES

.1. CAN/CGSB-138.1-M80, Fence, Chain Link, Fabric.
.2 CAN/CGSB-138.2-M80, Fence, Chain Link, Framework, Zinc-Coated, Steel.
.3 CAN/CGSB-138.3-M80, Fence, Chain Link-Installation.
.4 CAN/CGSB-138.4-M82, Fence, Chain Link, Gates.
.5 CSA G164-M1981, Hot Dip Galvanizing of Irregularly Shaped Articles.
.6 ASTM A90-81, Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
.7 ASTM A53-88a, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
.8 CGSB 1-GP-181M-77, Coating, Zinc-Rich, Organic, Ready Mixed

## PART 2: MATERIALS

### 2.1 DELIVERY, STORAGE, AND HANDLING

.1 Deliver and store the products in the original manufacturer's packaging with labels intact and store the products where they will be protected from damage. Determine a suitable, Owner approved, on-site location for products.

### 2.2 FRAMEWORK

.1 All framework shall be galvanized schedule 40 structural steel pipe that meets the requirements of ASTM-A53 galvanized coating not less than 1.80 oz/s.f. (550 g/m$^2$).

### 2.3 WELDING RODS FOR SHIELDED METAL ARC WELDING (SMAW)

.1 The electrodes used in fence construction shall be low alloy, all position type that meets CAN.CSAW/483 – M 1982 specifications.

### 2.4 CHAIN LINK FABRIC

.1 Standard duty chain link fence fabric shall be minimum 9 ga. (.148") (3.76 mm) galvanized wire woven to a 2" (50 mm) diamond pattern.
.2. Heavy duty chain link fence fabric shall be minimum 6 ga. (.192") (4.90 mm) galvanized wire woven to a 2" (50 mm) diamond pattern.
.3 Non-climbable chain link fabric shall be minimum 9 ga (.148") (3.76 mm) galvanized wire woven to a 1" (26 mm) diamond pattern

.4 Minimum galvanized coating on standard, heavy and non-climbable fences shall be not less than 490 g/m² (1.60 oz/ft²)

.5 All chain link fabric to have a knuckle selvage at both ends. Knuckle to be closed or nearly closed to a measurement of less than the diameter of wire. Barb finish NOT accepted even if chain link is hung with barb finish down.

.6 All chain link fabric to be free of production oils, free of dents and bends.

.7 Diamond count for standard, heavy and non-climbable fence

| | |
|---|---|
| 4' 0" (1220 mm) standard fence | 13½ diamonds |
| 6' 0" (1830 mm) standard fence | 20½ diamonds |
| 8' 0" (2435 mm) standard fence | 27½ diamonds |
| 4' 0" (1220 mm) heavy fence | 13½ diamonds |
| 6' 0" (1830 mm) heavy fence | 20½ diamonds |
| 8' 0" (2435 mm) heavy fence | 27½ diamonds |
| 4' 0" (1220 mm) non climbable fence | 27 diamonds |
| 6' 0" (1830 mm) non climbable fence | 39 diamonds |
| 8' 0" (2435 mm) non climbable fence | 53 diamonds |

All fabrics to be vinyl coated black

## 2.5 TIE WIRE

.1 All chain link fabric ties shall be new 9 ga. (.148") (3.76 mm) hard aluminium wire.

## 2.6 TENSION BANDS

.1 All tension bands shall be industry standard hot dipped galvanized steel of an inside dimension to the post on to which they are clamped. Minimum 13 gauge in thickness and minimum ¾ in. (20 mm) width.

## 2.7 TENSION BARS

.1 Tension bar shall be continuous (unwelded) through the fabric height, hot dipped galvanized minimum 1.2 0z/ft² (366 g/m²) of zinc coated surface area 3/16" (5 mm) x ¾" (20 mm) x chain link fabric height. ¼" (6 mm) galvanized round bar for non-climbable fences.

## 2.8 POST/RAIL CAPS

.1 All post/rail caps shall be galvanized pressed steel, of identical style and with an inside diameter appropriate to the pipe O.D. which they are capping. Die cast, sand cast aluminium NOT acceptable.

## 2.9 RAILS

.1 All standard, heavy and non-climbable chain link fences shall have a top and bottom rail. All rails shall be hot dipped galvanized schedule 40, 1 7/8 (42 mm) O.D. with a minimum zinc coating of not less than 1.8 oz/ft² (550 g/m²). All rails to be welded continuous over top of line posts.

## 2.10 LINE POSTS

.1 All standard, heavy and non-climbable chain link fences shall have hot dipped galvanized schedule 40 pipe 2 3/8" (60 mm) O.D. with a minimum zinc coating not less than 1.8 oz/ft² (550 g/m²) posts set at maximum 10' 0" (3M) centres. All line post tops to be coped to accept top rail.

## 2.11 TERMINAL POSTS

.1 All standard heavy and non-climbable chain link fence terminal (end, corner and gate) posts shall be hot dipped galvanized schedule 40 pipe, 2 7/8" (75 mm) O.D. with a minimum zinc coating of not less than 1.8 oz/ft² (550 g/m²).

.1 Gates up to and including 5' 0" (1525 mm) wide panels to have 2 7/8" O.D. (73 mm) gate posts.

.2 Gates up to and including 10'0" (3050 mm) wide panels to have 3½" O.D. (89 mm) gate posts.

.3 Gates up to and including 15'0" (4572 mm) wide panels to have 4½" O.D. (114 mm) gate posts.

## 2.12 CARRIAGE BOLTS AND HEX NUTS

.1 Carriage bolts for tension bands to be galvanized steel 5/16" (8 mm) x 1¼" (32 mm).

## 2.13 TENSION WIRE

.1 Tension wire shall NOT be used.

## 2.14 FINISHES

.1 All fencing to be hot dipped galvanized and powder coated black. For fencing repair and welds contractor to provide sample finish for approval by landscape architect.

## 2.15 CHAIN LINK VEHICLE GATES

.1 The vehicle gates are not to use a centre post. The closure device is to operate by securing the gates together when in the closed position. The closure device is to operate independent of the locking pins. The closure device must accept a standard padlock

.2 The vehicle gate is to have locking pins with locking pin aluminium sleeves recessed

25mm into the concrete walkway to secure the gates in the open and closed positions. The top of the sleeve is to be flush with the surrounding concrete surface. The locking pin rod is to be spring-loaded so that the pin is always in the raised position unless pushed and turn locked into place, as per the drawings herein.

.3 The vehicle gate is to be to the full height of the fence and is not to be bridged with a top rail over it as to eliminate any restrictions on the height of objects passing through the gate.

.4 The vehicle gate is to operate on wheels which fully support the weight of the gate. The wheels must be suitable for use on concrete surfaces and must not mark the concrete surface.

.5 Vehicle gates are not to have signage inserts.

### 2.16 CHAIN LINK PERSON GATES

.1 The person gates are to use a closure device to operate by securing the gate to the gate post when in the closed position. The closure devices are to operate independent of the locking pins. The closure device must accept a standard padlock.

.2 The person gates are to have locking pins with locking pin aluminium sleeves recessed 25mm into the concrete walkway to secure the gates in the open and closed positions. The top of the sleeve is to be flush with the surrounding concrete surface. The locking pin rod is to be spring-loaded so that the pin is always in the raised position unless pushed and turn locked into place, as per the drawings herein.

.3 For the field entry gates, the gates are not to have locking pins for the open positions. Field entry gates are to be able to swing 180 degrees wide and lock open by attaching to main fence line.

.4 The person gates are to be to the full height of the fence or as specified and are not to be bridged with a top rail over them as to eliminate any restrictions on the height of objects passing through the gate.

## PART 3: EXECUTION

### 3.1 CONCRETE FOOTINGS

.1 All excavation shall be undertaken in accordance with the City of Coquitlam's Policy and Standard Operating Procedure - Soil and Excavation Water Contamination Management.

.2 All terminal and line posts for standard, heavy and non-climbable fences shall be set in a soil formed concrete footing. Each footing to be a minimum of 12" (305 mm) diameter by 36" (915 mm) deep. All concrete to be transit mixed with a minimum 25 MPA (3500 psi). Minimum pipe burial 36" (915 mm) into concrete footings.

### 3.2 JOINTS AND WELDING

.1 No fittings, other than tension bands, tension bars and dome tops shall be permitted. All joints shall be coped to a radius appropriate to the post or other member to which they are

to be welded. Crimping of pipe shall NOT be permitted. All steel dome tops to be tack welded in place.

.2 All welded joints shall be full round with the joint attaining proper penetration and professional appearance. All splashes shall be filled, chipped or rounded off. All slag shall be removed. All welded joints shall be thoroughly cleaned with Zinga solvent or equivalent and coated with two (2) coats of an approved zinc rich primer (e.g. Zinga Cold Galvanization coating to a dry film thickness of 2 mils per coat).

.3 All welds to be approved by the owner's inspector prior to the installation of the chain link fabric.

### 3.3 DRAPING

.1 All chain link fabric to be continuous vertically wherever possible. For the backstop, two lifts of 12' are acceptable.

.2 Fabric shall be taut, level and plumb.

.3 Face side of fabric to be determined by owner prior to installation to suit individual site requirements and conditions.

### 3.4 STRETCHING

.1 Every straight run of fabric shall be held in tension, by tension bar at each runs start and end. At no time shall it be permitted to stretch the fabric over a post at a change of angle in fence direction.

.2 Stretching of the fabric during installation shall be done using a tension bar properly threaded through the chain link such that the chain link is not damaged. The fence fabric shall be taut after stretching to industry standards.

.3 Tension bars to be fastened to terminal posts with tension bands spaced evenly at maximum 12" (305 mm) centres.

### 3.5 TYING

.1 Standard, heavy and non-climbable chain link fabric shall be tied as per details.

.2 All ties shall be double looped at both ends where anchored to the fabric and ends shall not constitute a safety hazard. All ties shall be made with one piece of wire. Any tie that fatigue breaks shall be removed and replaced.

.3 Fabric shall be secured to each line post as per details.

### 3.5 TOUCH UPS

.1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of black high gloss organic zinc-rich paint to damaged areas, allowing the manufacturer's recommended drying time between coats. Pre-treat damaged surfaces per

manufacturers' instructions for zinc-rich paint.

.2 Wire brush, clean, and paint all welds with two coats of high gloss zinc rich paint, allowing the manufacturer’s recommended drying time between coats. Use paint colour that matches surrounding powder-coated surfaces.

### 3.7 CLEANING

.1 Upon completion of work, the site shall be left clean and free of the cut-offs, staples, excess wire, pipe or other construction debris. Any ruts caused by equipment shall be filled and levelled to specified surface tolerances to the owner’s satisfaction.

**END OF SECTION 32 31 13**

## PART 1: GENERAL

### 1.1 GENERAL REQUIREMENTS

.1 Refer to Division 1, General Requirements.

.2 This section of the specification forms an integral part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

### 1.2 DESCRIPTION

.1 Supply all products, labour, equipment, and services necessary to install exterior site furniture as indicated in the contract documents.

### 1.3 RELATED WORK

.1 Cast-in-Place Concrete Section 03 33 00

### 1.4 REQUIREMENTS INCLUDED

.1 Furnish all labour, materials, equipment and services necessary to supply and install all site furniture.

### 1.5 GUARANTEE

.1 The Contractor hereby warrants that the supplied Site Furnishings and their installation will remain free of defects and in good condition in accordance with the General Conditions.

.2 The Contractor hereby warrants that the installation of all relocated Site Furnishings will remain free of defects and in good condition in accordance with the General Conditions.

## PART 2: PRODUCTS

**2.1 PLAYERS BENCHES:** See drawings and specific product specifications.

**2.2 DUGOUT SHELVES AND HOOKS:** See drawings and specific product specifications.

**2.3 BASE PLATE:** See drawings and specific product specifications.

**2.4 HOME PLATE:** See drawings and specific product specifications.

**2.5 BAT HOLDER:** See drawings and specific product specifications.

**2.6 WASTE RECEPTACLE:** See drawings and specific product specifications.

**2.7 BOOT BRUSH:** See drawings and specific product specifications.

**2.8 BULLPEN MATTING:** See drawings and specific product specifications.

## PART 3: EXECUTION

### 3.1 INSTALLATION

.1 Benches:

.1 Assemble and install bench in accordance with manufacturer's instructions.

.2 Bolt to concrete footing, and, or paving, as per manufacturer's specifications with 20 mm (3/4”) Galv. bolts.

.3 Touch-up damaged finishes to the acceptance of Owner’s Representative.

.2 Player’s Benches and Shelters:

.1 Assemble and install all player’s benches.

.2 Location of all benches to be confirmed by landscape architect prior to placement of imbedded posts.

.3 Touch-up damaged finishes to the acceptance of Owner’s Representative.

**END OF SECTION 32 37 00**

# 1 GENERAL

## 1.1 SECTION INCLUDES

.1 Design, labour, Products, equipment and services necessary for irrigation work in accordance with the Contract Documents.

## 1.2 REFERENCES

.1 CSA B137.3, Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications (Withdrawn, No Replacement).

.2 ASTM D1248, Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.

.3 ASTM D2466, Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

.4 ASTM D3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

## 1.3 CODES AND PERMITS

.1 All work shall be installed in accordance with the requirements of local and applicable provincial and federal regulations. Any work shown on the drawings or described in the specifications which is at variance with the regulations shall be changed to comply with the requisite authority at no cost to the City.

.2 WorkSafe BC regulations shall be followed.

.3 The Subcontractor shall be responsible for obtaining all permits and licenses required to undertake and complete the work. Include costs for required permits and approvals in tendered prices.

.4 Provide the Consultant with signed and approved copies of all required permits, including the following:
- .1 Backflow test report.
- .2 Technical Safety BC Electrical Contractor Authorization and Declaration of Compliance Electrical Inspection Request Form.

## 1.4 SUBMITTALS

.1 Provide a Certified Irrigation Contractor certificate and proof of good standing with the Irrigation Industry Association of BC or the Irrigation Association within 5 days of receipt of the Notice to Proceed.

.2 Provide FSR C-R Low Energy field safety representative certificate of qualification and Electrical Contractor License within 5 days of receipt of Notice to Proceed.

.3 Provide Backflow Assembly tester certificate within 5 days of receipt of Notice to Proceed.

.4 If required, the Subcontractor shall submit evidence of project personnel having certification in High-Density Polyethylene Butt-Fusion within 5 days of the Notice to Proceed.

.5 The Subcontractor shall submit Shop Drawings for approval by the Consultant prior to construction. Shop Drawings of the irrigation system are required for all aspects of the irrigation system not included in the Drawings. This includes but is not limited to:
- .1 Revisions to irrigation system design not previously addressed in Contract Documents, including revisions to irrigation system design which markedly alter the original design, as determined by the Consultant.
- .2 Installation details for irrigation components are not addressed in the Contract Documents.
- .3 Details are required by the consultant for the review of proposed substitutes.
- .4 Tasks identified in project specifications as requiring a Shop Drawing.
- .5 Submit shop drawings to the consultant for review, comment, approval, or rejection.

.6 The Subcontractor shall submit product literature for approval by the Consultant prior to the start of construction.

.7 Provide Electrical Installation Permit and Electrical Contractor Authorization and Declaration of Compliance Electrical Inspection Request upon permit issuance.

.8 Submit a complete set of Record Drawings to the Consultant prior to the issuance of a Certificate of Substantial Performance. Submit a digital copy in .pdf and .dwg format, hard copies in full and half-sized, and a half-sized laminated copy in the controller cabinet.

.9 Submit the complete Operating Manual to the Consultant prior to issuance of Substantial Performance. Provide one (1) hard copy in a binder and one (1) digital copy.

.10 Submit a written guarantee to the Consultant prior to issuance of Substantial Performance.

## 1.5 IRRIGATION RECORD DRAWINGS

.1 Maintain accurate scaled records of the installed irrigation system and its components on a marked-up set of Contract Documents daily during Construction. Show all deviations from the Contract Drawings. Make marked-up Contract Drawings available to the Consultant upon request.

.2 For sports fields and large parks, retain a qualified survey instrument operator to record the exact locations of all installed irrigation components, including changes of pipe direction.

.3 The Record Drawings shall be submitted within 14-days of issuance of Substantial

Performance. Submit one (1) full-sized copy, one (1) half-sized copy, and one (1) half-sized laminated copy. Submit digital copies in .pdf and .dwg format with the digital submission of the Operating Manual.

.4 The Record Drawings must clearly and legibly show all components of the irrigation system as installed, including wire splices. The Record Drawings must include the following:
- .1 Identify each zone numerically, complete with precipitation rate and GPMs per zone.
- .2 Scale and north arrow.
- .3 Legend of all equipment installed, complete with make and model of each product.
- .4 Date of installation.
- .5 Irrigation watering schedule.

.5 The Subcontractor shall maintain the as-built record drawing throughout the maintenance and warranty period and issue a revised as-built Irrigation Drawing at Final Acceptance if any changes are made. The as-built drawings shall be certified by the landscaping subcontractor as being an accurate record of the installation.

## 1.6 OPERATING MANUAL

.1 Prepare a complete Operating Manual for the installed irrigation system. The Operating Manual shall be submitted within 14-days of issuance of Substantial Completion. The content of the Operating Manual must include:
- .1 Product literature and warranty documentation
- .2 Equipment operating instructions.
- .3 Maintenance instructions, including spring start-up and winterization procedures.
- .4 Copies of all irrigation inspection reports and test results.
- .5 Copies of the backflow test report and Electrical Permit.

.2 A written guarantee statement covering workmanship and materials shall be provided to the City for at least one (1) year from the date of Substantial Performance. The Subcontractor shall warranty maintenance on the system for at least one (1) year, including but not limited to spring start-up, adjustments and maintenance operations as required, and winterization. The Subcontractor will also attend a warranty inspection before handover.

## 1.7 QUALITY ASSURANCE

.1 The Subcontractor performing this work shall be a "Certified Irrigation Contractor," having met the certification standards established by the Irrigation Industry Association of British Columbia or the Irrigation Association and having experienced, trained, and insured personnel qualified for the scope of work.

.2 Be certified as a Class C-R Low Energy field safety representative (FSR) registered with Technical Safety BC as an Electrical Contractor.

.3 If the design involves High-Density Polyethylene Pipe (HDPE), the Subcontractor

shall be certified in High-Density Polyethylene Butt-Fusion as certified by the British Columbia Institute of Technology or approved equivalent.

.4 Manufactured products, including but not limited to irrigation heads, quick couplers, controllers, valve boxes and valves, will be warranted as per the manufacturer's standard warranty period or a minimum of one (1) year, whichever is greater.

.5 The double-check valve assembly and meter shall be installed and tested by a certified and licensed backflow tester with B.C.W.W.A.

.6 All electrical components or products specified or used in the construction of the proposed irrigation system must be CSA-approved and installed in accordance with all local, provincial, and national electrical codes.

.7 All materials are to be new and without flaws.

.8 The completed irrigation system is to efficiently and uniformly irrigate all areas and perform as required by these specifications.

.9 A written guarantee of the installed irrigation system shall be provided to the City covering workmanship and materials for at least one (1) year from the date of substantial completion. The Subcontractor shall warranty maintenance on the system for at least one (1) year, including but not limited to spring start-up, adjustments and maintenance operations as required, and winterization.

## 1.8 TESTS AND INSPECTIONS

.1 Inspection and testing of components will be required at various milestones during construction to ensure the irrigation system's performance meets expected standards.

.2 Provide equipment and personnel necessary for the performance of inspections and tests.

.3 The Subcontractor shall provide a minimum of 3-days' notice to the Consultant of required inspections.

.4 Conduct all inspections and tests in the presence of the Consultant and request the Consultant issue a signed report to the Subcontractor within three days regarding each test result.

.5 Keep work uncovered and accessible until successful completion of inspection or test.

.6 As a condition of issuance of a Certificate of Substantial Performance, confirm in writing to the Consultant the following inspections and successful tests:

- .1 Backflow prevention test.
- .2 Point of Connection Inspection.
- .3 Mainline Inspection.
- .4 Mainline pressure test.
- .5 Mainline pressure test.

.6 HDPE pipe strap test.

.7 System installation inspections shall be held regularly.

.8 Backflow Assembly Test:
- .1 Conduct backflow prevention assembly test as per BC Water Works Association standards using qualified personnel.
- .2 Conduct backflow upon backflow assembly installation and submit the report to the Consultant.

.9 POC Inspection:
- .1 Inspect the point of connection. Inspect all components, connections, wire splices, supports, and sizing.
- .2 Call for inspection upon completing the installation of the point of connection.

.10 Mainline Inspection:
- .1 Inspect the mainline trench, depth, sand bedding, welds, connections, caution tape, and wire.
- .2 Call for inspection once 50% of the mainline is installed.

.11 Mainline Pressure Test:
- .1 Perform mainline pressure test to identify potential leaks and ensure mainline can operate at design pressure and maintain pressure.
- .2 Conduct mainline pressure test before backfilling of mainline.
- .3 Fill the mainline with water and expel all air from the pipe. Maintain water in the pipe for 3 hours.
- .4 Subject mainline to hydrostatic pressure of 120psi or twice the optimum design pressure of the mainline and not to exceed 160psi.
- .5 Stop the make-up water supply from going to the mainline and record hydrostatic pressure.
- .6 Visually inspect mainline and fittings for leaks.
- .7 Record hydrostatic pressure in the mainline 3 hours after the supply of make-up water stopped.
- .8 The test result is determined based on the difference in recorded pressures at the beginning and end of the test. A 5% difference or less is considered a pass.
- .9 Identify the source of the leak and replace all defective material and workmanship as necessary to eliminate the leak.
- .10 Repeat the mainline pressure test and make replacements as necessary until a passed result is achieved.

.12 System Coverage and Operation Test:
- .1 Conduct coverage and operation tests after installation and operation of the complete irrigation system. Conduct inspection to confirm that:
  - .1 Head spacing does not exceed the distances shown on Contract Drawings, and head-to-head coverage is achieved.
  - .2 Where applicable, irrigation piping should be installed to follow the contours of the land to minimize low-head drainage situations.
  - .3 Heads, boxes, vaults, and trenches are at a specified elevation

relevant to the finished grade and are not subject to settlement or lifting.

.4 Valves are installed with the required clearances, materials, products, and connections.

.5 All irrigation components are installed with all required clearances, materials, products, and connections.

.2 Conduct operational tests to verify that:

.1 The controller can be programmed manually and remotely via the City's central control system.

.2 The controller can send and receive communication with the City's central control system 10 consecutive times without a missed communication.

.3 The controller responds to the flow sensor.

.4 Operating pressure is within design parameters.

.5 Each zone can be operated automatically and in succession via the programmed controller.

.6 There is no overspray onto different control zones, hard surfaces, or other improvements.

.13 Dripline Emitter Test:

.1 Perform inspection and testing of the dripline/emitter manifold and lines to identify potential leaks and confirm that the manifold, driplines, and emitters can operate at design pressure. Conduct inspection and testing prior to backfilling the manifold, driplines, or emitters.

.2 Fill the manifold and lines with water at operating pressure and maintain pressure for 15 minutes. Visually inspect the manifold, driplines, and fittings for leaks. Confirm that emitters are functioning correctly. Identify sources of leaks and replace all defective materials and workmanship as necessary to eliminate the leak.

.3 Repeat inspection and testing and make replacements as necessary until no further leaks are identified.

.14 HDPE Pipe Strap Test:

.1 Conduct an HDPE pipe strap test at least 1 hour after the fusion weld has been made before backfilling of HDPE pipe on those fusion welds where, upon visual or tactile inspection, the bead does not roll back properly or is inconsistent in height or width.

.2 HDPE pipe strap consists of:

.1 Cut fusion weld from pipe, allowing 200mm on either side of weld to work with.

.2 Cut pipe lengthways through fusion weld to create a strap 25mm wide.

.3 Bend strap back on itself.

.4 If weld breaks repeat test on another fusion weld, chosen by the Consultant. If second fusion weld fails, then all welds become suspect, and the HDPE pipe cannot be installed until the reason for the fusion joint failures is determined.

.5 If the fusion weld does not break, then the weld is acceptable, and no further testing of similar welds is required.

.6 Replace or repair the tested pipe strap.

.15 Vault Drainage Test:
- .1 Conduct vault drainage test when the vault is installed and backfilled.
- .2 Plug the drain, fill the vault with water to a depth of 300mm, and leave the water to drain.
- .3 Determine the test result based on the time required for the water to drain. To pass this test, the water must drain in 60 minutes or less.

## 1.9 SUBSTITUTIONS

.1 Where materials are specified by brand name and model number, such specifications shall be deemed to facilitate a description of the materials and material quality and shall establish a standard for performance and quality against which proposed substitutes shall be evaluated.

.2 Substitution requests shall not be considered unless submitted in writing with sufficient descriptive literature and product samples to permit product comparison.

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.3 All product substitutions shall be equal to or greater than the original design in performance, value, and water efficiency. All proposed sprinkler substitutions must be accompanied by verifiable water efficiency performance data provided by the manufacturer or an independent industry source such as the Centre for Irrigation Technology (CIT), Fresno.

.4 Alternate materials shall match the specified materials in performance, flow, and pressure loss so as not to compromise the intent of the design.

.5 The consultant's written approval is required for the use of materials different from those shown in the design. Materials installed that have not been preapproved by the Consultant are subject to removal and replacement with approved materials at the Subcontractor's expense.

.6 Substitution requests by the Subcontractor shall have no impact on Milestone Dates.

## 1.10 SITE CONDITIONS

.1 Verify the existence and location of all underground utilities and services before the commencement of the work.

.2 Consult with the Consultant to adjust the design, if necessary, to suit existing site conditions and grades before the work commences.

.3 Ensure that sequencing of irrigation work is carried out in coordination with the work of other trades and that sleeves, wire, pipes, valves, and other equipment are installed when appropriate.

.4 Plan, schedule and execute work to ensure a water supply is available for landscape establishment and maintenance purposes at the appropriate time, in adequate amounts, and operating at design pressures to ensure satisfactory irrigation of all landscaped areas.

.5 Report to the Consultant in writing any conditions or defects encountered on the site during or before construction upon which the work of this section depends and which may adversely affect its performance.

.6 Protect existing landscape features, plant material, structures, irrigation work in progress, and the work of other trades from damage.

## 2 PRODUCTS

### 2.1 ELECTRICAL PRODUCTS

.1 All electrical products shall be CSA-approved and bear the CSA label. Alternatively, where a product does not bear the required CSA label, it shall be approved in writing by the authority having jurisdiction.

.2 The wiring conduit shall be a Grey PVC DB2 non-metallic electric conduit, as shown on the drawings, with a minimum diameter of 50 mm.

### 2.2 ELECTRICAL SERVICE AND METER

.1 Unless already installed or otherwise required by the electrical utility having jurisdiction over the site, provide a metered electrical service, including but not limited to:
- .1 Electrical permit.
- .2 Electrical meter.
- .3 Establish and verify the electrical account with the appropriate utility provider.

.2 The type and size of electrical service are to be specified in the contract drawings.

.3 Unless specified otherwise, an electric meter is to be supplied and installed according to the electrical utility's standards and specifications.

### 2.3 IRRIGATION CONTROLLER

.1 Acceptable controllers are the Toro DXi Central Control Assemblies series. Refer to the design for specific models.

.2 The controller must include a Toro M8C cellular Kit with an antenna.

.3 Where power is not available, acceptable battery-operated controllers are:
- .1 Rain Bird ESP-BAT-BT
- .2 Toro Tempus DC Series

### 2.4 CONTROLLER CABINET

.1 Acceptable controller cabinets include the following:
  .1 DXi Stainless Steel Wall Mount Cabinet.
  .2 DXi Stainless Steel Pedestal Type 1.
  .3 Or as shown on the Contract Drawings.

## 2.5 CONTROL WIRE

.1 The control wire from the irrigation controller to the electric control valve is to be a minimum of #14-gauge, with direct burial and type TWU-40 wire. It may be any colour other than white, blue, purple, or red.

.2 The common wire from the irrigation controller to the electric control valve must be a minimum #14-gauge direct burial, type TWU-40 wire, and white in colour.

.3 The master valve wire from the controller to the valve must be a minimum #14-gauge direct burial, type TWU-40 wire, and it must be red in colour.

.4 The spare control wire is to be blue in colour.

.5 Spare common wire to be white in colour.

.6 All connectors will be new, two-step, CSA-approved for watertight applications and assembled according to the manufacturer's recommendations.

## 2.6 TWO-WIRE CONDUCTOR

.1 The Paige Electric P7350D shall be used to communicate between the controller and the field decoders at the electric control valves.

.2 Single conductor spare decoder wire shall be CSA-approved #14 AWG Blue.

.3 All control wires installed shall use a Polyethylene outer jacket.

.4 All connectors are to be new, two-step, CSA-approved for watertight applications and assembled according to the manufacturer's recommendations.

## 2.7 GROUNDING AND BONDING

.1 Ground assembly consists of CSA and BC Electrical Code-endorsed products per the irrigation controller manufacturer's recommendations for grounding.

## 2.8 WIRE SPLICE BOXES

.1 The wire splice box, matching lid, and extensions are to be commercial grade and grey in colour. The wire splice box is to have a locking overlapping lid with a stainless steel bolt locking device and appropriate washers.

## 2.9 WATER SERVICE AND METER

.1 Unless already installed or otherwise required by the water utility having jurisdiction over the site, provide a metered water service, including but not limited to:
  .1 Permit.
  .2 Backflow prevention assembly.
  .3 Establish and verify water accounts with the appropriate utility provider.

.2 Supply and install a water meter in accordance with the requirements of the water utility.

.3 Conform water meter size to mainline diameter and allow for minimal pressure losses.

## 2.10 VAULT AND LID

.1 Refer to Contract Drawings for acceptable vaults and lids for point-of-connection components.

.2 Lids to have recessed hinges and locking hardware.

## 2.11 VAULT DRAIN

.1 Perforated Schedule 40 PVC pipe, 100mm diameter with threaded inlet cover having 13mm grated openings.

## 2.12 BACKFLOW PREVENTION ASSEMBLY

.1 Acceptable double-check valve assemblies are:
  .1 Watts Series 007 Double Check Valve Assembly.
  .2 Apollo 4A-100 Double Check Valve Assembly.

## 2.13 FLOW SENSORS

.1 Flow sensors are to be PVC, sized to match system low and high flows. Acceptable flow sensors are:
  .1 Toro TFS-050.
  .2 Toro TFS-075.
  .3 Toro TFS-100.
  .4 Toro TFS-150.
  .5 Toro TFS-200.
  .6 Toro TFS-300.
  .7 Toro TFS-400.

.2 Acceptable wires for the flow sensor shall be shielded, direct burial communication cable and include the following:
  .1 Regency Wire PE-39 Communication Cable.
  .2 Paige Electric P71R2D.
  .3 Approved equal.

## 2.14 MASTER VALVE

.1 Acceptable master valves are as follows:
.1 Rain Bird PEB Series.
.2 Toro P220 Series.

.2 Master valve to be sized to maximum and minimum flow parameters as shown on Contract Drawings.

## 2.15 PRESSURE REDUCING VALVE

.1 Acceptable water pressure-reducing valves are Watts Series 25AUB-Z3.

## 2.16 BLOW-OUT ASSEMBLY

.1 Blowout assembly to consist of a tee with a 25 mm ball valve with a plug.

## 2.17 QUICK-COUPLING VALVE

.1 Acceptable quick coupling-valves are as follows:
.1 19mm Rain Bird 3-RC.
.2 25mm Rain Bird 5-RC.

## 2.18 GATE VALVE

.1 For gate valves sized up to 50mm, acceptable gate valves include the following:
.1 Red White #280.
.2 Toyo #206A.

.2 Acceptable gate valves that are sized greater than 50 mm are as shown on Contract Drawings.

## 2.19 POLYVINYL CHLORIDE (PVC) PIPE

.1 Conform to CSA B137.3.

.2 New condition, extruded from virgin, high impact materials, solvent weldable with belled ends, continually and permanently marked showing manufacturer's name, material, size, and pressure rating.

.3 Acceptable PVC pipe to be as follows:
.1 Class 200 PVC.
.2 Schedule 40 PVC.

## 2.20 POLYETHYLENE (PE) PIPE

.1 New condition Series 100, in new condition, extruded from virgin materials, continually and permanently marked showing manufacturer name, material, size, and pressure rating.

## 2.21 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

.1 New condition CSA Approved, extruded from virgin materials, continually and permanently marked showing manufacturer's name, materials, size, and pressure rating.

.2 Material to be listed by the Canadian Standards Association (CSA) and Plastic Pipe Institute (PPI) as a PE-3408 resin with a hydrostatic design basis (HDB) of 1600 psi for water at 231C. Material to comply with ASTM D1248 as a Type III Class C, Category 5, Grade P34 material and with ASTM D3350 as a 345434C cell material.

.3 Acceptable HDPE pipe is dependent on operating pressure and to have Standard Density Ratios (SDR) as follows:
.1 Max. pressure up to 100psi: SDR 17.0.
.2 Max. pressure exceeding 100psi: SDR 11.0.

## 2.22 SLEEVING

.1 Schedule 40 PVC for irrigation sleeve in a bored hole or under the hard surface.

.2 Irrigation sleeve diameter is to be a minimum of 50mm or twice the diameter of the pipe running through it, whichever is greater.

.3 Control wire conduit to be a minimum of 50mm diameter CSA Approved electrical conduit.

## 2.23 FITTINGS

.1 New condition Schedule 40 PVC is conforming to ASTM D2466 standards and is of the same material as the pipe. Fittings are to be designed for solvent welding to PVC pipe except where valves and risers require threaded joints.

.2 Nipples are to be threaded Schedule 80 PVC and manufactured from the same material as pipe.

.3 At the point where the supply source changes from metal to PVC pipe, the metal end of the pipe must be an FIPT (female) adapter and the PVC fitting a MIPT (male) adapter.

.4 Flange couplers may be used upon approval of the Consultant.

.5 The fittings for the LDPE pipe are to be Spears insert fittings complete with stainless steel gear clamps.

.6 Fittings for HDPE pipe to be butt fusion type for end-to-end joints.

.7 The SDR rating of HDPE fittings must match the SDR rating of the HDPE pipe specified.

.8 HDPE pipe fittings are to be moulded or fabricated by the pipe manufacturer. HDPE

pipe fittings and flange adapters made by contractors or distributors are prohibited.

.9 Fittings for dripline and drip emitters to be compatible with specified dripline or emitter and as recommended by the manufacturer.

.10 All pipes and fittings installed in the irrigation vault are to be Schedule 80 per Drawings.

## 2.24 PIPE SOLVENT AND PRIMER

.1 PVC pipe solvent and primer combinations are recommended by the manufacturer and suitable for use with specified materials and applications.

.2 Use solvent and primer as directed by the manufacturer. Use only solvent and primer that meets local codes.

.3 The use of wet and dry solvents and primers is prohibited.

## 2.25 VALVE BOXES

.1 Acceptable irrigation valve boxes are:
- .1 Rain Bird VB Series Valve Boxes.
- .2 NDS Pro-Spec Series.

.2 Valve box and matching T Cover Lid and extensions to be commercial grade and green in colour.

.3 The valve box is to have a locking lid with a stainless steel bolt locking device and appropriate washers.

## 2.26 ELECTRICAL CONTROL VALVE

.1 Acceptable electric control valves are:
- .1 Rain Bird PEB Series.
- .2 Toro P-220 Series.

.2 Size the electric control valve in accordance with the valve manufacturer's recommendations for the design flow.

## 2.27 SWING JOINT ASSEMBLY

.1 Acceptable swing joint assemblies for sprinklers flowing up to 8 gpm:
- .1 Rain Bird SA Series Swing Assembly.

.2 For sprinklers flowing greater than 8gpm, use swing joints with three (3) threaded Schedule 40 PVC elbows and one threaded Schedule 80 PVC nipple.

.3 The length of the nipple shall be such a length to permit the installed head or valve to be set as specified.

.4 The diameter of the nipple to match the inlet for the valve or head is shown on the Contract Drawings.

## 2.28 SPRINKLERS - SPRAYHEADS

.1 Acceptable sprayhead sprinklers are as follows:
- .1 Rain Bird 1806-SAM-PRS, 1806-SAM-P45, 1812-SAM-PRS, 1812-SAM-P45 Series.
- .2 Rain Bird RD1800 Series Spray Heads.

.2 Acceptable nozzles are Rain Bird MPR fixed arc nozzles. Where fixed arc nozzles do not fit the desired irrigated area, use Rain Bird HE-VANs.

## 2.29 SPRINKLERS - ROTORS

.1 Acceptable rotors are as follows:
- .1 Rain Bird 5004-+-SAM-R Series.
- .2 Rain Bird Falcon 6504 Series.
- .3 Rain Bird 8005-SS Series for sports field applications.
- .4 Rain Bird 8005.

## 2.30 ROOT WATERING SYSTEM

.1 Acceptable root watering systems are Rain Bird RWS Series, and the size and depth are specified on the contract drawings.

.2 Root watering systems shall be outfitted with a Rain Bird RWS-SOCK when installed.

## 2.31 DRIP ZONE KITS

.1 Acceptable drip zone kits are as follows:
- .1 0.3 to 20 GPM: Rain Bird XCZ-100-PRB-COM.
- .2 15 to 40 GPM: Rain Bird XCZ-150-LCS.

## 2.32 FILTERS

.1 Acceptable filters are as shown on the Contract Drawings.

.2 Filter to be commercial grade appropriate for designed flow rates and manufactured by Rain Bird.

## 2.33 LANDSCAPE DRIPLINE

.1 Acceptable driplines are as follows:
- .1 Rain Bird XFD On-Surface Dripline.
- .2 Rain Bird XFS Sub-Surface Dripline.
- .3 Rain Bird XFS-CV Dripline.

## 2.34 DRIP EMITTERS

.1 Acceptable emitters are Rain Bird Xeri bugs, sized as shown on Contract Drawing.

**2.35 LATERAL FLUSH ASSEMBLY**

.1 Ball valve with a street elbow on swing joint assembly complete with Rain Bird VB10RND valve box.

**2.36 AIR RELIEF VALVES**

.1 Acceptable air relief vales are Rain Bird ARV050 Air/Vacuum relief valves.

**2.37 THRUST BLOCK**

.1 Thrust blocks to be 20MPa at 28-day strength. Thrust blocks can be either:
.1 Poured in place concrete.
.2 Pre-cast concrete block.

**2.38 BACKFILL MATERIAL**

.1 Native excavated material shall be clean excavated soil, free from organic matter, stones larger than 25mm, building debris, and other foreign substances.

.2 Sand: pit run sand.

**3 EXECUTION**

**3.1 EXAMINATION**

.1 Report existing conditions at variance with Contract Drawings to the Consultant.

.2 Verify locations of underground utilities before commencing excavation and conduct work to prevent interruption and damage to services and utilities. Make good all damages to same at Subcontractor's cost.

.3 Verify the location of all services in building walls before boring or drilling holes. Make good all damages to same at Subcontractor's cost.

.4 Protect existing conditions and complete work from disturbance during work. Make good all damages to same at Subcontractor's cost.

.5 Adjustments to the irrigation system installation to avoid existing conditions, completed work, and utilities will be permitted subject to prior approval by the Consultant.

**3.2 LAYOUT**

.1 Locations of irrigation components shown on plans are schematic in nature. Coordinate the actual location of irrigation components with landscaping, building

and physical features of the site. Confirm proposed changes to the location of irrigation components in writing with the Consultant before installation. Changes that markedly alter the irrigation design, in the consultant's opinion, require the submission of Shop Drawings and an updated Design Report to the Consultant for their permission to proceed. Record all approved revisions on a marked-up set of Contract Drawings.

.2 Layout and stake irrigation system per Contract Drawings to confirm:
- .1 The layout is within the project boundary and property lines.
- .2 Site grades are consistent with Contract Drawings.
- .3 Damage to the root system of existing trees is minimized.
- .4 Installation of irrigation components to be a minimum of 1 meter outside the dripline of existing trees.
- .5 Minimum horizontal and vertical clearances from electrical and other utilities are met.
- .6 Location of all sleeving, mainlines, pedestals, vaults, valve boxes, and splice boxes.

## 3.3 EXCAVATION

.1 Excavate to ensure depth and bedding requirements are met.

.2 All excavation is unclassified. Report any material or site condition that cannot be excavated by normal mechanical or normal means, or that may affect excavation to the required depth to the Consultant before excavation.

.3 Identify and recycle all suitable materials recovered during construction.

.4 Remove and dispose of buried debris exposed during excavation, including decommissioned irrigation materials and underground utilities, which may impede the proper installation and operation of the irrigation system.

## 3.4 IRRIGATION CONTROLLER

.1 Install irrigation controller in the cabinet as per Contract Drawings.

.2 Coordinate controller installation with other electrical components.

.3 Install controller and wiring in accordance with local, provincial, and national electrical codes.

.4 Install communication components per the manufacturer's recommendations and establish communication between the controller and the City's Central Control System, including relays or boosters as necessary.

.5 Before issuance of Certificate of Substantial Performance, request irrigation program from the Consultant and set controller program accordingly.

## 3.5 CONTROLLER CABINET

.1 Install the controller cabinet in the location shown on Contract Drawings or in an alternate location approved or directed by the Consultant.

.2 Orient alignment of the controller cabinet as approved by the Consultant, to provide optimal observation of the irrigation system in operation.

.3 Install the controller cabinet using a poured-in-place concrete pad mount.

.4 Provide electrical service to controller cabinet as shown in Contract Drawings.

## 3.6 CONTROL WIRE

.1 Install control wire per code by qualified personnel employed by the company holding the electrical permit.

.2 Bury control wire per applicable code and in no case above the bottom side of the parallel pipe.

.3 Bed control wire in sand with a minimum of 50 mm sand around the control wire. Where the control wire is in the same trench as the pipe, place the wire beside the pipe with a horizontal clearance of a minimum of 50 mm and in accordance with BC Electrical Code depth.

.4 Bundle multiple lengths of wire in the same trench or conduit with ties at a maximum of 3.0m intervals.

.5 Install wire with 600 mm length of coiled slack at all direction changes, in wire splice boxes and at connections to controlled components.

.6 Identify all control wires entering the controller cabinet with a permanent label or tag indicating the zone number of the valve operated by each control wire.

.7 Maintain consistent wire colour through wire splice box.

.8 Minimize wire splices. Where wire splices are unavoidable, make splices only in the wire splice box using a specified connector.

.9 Identify spliced wire with permanent label or tag indicating zone number of the spliced control valve.

.10 Where specified on Contract Drawings, install extra control wire to wire splice box. Provide 600 mm of coiled slack of each wire end in the wire splice box. Identify extra control wire as 'extra' wire with a permanent label or tag.

## 3.7 GROUNDING AND BONDING

.1 Install ground assembly in the location shown on Contract Drawings or the revised location approved by the Consultant.

.2 Use the rod, plate and wire configuration as recommended by the manufacturer of the irrigation controller and per BC Electrical Code.

## 3.8 WIRE SPLICE BOX

.1 Where possible, locate the wire splice box in the planting bed for ease of access, maintenance, and testing.

.2 Install the wire splice box per the drawings and arrange it neatly and in an orderly manner.

.3 Do not install valves in the wire splice box.

.4 The wire splice box is to be a Rain Bird VB10RND valve box.

## 3.9 WATER SERVICE AND ACCOUNT

.1 Establish a water utility account and obtain permits and approvals necessary to install and operate irrigation systems.

.2 Review regulations and restrictions imposed by applicable water utility with a Certified Irrigation Designer and advise the Consultant of any regulations or restrictions that will affect the operation of the proposed irrigation system. Provide the Consultant with the options necessary to respond to any regulations or restrictions affecting the operation of the proposed irrigation system.

.3 Coordinate with water utility as required to confirm availability, suitability, and location of an acceptable service connection.

.4 Isolate water service before installation of any irrigation components.

.5 Install water service to the point of connection. Refer to City requirements for irrigation water service.

## 3.10 VAULT AND LID

.1 Install vault in location on Contract Drawings or in an alternate location approved or directed by the Consultant.

.2 Support and brace point of connection components, piping and valves within the vault using adjustable aluminum pipe stands complete with riser, pipe clamps, base plate, and stainless-steel fittings in the quantity per service size indicated as follows:
- .1 19 mm: 2 supports.
- .2 50 mm: 3 supports.

.3 64 mm and greater: 3 supports per vault.

.3 Use Schedule 80 Pipe and fittings for inside vault and extend outside the vault a minimum of 300mm beyond the vault.

.4 Connect PVC and metal pipes using male threads on PVC and female threads on metal pipes.

.5 Install vault drain and connect to drain pit, dry well, manhole or catch basin.

## 3.11 VAULT DRAIN

.1 The vault drain consists of a minimum of 2m3 of 25mm drain rock wrapped in landscape fabric.

.2 The pipe from the vault shall have a minimum of 0.5% slope from the vault to the drain pit.

## 3.12 BACKFLOW PREVENTION DEVICE

.1 Install the Double Check Valve Assembly (DCVA) in a lockable concrete vault or a locked mechanical room, per the Contract Drawings.

.2 Install the backflow prevention assembly in accordance with all applicable codes and bylaws and the current Cross Connection Control Manual Accepted Procedure and Practice (BCWWA).

.3 Support backflow prevention assembly with specified supports per the manufacturer's recommendations for locations of the support points.

## 3.13 FLOW SENSOR

.1 Install flow sensor in the location specified by Drawings.

.2 The flow sensor wire is to run continuously, with no splices, between the flow sensor and irrigation controller.

.3 There must be an unrestricted pipe for at least 10x the pipe's diameter upstream and 5x the pipe's diameter downstream of the tee.

.4 Follow the manufacturer's recommendations for the installation of a flow sensor and wiring.

## 3.14 MASTER VALVE

.1 Install master valve per Contract Drawings.

## 3.15 PRESSURE REDUCING VALVE

.1 Install a pressure-reducing valve as shown on Contract Drawings.

## 3.16 BLOW-OUT ASSEMBLY

.1 Install the blow-out assembly immediately in a vault at the point of connection. If the point of connection is inside a building, install the blow-out connection immediately downstream of the isolation valve where the mainline pipe exits the building.

## 3.17 QUICK COUPLERS

.1 Install in valve box per manufacturer's recommendations and Contract Drawings.

## 3.18 GATE VALVE

.1 Install in valve box per manufacturer's recommendations and Contract Drawings.

.2 Where points of connections are located within a building, install an isolation valve immediately downstream of where the pipe exits the building, in a rectangular valve box.

## 3.19 PIPES AND FITTINGS

.1 Verify that all pipes, fittings, primer, and cement are compatible for proper installation.

.2 Do not locate the open side of the trench any closer than 300 mm from the hard surface or feature.

.3 Keep the inside and outside of the pipe and its ends clean at all times. Cap or plug open pipe ends to keep out dirt and debris.

.4 Cut PVC pipe ends at a right angle to pipe length, and clean burrs before joining pipe and fittings.

.5 Immediately before joining pipe and fittings, wipe contact surfaces clean with primer.

.6 Apply a light coat pipe of cement on the inside of the fitting and a heavier coat on the outside of the pipe. Insert the pipe into the fitting and give a quarter turn to seat cement. Wipe excess cement from outside of the pipe.

.7 Consultant reserves the right to request that the Contract remove and replace any solvent weld joints that are

.8 Wrap male threads of threaded fittings with a minimum of 3 wraps of Teflon tape immediately prior to making a connection.

.9 Flush all irrigation pipes fully to remove accumulation of dirt and debris before installation of heads, dripline, emitters, and filters. Flush all laterals in a manner approved by the manufacturer to prevent clogging of screens, nozzles, and emitters.

.10 Conduct mainline pressure test and HDPE pipe strap test and obtain approval from the consultant before backfilling lines.

.11 Sidewall fusion of HDPE is not acceptable.

.12 Set mainlines and laterals on and backfill them with sand to the clearance limit shown on the drawings.

.13 Install thrust blocks at all changes in the direction of PVC pipe 64mm in diameter or greater and for any change in the direction of gasketed pipe.

.14 Install lateral piping at a depth of 300 mm to 600 mm (12" to 24").

.15 Install mainline piping at a depth of 450 mm to 800 mm (18" to 32").

## 3.20 SLEEVING

.1 Install irrigation sleeves in locations shown on Contract Drawings.

.2 Install irrigation sleeve to depth as follows:
- .1 Mainline Piping:
  - .1 600 mm below walkways
  - .2 900 mm below driveways, roads and plazas
- .2 Lateral Piping:
  - .1 300 mm below walkways
  - .2 600 mm below driveways, roads and plazas

.3 Install sleeves to extend 1.0 m past the edge of the hard surface into the soft landscape surface.

.4 Cap sleeve with removable plug or cover. Maintain plug in sleeve until the pipe or wire is ready to be installed.

.5 Bed sleeves as follows:
- .1 Under walkways, 100 mm of sand is placed all around.
- .2 Under driveways, roads, and plazas, compacted base aggregate all around per materials shown on Drawings.

.6 Bury a piece of detectable metal on top of each end of the sleeve to enable the location of the sleeve end by a metal detector after burial.

.7 Stake location of each end of the sleeve prior to backfilling such that the top of the stake is 300 mm above finished grade and maintained. Label the exposed end of the stake with the word "sleeve".

.8 Record the location of sleeve ends and label the size of the sleeve on record drawings.

.9 Remove the sleeve stake after submitting the Record Drawings.

## 3.21 VALVE BOXES

.1 Install manual and electric control valves, control zone kits, and quick coupler valves in valve boxes or concrete vaults, as shown on the Drawings.

.2 Except as shown otherwise on Contract Drawings or approved otherwise by the Consultant, locate valve boxes in planting beds and locate for ease of access, maintenance, and testing.

.3 Install the valve box flush with the finish grade and arrange it in a neat and orderly manner.

.4 Provide a minimum 50 mm clearance between the valve box and all components within.

.5 The valve box must not contact the irrigation pipe. Use 300mm height-matching valve box extensions as required.

.6 Up to three (3) 25 mm control valves or two (2) 38 mm control valves may be contained within a single valve box provided 100mm of clearance between valves. Install valves 50 mm and larger in their own valve box.

.7 Install a minimum of four (4) bricks below all corners of the valve box. The bricks shall not intrude into the valve box's space.

.8 Wrap all valve boxes in landscape fabric before burial to prevent material from sloughing into the valve box.

## 3.22 ELECTRICAL CONTROL VALVE

.1 Install in valve box per manufacturer's recommendations and Contract Drawings.

.2 Identify the electric control valve with a permanent label or tag indicating the zone number of the valve.

.3 Install a 25 mm Schedule 40 PVC ball valve upstream of each 25mm; for larger valves, install a gate valve sized to match the valve.

.4 Ensure a 50 mm gap between the bottom of the valve and the top of the drain rock.

.5 Install valve box on bed 150mm depth of 25mm drain rock that extends 100mm past all edges of the valve box.

## 3.23 SWING JOINT ASSEMBLY

.1 Fabricate the assembly of a triple swing joint using three threaded Schedule 40 PVC elbows and one threaded Schedule 80 PVC nipple for sprinklers flowing more than 8gpm and preassembled Rain Bird swing joint assemblies for sprinklers flowing up to 8gpm.

.2 Install swing joint assembly to rotate counterclockwise when depressed.

.3 Tape threads of PVC fittings with Teflon tape and make hand tight.

.4 Install pre-fabricated swing joints per the manufacturer's recommendations.

## 3.24 SPRINKLERS

.1 Install per manufacturer's recommendations and in the location shown on Contract Drawings.

.2 The location of heads, as illustrated on the Contract Drawings, is intended as a guide to the layout of heads. Establish actual head locations in the field to ensure complete and adequate coverage of all areas to be irrigated and no overspray onto adjacent surfaces and improvements. Do not exceed the head spacing shown on the Contract Drawings.

.3 Where obstructions or site improvements hinder or block head-to-head coverage, advise the Consultant and determine the best method to maximize coverage.

.4 For flat surfaces, install head plumb to finished grade. For sloped surfaces, install a head perpendicular to half the grade of the slope.

.5 Mount pop-up heads on the triple swing joint assembly. Connect the sprinkler's bottom inlet to the swing joint assembly, not the side inlet. Adjust the swing joint assembly to set the head flush with the finish grade. Tape the threads of the PVC fittings with Teflon tape and make the hand tight.

.6 Adjust arc, the radius of coverage and flow at each sprinkler to achieve even head-to-head coverage of the area to be irrigated, with minimum over-spray onto other surfaces.

## 3.25 ROOT WATERING SYSTEM

.1 Install root watering system as follows:
- .1 Install sock over the canister.
- .2 Position units evenly spaced around the root ball and adjacent to the root zone within the tree canopy.
- .3 Fill the canister with pea gravel to 50mm below the bubbler.
- .4 Connect to lateral pipe with Rain Bird SPX Series Swing Pipe and Rain Bird SB Series Spiral Barb fittings.
- .5 Cover the grate with duct tape or landscape fabric to prevent the ingress of foreign material during construction. Remove it prior to Substantial Performance.

## 3.26 DRIP ZONE KITS

.1 Install in valve box per manufacturer's recommendations and Contract Drawings.

.2 Identify the electric control valve with a permanent label or tag indicating the zone number of the valve.

.3 Drip zone kits shall include one (1) schedule 40 PVC ball valve and filter.

.4 Drip zone kits are to include a ball valve, filter, and pressure regulating module.

.5 Ensure a 50mm gap between the bottom of the valve and the top of the drain rock.

.6 Install valve box on bed 150mm depth of 25mm drain rock that extends 100mm past all edges of the valve box.

## 3.27 FILTERS

.1 Install the filter in the same valve box as a valve, per the manufacturer's recommendations and Contract Drawings.

## 3.28 LANDSCAPE DRIPLINE

.1 Do not install driplines or emitters of different flow lengths or spacing on the same zone.

.2 Place the dripline on the prepared surface. The surface must be free of sharp rocks or other objects that may damage it. It must also be at the grade necessary for the dripline to be at the specified depth after the remainder of the topsoil or growing medium is placed.

.3 Placement of dripline by trenching using hand or mechanical methods permitted only if specified as such on Contract Drawings or upon written approval of the Consultant.

.4 Thoroughly flush each zone after installation and before beginning regular operation of the drip zone.

.5 Stake dripline in beds every 450 mm on centre.

.6 Make all zone connections and test the manifold, lines, and fittings for leaks prior to placing topsoil or growing medium over the manifold, headers, dripline, and emitters.

## 3.29 DRIP EMITTERS

.1 Install per manufacturer's recommendations and as shown on Contract Drawings.

## 3.30 LATERAL FLUSH ASSEMBLY

.1 Install flush assembly on the swing joint in the valve box.

.2 Install flush valve assembly at the end of each leg or section of drip line and at the end of each leg of lateral on a root watering system zone.

## 3.31 AIR RELIEF VALVE

.1 Install an air relief valve at the highest point in the zone or bed.

## 3.32 THRUST BLOCK

.1 Place a thrust block to support the pipe joints from separating, not to prevent the pipe from heaving. Do not cover the top of the pipe with concrete thrust blocking at change from a horizontal alignment to a vertical alignment.

.2 For thrust blocks installed in disturbed soils, increase the thrust block area by 50%.

.3 Place 2 ply of 6 mil polyethylene between the pipe and thrust block.

.4 Allow the concrete to set before backfilling the trench or pressurizing the line.

.5 Obtain approval from the Consultant before backfilling the thrust block.

## 3.33 CLEAN-UP AND RESTORATION

.1 Remove all waste and debris from the site resulting from irrigation installation.

.2 Restore all disturbed surfaces to original condition or better, and repair all trench settlements.

## 3.34 INSTRUCTIONS TO CITY (OWNER)

.1 Instruct the City in complete operating and maintenance procedures for the irrigation system, including start-up, winterization, and programming.

.2 Review Record Drawings and Operating Manual with the City on site.

## 3.35 GENERAL MAINTENANCE

.1 Inspect, operate, maintain, and adjust the irrigation system through the Landscape Maintenance Period until issuance of Certificate of Acceptance to ensure it operates as intended, including but not limited to:

- .1 Adjust irrigation schedule to ensure survival, health and growth of plant material and respond to soil conditions, and climate.
- .2 Clean sprinkler heads and adjust coverage to eliminate over watering, under watering and overspray onto adjacent surfaces.
- .3 Monitor and clean filtration equipment.
- .4 Restore grass areas, planting beds, and hard surfaces, as well as improvements affected by trench settlement and erosion.
- .5 Respond to requests from the Consultant for program adjustments, servicing, adjustments, and repairs.

## 3.36 WINTERIZATION MAINTENANCE

.1 During the Maintenance Period, be responsible for the winterization of the irrigation system at the end of the growing season and before the onset of air temperatures below 01 Celsius. Be liable for any damage resulting from late or improper winterization.

.2 Request the presence of the City at winterization at least 5 days prior to the proposed winterization date.

.3 Winterization includes but is not limited to:
- .1 Deactivation of controller
- .2 Drainage and blow-out assembly of the entire irrigation system.

## 3.37 MAINTENANCE SPRING START-UP

.1 During the Maintenance Period, be responsible for the spring start-up of the irrigation system at the beginning of the growing season or within 10 days of the request for start-up from the City. Be liable for any damage resulting from late or improper start-up.

.2 Ensure the City is present for spring start-up. Request the city's presence at least five (5) days before the proposed start-up.

.3 Spring start-up includes but is not limited to:
- .1 Checking and testing for leaks.
- .2 Cycling irrigation control program through all zones to ensure proper function and performance.
- .3 Checking and adjusting heads and emitters to achieve even coverage with minimum overspray onto other surfaces.
- .4 Test backflow prevention assembly. Submit test results to the Consultant.
- .5 Saturation of soil with water to a depth of 300 mm to provide deep watering of all lawn areas, planting beds and tree pits

## 3.38 GUARANTEE

.1 Submit a written guarantee, in approved form, stating that all work showing defects in materials, workmanship or operation will be repaired or replaced at no cost to the City for a period of one (1) year from the date of Substantial Performance.

.2 Guarantee includes the supply of labour, materials and equipment necessary for the repair and replacement of damaged or defective materials and workmanship. Guarantee also includes spring start-up, winterization, maintenance, necessary testing, program corrections or adjustments and restoration of settled trenches.

.3 Guarantee will not apply to materials or workmanship damaged after Substantial Performance by causes beyond the Subcontractor's control, such as vandalism or abuse.

**END OF SECTION**

# PART 1: **GENERAL**

## 1.1 GENERAL REQUIREMENTS

.1 Refer to Division 1, General Requirements.

.2 This section of the specification forms an integral part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

## 1.2 DESCRIPTION

.1 Supply all products, labour, equipment and services necessary to install growing medium and mulch as indicated in the contract documents.

## 1.3 RELATED WORK

| | | |
|---|---|---|
| .1 | Plants and Planting | Section 32 93 10 |
| .2 | Sodding | Section 32 92 23 |

## 1.4 REFERENCE STANDARDS

.1 Conform to the requirements of the latest editions of the following standards and legislation:

.1 Canadian Landscape Standard, Current Edition
.2 Environmental Management Act and Public Health Act of British Columbia
.3 Canadian Systems of Soil Classification, Methods of Soil Analysis
.4 ASTM International

## 1.5 DEFINITIONS

.1 GROWING MEDIUM: A mixture of mineral particulates, microorganisms and organic matter which provides a suitable medium capable of supporting the intended plant growth.

.2 SOIL: A biologically active, porous, growing medium composed of profiles and built of a combination of materials; Sand, Silt, Clay, Organic Matter and chemical inputs, either through natural formation or engineered processes. Soil taxonomy is graded mainly by particle size.

.3 OWNER'S REPRESENTATIVE: The person or entity employed by the Owner to represent their interest in the review of the work.

## 1.6 TESTING

.1 Provide a 3.79L sample of materials delivered to site to laboratory approved by Owner's Representative. At the discretion of Owner's Representative, submit two additional samples at directed intervals.

.1 Approved laboratory: Pacific Soil Analysis Inc.
Suite 5-11720 Voyageur Way, Richmond, BC, V6X 3G9
Tell: 604 273 8226

.2 Or approved equal testing centre.

.2 The analysis shall outline the testing laboratory's recommendations for amendments, fertilizer and other modifications to make the proposed growing medium meet the requirements of this specification.

.3 Samples of existing site soil that are under existing pavement to be removed should be submitted as soon as possible after the paving is removed.

.4 Native Soil samples to be taken from depth of established root mass.

.5 All samples to represent characteristics of the final delivered soil.

.6 Soils containing biosolids shall be submitted to demonstrate the finished product meets the BC Organic Matter Recycling Regulation's (OMRR) "Biosolids Growing Medium" standards.

.7 Failure to submit soils analysis is cause for immediate rejection and possible removal of any placed growing medium at their expense.

.8 Soil that has sat three months or longer on site is subject to further testing.

## 1.7 SUBMITTALS AND EVALUATION

.1 Action Submittals: Submit analysis to Owner's Representative for review and acceptance not less than forty-five (45) days prior to start of installation of materials and products specified in this Section, to allow time for adjustments to mix design and supplier.

.2 Analysis must Include:

.1 PH
.2 Soluble salt by electrical conductivity of a 1:2 soil water sample.
.3 Percent Organic Content
.4 Cation Exchange Capacity in Meg / g
.5 Nutrient levels by parts per million including: Phosphorus, Potassium, Magnesium, Manganese, Iron, Zinc and Calcium.
.6 Texture Analysis and distribution of gravel, coarse sand, medium sand, and fine sand in addition to silt and clay.

.3 Soil shall be free from crabgrass, couch grass, Equisetum, convolvulus or other weeds or seeds or parts thereof. Substantially free from roots, sticks, building materials, wood chips, chemical pollutants, and other extraneous materials.

.4 All similar materials supplied to the site shall be of similar nature and from a single source.

.5 Costs of imported materials shall include cost of modifications from source to ensure that these materials meet specifications.

.6 Acceptance of material at source does not preclude future rejection if material fails to conform to requirements specified following onsite analysis, or if its field performance is found to be unsatisfactory.

## 1.8 DELIVERY, STORAGE, AND HANDLING

.1 Weather: Do not mix or deliver soil when frozen or saturated with water following times of rainfall or heavy irrigation.

.2 Protect soil and soil stockpiles from wind, rain and washing that can erode soil or separate fines and coarse material, and contamination by chemicals, dust and debris that may be detrimental to plants or soil drainage. Confine delivered materials to neat piles in areas coordinated with the site supervisor. Cover stockpiles with plastic sheeting when not in use.

.3 Soils with high electrical Conductivity (2.5+) can be uncovered to correct salt concentrations through rainfall exposure or irrigation based on Owner's Representative approval and directions.

.4 All soil to be stripped and stockpiled on site in an approved location. Stripping and stockpiling work shall be such that the soil is not damaged or contaminated.

.5 All manufactured packaged products and material shall be delivered to the site in unopened containers and stored in a dry enclosed space suitable for the material and meeting all environmental regulations.

.6 Biological and Chemical additives shall be protected from extreme humidity, cold or heat. All products shall be freshly manufactured and dated for the year in which the products are to be used. Chemical amendments shall have original labels intact and legible.

### 1.9 CONTAMINATED ONSITE SOIL

.1 Soil containing invasive species to undergo further assessment by a Qualified Professional such as a registered Biologist or Agrologist - prior to further distribution throughout site or removal of materials from site.

.2 If soils are suspected as being contaminated, then further testing is required from an international standard ISO/IEC 17025 approved laboratory. A third-party accredited Biologist or Environmental Engineer must review findings to confirm presence and to give recommendations for amendment.

### 1.10 SCHEDULING

.1 All delivery notification of approved material to include and be given with no less than seven (7) days notice.

## PART 2: SOIL TYPES

### 2.1 LAWN AREA SOILS

.1 On site or imported soil shall be friable “A Horizon” topsoil to the requirements of the Canadian Landscape Standard Level 2 “Groomed” in addition to this:

.2 Soil shall be suitable for modification by screening and additives to meet the requirements within this specification, except where specified and approved for use “as is”.

.3 Containing between 3% and 15% organic matter (dry weight basis), organic matter not to contain large quantities of Mushroom Manure or Yard Waste.

.4 Containing min 75% Coarse Sand.

.5 Salinity: Maximum saturation extract conductivity of 2.5 mmho/cm.

.6 PH: 6.0-7.5 – unless planting is noted as specified for a PH 7.5-8.5.

.7 Approved product: Hank’s Trucking “Lawn Mix”
Or pre-approved equal.

### 2.2 MULCH

.1 Refer to Section 32 93 10 Plants and Planting.

### 2.3 AMENDMENTS

.1 All growing medium is to arrive pre-mixed with the exception of addition of the following components that are to be applied at rates indicated in the growing medium analysis recommendations and using:

.2 Manure: Not to be used in the amendment of soils.

.3 Organic Matter: Owner’s Representative does not allow use of any paper fibre amended

compost products. Shall be derived from organic source free of sewage biowaste, heavy metals, contaminants, animal or plant chemical additives or supplements.

.4 Sand: Coarse, well washed and free of contaminants, chemical and organic matter. Gradation of particle sizes shall fall within the Canadian Landscape Standard recommendations. Must have saturated hydraulic conductivity between 100-300mm.

.5 Peat moss: Not to be used.

.6 Wood Residuals: Content of wood residuals such as fir or hemlock sawdust shall not cause a Carbon to Nitrogen ratio higher than 25:1. Cedar or redwood sawdust shall not be present in the growing medium mix with the exception of Cedar bark that has had Thujone extracted.

.7 Dolomite Lime: Approved commercial brands for horticultural purposes, coarsely ground; containing not less than 20% calcium by weight.

.8 Thoroughly mix using mechanical mixing/screening equipment the constituent growing medium components and recommended additives. Resulting mixture must have a particle size class and properties that match the requirements of this specification.

### 2.4 FERTILIZERS

.1 Standard commercial brands, meeting the requirements of the Canada Fertilizer Act, packed in waterproof containers, clearly marked with the name of the manufacturer, weight and analysis. Granular slow release fertilizers only.

.2 Fertilizers must be those specified in the soil analysis or by Owner's Representative. Contractor shall not make any substitutions without prior written approval.

### 2.5 DRAINAGE MEDIUM

.1 Drain Rock: Shall consist of clean round stone or crushed rock. Acceptable material includes 19 mm (3/4") drain rock or torpedo gravel.

.2 Drain Mat: Light duty, UV stable, impermeable cuspated core bonded to a layer of non-woven filter fabric with the following minimum properties

.1 Compressive Strength -718 kN/m2 as per ASTM D-1621
.2 Flow Rate – 188 l/min/Metre as per ASTM D-4716
.3 Approximate profile thickness of 10mm (3/8"). Acceptable products include J-DRain 200 manufactured by JDR Enterprises (1.800.843.7569); Nudrain WD/15 manufactured by Nilex Geotechnical Products Inc., Burnaby, BC or pre-approved equal.

### 2.6 FILTER FABRIC

.1 Needled, non-woven polypropylene mat. Nilex 4545 by Nilex Geotechnical Products Inc., Burnaby, BC or pre-approved equal.

## PART 3: EXECUTION

### 3.1 SUBGRADE PREPARATION

.1 Verify the size, location and depth of all existing site services and sub-surface utilities prior to commencement of the work. Repair all damage as result of failure to perform adequate review at no cost to the Owner.

.2 Notify Owner's Representative when the site is prepared for growing medium placement. Do not place growing medium until subgrades have been reviewed and approved.

.3 Provide at least two days (48 hours) notice in advance of each required review.

.4 All excavation shall be undertaken in accordance with Municipal Rules and Regulations.

.5 On Grade Planting Area:

.1 Scarify compacted subgrade to a minimum depth of 200mm (8") immediately before placing growing medium.
.2 Verify that subgrades are at the proper elevations before placing growing medium
.3 Remove debris, roots, branches stones in excess of 50mm dia. and other deleterious materials as directed by Owner's Representative.
.4 Remove any soil contaminated with calcium chloride, toxic materials or petroleum products.
.5 Remove any materials that protrude 25mm (1") above the surface.
.6 Dispose of removed material off site.
.7 Review sub grade conditions to ensure that there is proper drainage in all planting areas and tree pits. Perform a percolation test as needed to confirm proper drainage.

## 3.2 PLACING GROWING MEDIUM

.1 Do not place growing medium until Owner's Representative has reviewed all planters or sub grades.

.2 Ensure that root barrier and irrigation lines to be installed have been reviewed by Owner's Representative prior to the placing of growing medium.

.3 Growing medium shall be moist but not wet when placed (25% of field capacity). It shall not be handled in anyway if it is wet or frozen.

.4 Except where Contract Drawings show otherwise, place to the following min. / max. depths and levels (measured after initial settling of growing medium):

.1 Tree Planting Areas on grade or on slab min 900mm (36") and shall conform to the following additional parameters:
.1 Planting hole shall be minimum 300mm (12") wider than rootball on all sides.
.2 Planting hole shall be minimum depth of root ball.
.3 Each tree shall have access to minimum $10m^3$ growing medium volume per street trees and minimum $10m^3$ growing medium volume per on-site tree within connected volumes. Soil volume of street trees may vary per Municipal Bylaws.
.4 The required growing medium volume may be accommodated with varying soil depths between 900mm (36") and 250mm (10") outside the area defined by the planting hole. Volume must have a direct relationship to the mature drip line with outward adjustment for columnar species.
.2 Shrub and Groundcover Areas on grade or on slab 450mm (18") minimum depth.
.3 Low or High Traffic Lawn Areas on grade or on slab 150mm (6") minimum depth.

.5 Crown or slope for positive surface drainage as shown on the drawings.

## 3.3 APPLICATION OF AMENDMENTS

.1 Ensure minimum seven (7) days separation time between the application of any lime treatment or fertilizers and plant material installation. All granular applications to be irrigated with sufficient water to dissolve amendments into soil.

.2 Addition of amendment components shall be at the rates indicated in the growing medium analysis recommendations via the following methods:

.3 Fertilizers

.1 This material shall be applied with mechanical spreaders over the entire planting area
.2 Rake fertilizers into top 50mm (2") minimum of the placed growing medium.

.4 Lime

.1 This material shall be applied with mechanical spreaders over the entire planting area and mixed thoroughly into the top 100mm (4") of the growing medium prior to fine grading.
.2 Do not apply by hand.
.3 Ensure lime does not come in contact with the nitrogen - phosphate - potash fertilizers during amending process.

.5 Organic Matter

.1 Organic matter shall be top-dressed and cultivated into the top 150 -200mm (6"-8") of the growing medium prior to fine grading.

## 3.4 FINE GRADING

.1 Manually fine grade growing medium installation to contours and elevations shown on Contract Drawings or as directed by Owner's Representative. Tolerance for finish grading to be 13mm (1/2").

.2 Eliminate rough spots and low areas to ensure positive drainage.

.3 Leave surface smooth, uniform, firm against deep foot printing, with a fine loose texture.

.4 In the event of heavy foot traffic compacting the soil grade, Contractor will need to cultivate the soil prior to finish grading to allow for absorption of water and oxygen into soil media.

.5 Limit foot traffic through soil grade to prevent plating and compaction. Use plywood to create temporary paths where soil grade is exposed to frequent traffic.

## 3.5 WEED CONTROL

.1 Ensure all weeds and weed roots that have germinated during the course of work of this Section have been eliminated from growing medium.

.2 Provide Owner's Representative with a written methodology outlining of weed removal for approval seven (7) days prior to starting weed removal operations.

## 3.6 MULCHING

.1 Place mulch over all growing medium except grass areas. Moisten uniformly and spread to a consistent settled depth of 50mm (2") in tree and shrub planting areas, 25mm (1") in ground cover areas. Mulch to not cover root flare of any tree or shrub.

## 3.7 CLEANING

.1 All excess materials and other debris resulting from growing medium preparation and placement operations shall be disposed off site.

.2 Ensure all discoloration of adjacent surfaces caused by growing medium placement have been removed. Ensure all paved areas, tops of planters, and adjacent surfaces have been thoroughly cleaned to the satisfaction of Owner's Representative.

**END OF SECTION 32 91 13**

# PART 1: **GENERAL**

## 1.1 GENERAL REQUIREMENTS

.1 Refer to Division 1, General Requirements.

.2 This section of the specification forms an integral part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

## 1.2 DESCRIPTION

.1 Supply all products, labour, equipment, and services necessary to install sod lawn as indicated in the contract documents.

## 1.3 RELATED WORK

| | | |
|---|---|---|
| .1 | Landscape Maintenance | Section 32 01 90 |
| .2 | Growing Medium | Section 32 91 13 |
| .3 | Irrigation System | Section 32 80 00 |

## 1.4 REFERENCE STANDARDS

.1 Conform to the requirements of the latest editions of the following standards and legislation:

.1 CSLA/BCLNA Standard – Current Edition
.2 British Columbia Standard for Turfgrass Sod
.3 British Columbia Weed Control Act
.4 Canada Seed and Fertilizer Act
.5 Canada Pest Control Products Act

## 1.5 SUBMITTALS

.1 Submit analysis of the grass mixture and purity of sod to Owner's Representative for review and acceptance not less than thirty (30) days prior to start of installation. Submit soil analysis of sod growing medium with sod product data.

## 1.6 TESTING AND APPROVALS

.1 Notify Owner's Representative at least forty-eight (48) hours before installing sod for review of finished grades and sod.

.2 Obtain approval in writing from Owner's Representative for application of any chemical vegetation controls.

.3 Comply with applicable federal, provincial, and municipal pesticide/herbicide control regulations regarding application of herbicides to control noxious weeds. Ensure all manufacturers' recommendations regarding application are strictly adhered to.

1.7 **PRODUCT HANDLING**

.1 During shipping, storage and installation, protect sod against drying, to the requirements of the B.C. Standard for Turfgrass Sod.

.2 When handling multiple pallets of sod during hot days, simultaneously pull materials from each pallet. Do not work one pallet at a time to ensure material does not spoil.

1.8 **PROTECTION**

.1 Always protect all sodded areas against trespassing and from damage until Acceptance. If any sodded areas are damaged, they shall be repaired as required at the Contractors expense.

1.9 **ACCEPTANCE**

.1 The conditions for acceptance of sodded areas and for turning over the sodded areas to Owner for subsequent maintenance are:

.1 Substantial Performance of the entire project has been declared.
.2 Sod shall be mown as specified no more than two days before inspection for Acceptance.
.3 Sod shall be uniformly healthy, dense, in a vigorous growing condition, rooted into the underlying soil and shall show no signs of yellowing. There shall be no gaps showing between adjacent rolls of sod.
.4 Sod shall have no evidence of noxious weeds.
.5 Sod shall have no evidence of pooling water due to grades altered during installation.

.2 The date of Final Acceptance shall be as determined by the Owner's Representative based upon the inspection. Notify the Owner's Representative at least forty-eight (48) hours in advance to schedule inspection of the entire landscape ready for Acceptance. Acceptance will only be given provided Maintenance as per Item 3.5 has been carried out and other Conditions of Item 1.9 have been met.

1.10 **WARRANTY**

.1 All workmanship and materials covered under work of this Section shall be guaranteed for a period of one (1) full year from the date of Substantial Performance.

.2 If defects are identified, following remediation, Owner's Representative reserves the right to reinstate an additional one (1) year warranty period to ensure issues are fully mitigated.

.3 Substantial Performance is the date of Substantial Completion or date of Final Acceptance, whichever is later.

## PART 2: **PRODUCTS**

### 2.1 **SOD**

.1 Sod:

.1 Suitability: All Turfgrass sod shall be suited to the locality, site conditions and intended function of each project or area.

.2 Sod shall be nursery grown Turfgrass Sod, true to type, conforming to the B.C. Standard for Turfgrass Sod. Only "Non-Netted" Sod will be accepted by Owner's Representative.

.3 The quality grade of sod (based on B.C. Standard for Turfgrass Sod) shall be No. 1 Premium Grade grown on a screened alluvial sand base, cultivated on a sterilized soil base to ensure a weed free product. The maximum fines (silt and clay) in the alluvial sand base to be no more than 1% by weight.

.4 Approved Turf products for sports and commercial/residential projects include:

.1 Anderson Sod Farms "Pro Sport"

.2 Western Turf Farms "Sports Turf"

.3 Boss Sod "Sand Based Sport Sod"

.2 Standard grass mixture requirements for general purpose areas shall be in the following approximate proportions:

| | |
|---|---|
| Kentucky Bluegrass | max. 50% |
| Perennial Turf Type Ryegrass | min. 50% |

.3 For Chafer Beetle sensitive area:

.1 Boss Sod "Chafer Beetle Resistant Sod"

.2 Or any sod with a mixture of the following approximate proportions:

| | |
|---|---|
| Kentucky Bluegrass + Perennial Turf Type Ryegrass | 30% - 40% |
| Tall Turf-type Fescue | 60% - 70% |

.4 Weed Control: Manual weed control is the preferred method and may be the only permitted methodology in some municipalities. Confirm with Owner's Representative. If chemical vegetation control is permitted, use herbicides of type and at an application rate as required to achieve the desired control. Use only standard commercial herbicide products registered for sale and use in Canada under the Pest Control Products Act.

### 2.2 **FERTILIZER**

.1 Fertilizer shall be as recommended for season of application as per industry standards or by the soil analysis report.

.2 Prior to sod installation in areas outside of SPEA + ESA or where Organic Land Use is required, apply a Turf Starter Fertilizer as directed by manufacturer or soil analysis report. Use 18-12-14 or 18-18-18 or similar.

2.3 **LIME**

.1 Dolomite Lime: Shall be finely and uniformly ground containing not less than 90% calcium carbonate.

2.4 **EDGE RESTRANIT**

.1 Pour in place Concrete

.1 As per contract drawings

.2 Aluminum Edger

.1 Acceptable Products Include
RoofEdge by LiveRoof
GeoEdge or CleanLine XL by Permaloc
Or pre-approved equal.

.3 Recycled Plastic

.1 Shall be manufactured from 100% recycled material, UV stable and capable of retaining curved or straight precast concrete unit paver installations.
.2 Acceptable Products Include:
EdgePro One by Abbotsford Concrete Products
B.E.A.S.T. by Brickstop
1”x6” Perma-Deck Plastic Lumber by Wishbone Site Furnishings
Or approved equal
.3 Edge Restraint Spike
.1 As per Edge Restraint Suppliers Specifications
.2 If Edge Restraint Supplier does not specify an acceptable spike, 300mm (12”) long, galvanized metal spikes shall be used.

2.5 **APPROVED EQUALS**

.1 All items as specified or pre-approved equals.

## PART 3: **EXECUTION**

3.1 **SUBGRADE PERPARATION AND FINISHING**

.1 Obtain approval of Owner’s Representative of subgrade and growing medium prior to laying any sod. Ensure that growing medium is placed to required depths and tolerances as specified and detailed on the Contract Documents and spread evenly over the approved subgrade. Ensure the growing medium is firm against footprints, loose in texture and free of all stones, roots branches, etc. as required under Section 32 91 13 Growing Medium.

.2 Ensure smooth finish on all surfaces and finished grades as shown in the Contract Drawings and as specified herein.

.3 Grades:

.1 Areas to be sodded shall be at grades as shown at the time of sodding, less an allowance for the thickness of the sod.
.2 Restore all areas to be sodded which are misshapen or eroded to original specified condition, grade and slope as directed just prior to sodding. Minor adjustment and refinement of finished grade to be made as directed by Owner's Representative.
.3 Crown or slope for surface drainage (2%minimum - 33% maximum) and eliminate all low spots or depressions.
.4 Obtain approval of finished grading from Owner's Representative prior to proceeding.
.5 Refer to municipal regulations for the maximum slope allowed for sodding.

.4 If the surface of the growing medium is dry, lightly moisten the growing medium immediately prior to laying sod.

3.2 **SOD LAYING**

.1 Use full rolls where possible. No bits or sod remnants are allowed.

.2 Apply turf starter fertilizer specified in section 2.2 to finished grade.

.3 Lay sod in rows with ends staggered 1/3 of a roll length. Butt all sections closely. Do not overlap or allow gaps wider than 2mm between sections. Top of sod to be flush with adjacent walking surfaces.

.4 Where applicable use a string line to assist laying an initial course of sod where hard surfaces are not available to provide a straight line.

.5 Protect new sod from heavy foot traffic during laying. Place planks or plywood if necessary, to prevent damage. Lay within 24 hours after delivery to prevent deterioration. Any sod laid after the 24-hour period will be rejected.

.6 Lay sections on slopes at right angles to the direction of the slope. Stake sod into place with wood stakes driven flush with the surface in any locations having slopes steeper than 3:1. Interval spacing on stakes shall not exceed 500mm. Prior to pedestrian traffic being allowed onto the sod, and only after the sod is well rooted into the growing medium, pegs or stakes shall be removed or driven to an elevation 50mm below the finished surface.

.7 Cut sod where necessary only with sharp tools, ideally a sharp Exacto/X-Acto/utility knife.

.8 When cutting large curves, lay and stake a flexible irrigation pipe to provide smooth corners.

.9 Water to thoroughly penetrate the full depth of the growing medium as specified. On days above 25 degrees Celsius, water sod as it is laid. Do not wait until the entire area is installed to start the watering. At minimum 25mm (1”) of water should be applied during initial installation day unless heavy rains are falling. Sites with surrounding buildings which reflect heat, additional initial irrigation is required.

.10 When sod has dried sufficiently, roll with 113kg. (250lb.) roller to obtain smooth uniform surface and ensure a good bond between soil and sod.

.11 Erosion control netting shall be installed in sodded areas where required, erosion control mesh or netting shall be placed and secured with stakes or staples set firmly into the ground to a minimum depth of 150mm. Spacing of stakes or staples shall be adequate to ensure complete anchorage of the sod to the ground.

## 3.3 FERTILIZER

.1 Apply fertilizer at manufacturers' recommended rates. Ensure equal distribution. Mix into top 50 mm. (2") of growing medium by discing, raking, or harrowing. Application of fertilizer shall be within 48 hours of laying sod and during turf establishment and warranty periods.

## 3.4 LIMING

.1 Add Granular Lime as required to ensure pH 6.0 to 6.5. Mix into full depth of growing medium. Coordinate with soils analysis.

## 3.5 MAINTENANCE

.1 Maintenance shall follow the Canadian Landscape Standard, current edition, Level 2 'Groomed'.

.2 Begin maintenance immediately after installation and continue until Acceptance of sodded areas. Maintenance shall consist of all measures necessary to keep grass healthy, in a vigorous growing condition and well rooted into the underlying soil. Maintenance shall include, but not be limited to the following:

- .1 Mowing shall be carried out at regular intervals as required to maintain grass at a maximum height of 60mm. (2-1/2"). Not more than 1/3 of the blade shall be cut at any one mowing. Edges of sodded areas shall be neatly trimmed. Heavy clippings shall be removed immediately after mowing and trimming. Edge of beds to be defined by cutting with a half moon edger tool or similar to provide a well defined barrier.
- .2 Watering shall be carried out when required and with enough frequency to prevent grass and underlying growing medium from desiccation.
- .3 Rolling shall be carried out when required to remove any minor depressions or irregularities.
- .4 Weed control shall be carried out when the density of weeds reaches 10 broadleaf weeds or 50 annual weedy grasses per 37 sq. M. (400 square feet).
- .5 Weed control, whether manual or chemical, shall reduce the density of weeds to zero. If chemical apply in strict accordance with the manufacturer's recommendations and to the Weed Control and IPM Acts.
- .6 Any sodded areas showing deterioration or bare spots shall be repaired immediately. All areas showing shrinkage due to lack of watering shall be top dressed and seeded with a seed mix matching the original seed mix.
- .7 All sodded areas shall be adequately protected with warning signs and temporary fencing as directed by the Owner's Representative. Fencing shall be maintained in good condition to provide a continuous barrier until Acceptance. Except as otherwise required by the Owner's Representative, the fencing shall be removed from the site upon Acceptance.

3.6 **SUPPLEMENTARY FERTILIZER APPLICATION**

.1 Prior to Acceptance, at a time approved by Owner's Representative, apply fertilizer formulation as recommended for the season at manufacturer's recommended rates evenly to all sodded areas. Water thoroughly.

3.7 **CLEANING**

.1 All excess materials and other debris resulting from sodding operations shall be removed from the job site.

.2 Sweep and flush all walks and paved areas clean to the satisfaction of Owner's Representative.

**END OF SECTION 32 92 23**