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 reinforcing steel as indicated in the contract documents.

1.3 RELATED WORK

.1 Cast–in–Place Concrete Section 03 30 53

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-A23.2 Methods of Tests for Concrete
- .3 CAN/CSA-A23.3 Code for the Design of Concrete Structures for Buildings.
- .4 CAN/CSA- A23.1 Concrete Materials and Methods of Concrete Construction
- .5 CAN/CSA G30.5–M Welded Steel Wire Fabric for Concrete Reinforcement.
- .6 CAN/CSA G30.12-M Billet-Steel Bars for Concrete Reinforcement.
- .7 CAN/CSA W186–M Welding of Reinforcement Bars in Reinforced Concrete Construction.
- .8 ACI manual of Standard Practice for Detailing

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

1.5 INSPECTION

.1 All steel for the section shall be placed before pouring of concrete has begun.

1.6 TESTING AND APPROVALS

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

1.7 SUBMITTALS

.1 Submit mill certificates properly correlated to the materials in accordance with CAN/CSA G30.18.

Part 2: PRODUCTS

2.1 GENERAL

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

2.2 MATERIALS

.1 Reinforcing bars will conform to CAN/CSA G30.18, Grade 400 R, unless otherwise specified herein or on the drawings.

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

.3 Reinforcing bars to be welded will conform to CAN/CSA G30.18, Grade 400 W.

.4 Welded wire fabric will conform to CAN/CSA G.30.5, size and gauges as shown on the drawings.

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

.6 Accessories: tie wire, hangers, bolsters, bar supports and spacers adequate for strength and support of reinforcing construction conditions.

.1 Use non-staining supports for architectural concrete.

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 The Contractor shall notify the Owner's Representative at least 48 hours before any concrete is placed in order that an inspection may be made.

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

3.2 FABRICATION

.1 Fabricate reinforcing to CSA-A23.1.

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

.3 Splices in reinforcing bars at locations not shown on the Drawings must be submitted for review by the Owner's Representative. Such splices will conform to the standards.

3.3 PLACING

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

.2 Reinforcement shall be adequately supported by chairs, spacers, support bars, hangers, or other accessories, and secured against displacement within the tolerances permitted in the standard. Support devices contacting surfaces exposed to the exterior shall be non-corroding.

.3 Reinforcing bars that are not part of the structural design or drawing, and whose only function is supporting other reinforcing in lieu of other support accessories, will be considered as accessories.

.4 Clean reinforcement before concrete is placed.

.5 Contractor to coordinate a site meeting for the Owner's Representative to review reinforcing steel and placing before concrete is placed. A minimum of 48 hours notice is required for this review meeting.

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 DESCRIPTION

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

.2 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.

1.2 RELATED WORK

.1 Concrete Reinforcing Section 03 20 00

1.3 SAMPLES

.1 At least fourteen (14) days before beginning work, construct on site samples of all proposed finishes, joint types and edge details, each sample being at least 600mm x 600mm. Construct additional samples as necessary until a sample is approved by the Inspector.

.2 Samples shall be reviewed and approved by the Inspector **prior** to commencing concrete work. Any concrete placed prior to sample approvals may be rejected.

.3 The sample area SHALL NOT be part of the finished paving installation unless prior written approval has been obtained from the Project Manager.

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

1.4 PROTECTION

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

1.5 REFERENCE STANDARDS

.1 Concrete shall be ready-mixed and conforming to CSA A23.3 and most recent NBC for mixing, transporting and placing.

.2 No admixtures are permitted without the Inspector's approval.

.3 All reinforcing shall be fabricated, placed and supported in accordance with CSA A23.3 and NBC.

.4 Do not place concrete until reinforcing has been inspected by the Inspector. Inform the Inspector a minimum of 24 hours **prior** to placing.

.5 Minimum compressive strengths at 28 days.

.1	For footings, grade beams and walls	18 MPa; Maximum slump = 90mm.
.2	For slabs	23 MPa; Maximum slump = 70mm.

.6 Concrete reinforcing shall conform to CSA G30.12M, grade 300 or better.

.7 Footing and wall reinforcing shall be continuous in straight runs and at corners and intersections. Bar lap - 150mm.

1.6 PRODUCT DELIVERY

.1 Concrete shall be delivered from a plant approved by the Project Manager.

1.7 APPROVED EQUALS

.1 All items as specified or pre-approved equals.

1.8 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.

1.9 INSPECTION AND TESTING

.1 A qualified testing agency paid by the Contractor and approved by District of Mackenzie

shall be appointed to prepare mix designs, perform field quality tests and test and report on concrete strength.

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

Part 2 PRODUCTS

2.1 MATERIALS

.1 Concrete Material: To CAN3 A23.1

.2 Aggregate for Exposed Aggregate Concrete: as required to produce approved finish with 75% of exposed aggregate pieces 10mm to 12mm size.

.3 Expansion and Isolation Joints: Bituminous impregnated fibre board to ASTM D1751-83 (1991) (AASHTOM213-74).

.4 Control joints to be saw cut as detailed. Tooled joints to be as detailed.

.5 All above grade concrete including but not limited to stairs, planter walls etc. shall be 32 MPa.

.6 Concrete Forms: Douglas Fir (SIS) plywood.

.7 Form Ties: Noncorrosive snap type.

.8 Reinforcing Steel: As per Landscape Architect`s/Civil Designer's Drawings.

2.2 MIX DESIGN

.1 Contractor to submit mix design to Consultant for approval 2 weeks prior to first pour.

.2 Flat work and Vertical Elements (Reinforced)

.1 Class of Exposure C-1 (table II CSA A23.1-00)
.2 Minimum compressive strength at 28 days of 32MPA.
.3 Slump 80 +/- 20 max.
.4 Maximum water cement ratio 0.40 (Table CSA A23.1-00)
.5 Air content 5% to 8%
.6 Maximum size of coarse aggregate 19mm.

.7 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 Concresive Liquid LPL, Master Builders

2.4 NON-SHRINK GROUT FOR PATCHING: ACCEPTABLE MATERIALS INCLUDE BUT ARE NOT LIMITED TO:

.1 Embeco Mortar, Master Builder's,
.2 Fast- Set Patching Concrete, Target

2.5 INTEGRAL LIQUID COLOUR ADDITIVE: Iron oxide pigment suitable for sandblasted concrete that will produce a uniform, consistent colour. Colour pigment shall be permanent, inert, stable in atmospheric conditions, sun fast, weather resistant, alkali resistant, lime proof and non-bleeding. Particle size shall be 95to 99% minus 325 mesh.

.1 Acceptable products include; SGS Color-Flo Liquid Colours, by Solomon Colors, Springfield, Illinois, sgs@solomoncolor.com or pre-approved equal.
.2 Colour as indicated on Contract drawings.

2.6 ANTI-GRAFFITI COATING: All walls exceeding a height of 0.60M 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 CB Products, 102-876 Cordova, Vancouver BC. (604) 254.3325.
.2 Pre approved equal

Part 3 EXECUTION

3.1 FORMWORK

.1 Form lumber shall be free from defects.

.2 The strength and rigidity of forms shall be such that they will not deflect or leak.

.3 Removal of form ties shall be done carefully to avoid marking concrete and to allow for patching.

.4 All Exposed corners and edges shall be as detailed.

3.2 REINFORCING STEEL

.1 Concrete cover on reinforcing steel:

.1	Concrete cast against earth	3"
.2	Concrete exposed to earth or weather	1-1/2"
.3	Other locations	3/4"

3.3 PLACING

.1 **Obtain Project Manager's approval 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 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.

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

.4 Chuting must be done to Inspector's approval.

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

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

.7 A spare vibrator in good working order shall be on site at all times.

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

.9 The method, sequence and interruption where necessary of pours shall be approved by the Inspector. The position and method of bulkheading to allow for interruption shall have the Inspector's **prior** approval.

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

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

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

3.4 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 within ±3mm over a 3M length and shall be free from trowel marks and “washboard” chatters.

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

3.5 FINISHING OF CONCRETE SURFACES

.1 Finishes shall be:

.1 Light Sandblast - All elements with wood formed surfaces, except where shown otherwise, including, but not limited to walls and stairs.

.2 Form Finish - All surfaces shown on details as form finish shall be masked to protect them when sandblasting nearby surfaces.

.3 Smooth Steel Trowel Finish - All tops of walls above form finish surfaces.

.4 Light Broom Finish - All paved areas except those shown as exposed aggregate concrete, including all splash pads.

.5 Exposed Aggregate Concrete - Paved areas where specifically shown.

3.6 SANDBLASTING

.1 Vibrate and float the concrete sufficiently so mortar is brought to the surface to fill **all** voids. Over trowel to remove mortar and float lines. Finish surface will be smooth without imperfections which will ghost through finish sandblasting.

.2 Light sandblast to a uniform finish without excessive exposure of aggregate.

.3 Notify the City Staff Inspector at least 48 hours in advance of sandblasting to be carried out with the City Staff Inspector present to establish a standard finish for subsequent work.

3.7 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.

3.8 BULL FLOAT AND BURLAP

.1 Bull float to a surface true to grades and free from depressions. Texture surface by pulling lightly-weighted burlap across the surface in directions shown or as instructed by City Staff Inspector.

3.9 LIGHT 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 the Inspector.

.3 Install expansion joints and make saw cut control joints as shown on the Contract Drawings or as directed by the Inspector.

.4 **District of Mackenzie will not accept any concrete which has been overworked by trowelling, dusted with dry cement or finished with a mortar coat.**

.5 **Sawcut joints a maximum of 24 hours after concrete finishing**. Sawcut as close to columns and walls as practical. Sawcut depth to be 1/4 of slab thickness unless otherwise noted or detailed. All sawcuts to CAN3-A23.1-M77.

3.10 EXPOSED AGGREGATE CONCRETE

.1 After the surface of the concrete has been levelled to within specified tolerance and surface water has disappeared, wash the concrete surface to expose aggregate uniformly. Exposure of the aggregate shall start after the matrix has hardened sufficiently to prevent dislodgement of the aggregate. Water, in copious quantities but without force, shall be allowed to flow over the surface of the concrete while the matrix encasing the selected aggregate is removed by brushing with a fine bristle brush. This operation shall continue until the selected aggregate is uniformly exposed but not dislodged.

.2 An approved chemical retardant sprayed onto the freshly floated surface may be used to extend the working time for exposure of aggregate. Confirm retardant with Inspector **prior** to use.

.3 Colour and texture shall be uniform throughout and free from blemishes, discoloration and patches. Proper procedures shall be set up to ensure this uniformity, including but not limited to concrete mix, placing, consolidation, curing and finishing. If any surface treatment is executed prior to the slabs reaching final design strength, such surface treatment shall be done at a uniform curing stage for all pours.

3.11 PATCHING

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

.2 No patching of defective horizontal surfaces shall be permitted. See item 1.8.

.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 Do not fill or patch snap tie holes and touch up exposed ends of form ties with galvicon zinc rich paint.

3.12 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.

3.13 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.

.3 Paving shall be cured for a period of not less than ten (10) days by an approved method. 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 so as to prevent cracking of the surface of the concrete immediately after placing, and it shall be maintained so as 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.

3.14 ADJUST AND CLEAN

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

3.15 APPLICATION OF ANTI-GRAFFITI COATING

.1 Unless otherwise indicated in the specifications or on the contract drawings anti-graffiti coating to be applied to all exposed vertical concrete surfaces.

.2 Surface preparation and application in strict accordance with the manufacturers technical data and application instruction sheet.

END OF SECTION 03 30 53

PART 1: GENERAL

1.1 DESCRIPTION

.1 Section includes:

.1 All framing and woodwork on site.

.2 Furnish labour, materials, equipment and services necessary for installing wood or plastic decking.

1.2 RELATED WORK

.1	Decorative Metal Fences, Gates, and Exterior Railings	Section 32 31 19
.2	Exterior Rough Carpentry	Section 06 10 63

1.3 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.

1.4 SAMPLES

.1 At least seven (7) days before beginning work, construct on site samples of all proposed finishes, hardware, sealant, and lumber types.

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

.3 The sample area SHALL NOT be part of the finished installation unless written approval has been obtained from the Owner's Representative after review.

.4 Protect approved samples until acceptance of all work. Approved samples shall be the basis for evaluation of finished 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 Canadian Standards Association (CSA)

.1 CSA B111, Wire Nails, Spikes, and Staples.
.2 CAN/CSA O80 Series, Wood Preservation.
.3 CSA O86, Engineering Design in Wood.

.2 National Lumber Grades Authority

.1 NLGA Standard Grading Rules for Canadian Lumber

.3 Canadian Standards Association

.1 CAN/CSA Z614-14 – Children's Playspaces and Equipment

1.7 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.

1.8 ACCEPTANCE OF FINISHES

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

.2 For preservative-treated wood products, indicate type of preservative used and net amount of preservative retained.

PART 2: PRODUCTS

2.1 LUMBER, GENERAL

.1 Factory mark each item with grade stamp of grading agency.

.1 For items that are exposed to view in the completed Work omit grade stamp and provide certificates of grade compliance issued by grading agency.

.2 Provide dressed lumber, S4S, unless otherwise indicated. Lumber shall be straight, sound, and free of splits, wraps, cracks, large knots, and other defects.

.3 All Railings, exterior posts, facia, kickplates, and stairs to match wood decking materials. All wood materials to be #2 Grade or better.

.4 All general lumber to be sealed to match decking.

.5 For IPE and Plastic/Recycled Lumber Decking refer to drawings for railings, exterior posts, facia, kickplates, and stair materials.

.6 Decking lengths: 1.8m to 6.0m with a minimum of 90% of planks exceeding 30m2 end trimmed. For single spans shorter than 3m use decking of same length span.

2.2 MATERIALS

.1 Wood Decking – All wood decking to be No. 2 Grade Prime or better. Wood decking to be as specified in contract drawings. If no decking specified acceptable wood decking materials include:

.1 Douglas Fir, Western Larch
.2 Western Hemlock, Amabilis Fir
.3 White Spruce, Engelmann Spruce, Black Spruce, Red Spruce, Lodgepole Pine, jack Pine, Alpine Fir, Balsam Fir
.4 Eastern White Cedar, Western Red Cedar, Yellow Cedar, Grand Fir, Eastern Hemlock, Eastern White Pine, Ponderosa Pine, Red Pine, Western White Pine, Poplar, Largetooth Aspen, Black Cottonwood, Balsam Poplar
.5 Western Red Cedar, or Yellow Cedar

.2 IPE/Hardwood – To be No. 2 Grade Prime or better. Wood to be as species specified on drawings unless otherwise stated

.1 IPE
.2 Brazilian Walnut, Amapa, Cortez, Greenheart, Lapacho Negro

.3 Pressure Treated Timber:

.1 Exterior wood in contact with ground, concrete, masonry, or where continuous moisture may occur: Pressure treatment according to CSA 080 Series, water borne Alkaline Copper Quaternary (ACQ) or Copper Azole (CA) Preservative.
.2 Pressure treat timber with waterborne preservative according to AWPA U1; Use Category UC4a.
.3 Preservative Chemicals: Acceptable to authorities having jurisdiction.
.4 Do not use chemicals containing arsenic or chromium, except for timber posts.
.5 Use process that includes water-repellent treatment
.6 Treat cut surfaces with two brush coats of copper naphthenate preservative or liquid Borate as applicable.
.7 After treatment, re-dry to 19% maximum moisture content.
.8 No pressure treated timber to be in direct contact with children playspaces.

.4 Plastic/Recycled Lumber Decking –

.1 Acceptable products include:
  .1 Trex Composite Decking
  .2 Hahn Plastics
  .3 Wishbone Perma-Deck
.2 All fasteners and installation to be as per manufacturer's specifications.
.3 Colour: As per Landscape Architect's drawings

.5 Nails/Hardware – to be CSA B111, Hot-dipped galvanized finish unless otherwise specified;

sizes as recommended in CAN/CSA-O86. Supply 200mm spiral spikes for lateral nailing. Use hot-dipped galvanized fasteners meeting ASTM A153 and connectors meeting ASTM A653 Class G185 for ACQ and CA for pressure treated wood. Nails to be a minimum of 35m.

.6 Wood preservative/sealer: Unless otherwise stated on drawings all decking to have CIL Rainshield WP Clear Wood Sealer applied as per manufacturer's specifications. All IPE/Hardwood decking to have Deckwise IPE Oil Hardwood Deck Finish applied as per manufacturer's specifications.

.7 Splines – Galvanized metal as recommended by decking manufacturer.

PART 3: EXECUTION

3.1 INSTALLATION, GENERAL

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

3.2 INSTALLATION OF DECKING

.1 Conduct wood deck installation work in accordance with CAN/CSA 086 except where otherwise specified.

.2 Install decking in accordance with CAN/CSA 086, simple span pattern unless otherwise shown on drawings.

.3 Provide a minimum of one bearing support for each plank.

.4 Stagger end joints in adjacent planks minimum of 0.5m. Separate joints in same area by at least two intervening courses. Avoid joints in first fifth of end spans. Minimize joints in middle third span.

.5 Touch up end cuts with preservative where pressure treated lumber is specified.

.6 Apply sealer to all deck boards evenly as per manufacturer's specifications.

.7 For IPE/Hardwood Decking pre-drill all decking to ensure splitting does not occur. All decking holes to be filled.

3.3 INSTALLATION OF FRAMING

.1 Framing Standard to be set to AF&PA M4 and the BC Building Code.

.2 Install metal framing anchors to comply with manufacturer's written instructions.

.3 Do not splice structural members between supports unless otherwise indicated.

.4 Securely attached exterior rough carpentry work to substrate by anchoring and fastening as indicated, comply with the following:

.1 ICC-ES for power-driven fasteners
.2 'Fastening Schedule' In ICC's International Building Code
.3 BC Building Code

3.4 INSTALLATION OF GENERAL LUMBER

.1 Provide stair installation with no more than 5mm variation between adjacent treads and risers and no more than 10mm variation between largest and smallest treads and risers within each flight.

.2 Treads and Risers: Secure by gluing and nailing to carriages. Countersink fastener heads, fill flush and sand filler. Extend treads over carriages

.3 Balusters: Fit to railings, glue, and nail in place. Countersink fastener heads, fill flush, and sand filler

.4 Newel Posts: Secure to stringers and risers with through bolts.

.5 Railings: Secure wall rails with metal brackets. Fasten freestanding railings to facia/newel posts/framing with countersunk head wood screws or rail bolts.

3.5 CLEANING

.1 Remove tool marks, bruises, and scratches.

3.6 QUALITY CONTROL

.1 Testing moisture content of delivered material will be performed by the contractor. Tests to be provided to Owner's Representative prior to installation.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

3.8 MAINTENANCE

.1 Provide owner with two (2) 946ml containers of each sealer applied upon completion of project.

END OF SECTION 06 15 33

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 clear and grub site in preparation for landscape or site work indicated on the contract drawings.

.2 The work shall include but is not limited to the following areas:

.1 Clearing and grubbing operation.

.2 Disposal of material cleared and grubbed from the site.

1.3 Related Work

.1	Site Preparation and Grading	Section 01 89 13
.2	Tree Protection	Section 32 01 56

1.4 Protection

.1 Protect existing fencing, natural features, benchmarks, existing buildings, existing pavement, sub surface and surface utility lines, and water courses and miscellaneous items noted on contract drawings as to remain.

.2 Protect all existing trees, landscape plant beds, miscellaneous plant material and their associated root areas within the area to be cleared and grubbed that have been identified to remain on the contract drawings.

.3 Protect all existing trees, landscape plant beds, miscellaneous plant material and their associated root areas that are outside of area to be cleared and grubbed.

.4 The Contractor, at no cost to the Owner shall make good all damages incurred during the clearing and grubbing process.

PART 2: PRODUCTS (Not Applicable)

PART 3: EXECUTION

3.1 Clearing and Grubbing

.1 All excavation shall be undertaken in accordance with the Standard Operating Procedure-Soil and Excavation Water Contamination Management.

.2 Clear and grubbing operations shall be limited to areas indicated on the Contract drawings. Contractor shall identify the areas to be cleared and grubbed in the field by flagging or staking for Owner's Representative review prior to the start of work.

.3 Clear all trees, existing plant growth, undergrowth, dead wood, surface rocks or boulders and all deleterious material.

.4 Grub out all stumps, roots rubbish over 50mm (2") in size to minimum depth of 300mm (12") below indicated finish grade.

.5 Grub out all parts of noxious or invasive plants including but not limited to varieties of Equisetum, Rubus, Hedera and Fallopia japoinica.

.6 Remove and dispose of off-site, embedded rocks and boulder less than 0.15 cubic metres (5 cubic feet) encountered during clearing and grubbing operation.

.7 Dispose of cleared and grubbed material in an approved off-site dump location. No on site burning or burying of grubbed material will be allowed.

.8 Do not clear or grub existing trees, landscape plant beds, miscellaneous plant material and their associated root areas that have been identified on the contract drawings or marked in the field by the Owner's Representative or Contractor to remain.

3.2 Finished Surface

.1 Finished grade of the areas that have been cleared and grubbed shall be left generally smooth and level and suitable for immediate rough grading operations.

END OF SECTION 31 11 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 excavate and backfill for all landscape paved areas, footings, walls, etc. indicated on contract drawings.

.2 The work shall include but is not limited to the following areas:

.1 Excavation of subgrade

.2 Grading operations to attain sub grade design grades

.3 Import and placement and compaction of granular fill materials

.4 Compaction testing

.5 Removal and disposal of excess material off site

1.3 Related Work

.1 Cast-In-Place Concrete Section 03 30 53

1.4 Reference Standards

.1 Contractor is responsible for complying with all current Work Safe BC requirements for site safety related to the scope of work in this section. This includes but is not limited to protection of personnel and site safety procedures related to open excavation.

.2 All work under this section shall conform to the requirements of the American Society for Testing and Materials, Standards as referenced herein.

1.5 On and Off Site Construction Maintenance

.1 Contractor shall be responsible for implementation, maintenance, and decommissioning of vehicle wheel wash facility. Decommissioning of wheel wash facility includes but is not limited to fill and regrading of affected area to the satisfaction of the Owner's Representative.

.2 Contractor shall be responsible for cleaning of adjacent municipal streets, private streets and driveways affected by vehicle movements on site or to and from the site.

.3 Contractor shall be responsible for implementing and maintaining dust control measures for all on site activities of this section. Dust control measures shall meet all local bylaws and regulations.

1.6 Site Access

.1 The Contractor shall be responsible for ensuring that there is minimal disruption of vehicle and pedestrian traffic flow on adjacent existing roads during work of this section.

.2 The Contractor shall be responsible for providing warning signs, flashing lights, flag people barricades, etc. to ensure vehicle and pedestrian movement associated with the site or adjacent to the site meets all applicable municipal, provincial or federal requirements.

1.7 Protection

.1 Prior to commencing any excavation work the contractor shall establish the location of any existing active buried utility or service lines, including service entry points. Mark these locations clearly on site to prevent accidental disturbance during the work.

.2 Any utility or service which is presently in use, or not established as abandoned but which must be moved or otherwise disturbed, shall be referred to the utility or service company concerned so that they may advise on, co–ordinate, inspect necessary operation for relocation.

.3 Costs incurred by any disturbance of existing active utilities and service lines, not called for under the contract documents, shall be borne by the Contractor.

.4 Any damage done including settlement or collapse to existing active services caused by inadequate measures taken by the Contractor to prevent such disturbances shall be rectified immediately by the Contractor at no cost to the Owner.

.5 The Contractor shall protect all adjacent structures and surfaces including but not limited to roadways and sidewalks from damage, direct or incidental as a result of work of this section.

.6 The Contractor shall make good all damages to adjacent structures and surfaces including but not limited to roadways and sidewalks as a result of work of this section to the satisfaction of the Owner's Representative.

1.9 Deposits

.1 The Contractor shall at no cost to the Owner shall obtain all damage and/ or crossing deposits required by the municipal, provincial, federal or utility to carry out the work of this section**.**

1.10 Tests and Approvals

.1 The Contractor shall at no cost to the Owner and as part of the work of this section perform, or cause to be performed, all tests, inspections and approvals.

.2 Should the test, inspection or approval require a representative sample of the material or workmanship the Contractor shall at no cost to the Owner supply the labour and materials necessary to provide the sample or test.

.3 Should the test or inspection indicate that the material or work completed does not conform to the specifications the Contractor shall at no cost to the Owner promptly remove this work, dispose of it off site and re-execute it in accordance with the Contract Documents. The remedial work shall include retesting as required to establish conformance with the Contract Documents.

1.11 Submittals

.1 Prior to the start of work for this section the Contractor shall submit the following to the Owner's Representative for review;

.1 Sieve analysis of granular material

.2 Source for supply of all materials (source shall be used throughout duration of project). Should a change of material source be proposed during work; provide samples and sieve analysis from proposed source.

.3 Company name, address and contact information for material testing company.

.4 Confirm in writing to the Owner's Representative that he/she has verified the locations of all underground services.

.5 Obtained in writing and submitted to the Owner's Representative at no Cost to the Owner permission from adjacent property owners and/or municipality to carry out work beyond the property limits of this contract if required to carry out the work of this section.

.6 Notify the Owner's Representative for on site review of sub grade preparation work forty–eight (48) hours prior to commencement of import, placement and grading operations.

PART 2: PRODUCTS

2.1 General

.1 Review and approvals by a Geotechnical Engineer engaged by the Contractor shall be signed and sealed and submitted to the Owner's Representative prior to use of this material.

2.2 **Native Material Fill**: Will be considered but must be reviewed and approved by either the project Geotechnical Engineer or should a Geotechnical Engineer not be part of the project team a Geotechnical Engineer engaged by the Contractor at no cost to the Owner.

2.3 **Pit Run Gravel:** To be well graded granular material, substantially free from clay lumps, organic matter and other extraneous material, screened to remove all stones in excess of maximum diameter specified in material description, e.g. (300mm Pit Run Gravel, 200mm Pit Run Gravel and 100mm Pit Run Gravel). Recycled concrete free from contaminated and other extraneous materials conforming to the specified gradations may be used as pit run gravel.

Sieve Size (mm)	Percent Passing
(300)	100
(200)	100
(100)	100
75	100
50	70-100
25	50-100
4.75	22-100
2.36	10-85
0.075	2-8

2.4 **Granular Sub Base:** Shall be 75 mm (3") minus, clean, granular material free of organic material conforming to following gradation limits:

Sieve Size (mm)	Percent Passing
80	100
75	55-100
4.8	30-100
38	60-100
19	35-80
9.5	26-60
4.75	20-40
2.36	15-30
1.18	10-20
0.6um	5-15
0.3um	3-10
0.075um	0-5

2.5 **Granular Base:** The 19 mm (3/4") crushed granular base shall consist of sound, durable particles, free from clay, organic material or other deleterious matter, evenly graded, to meet the following gradation requirements.

Sieve Size (mm)	Percent Passing
19	100
12.5	75-100
9.5	60-90
4.75	40-70
2.36	27-55
1.18	16-42
0.60	8-30
0.30	5-20
0.15	5-15
0.074	2-8

2.6 **River Sand:** River sand to be free of organic material, salt and foreign objects and conform to the following gradation:

Sieve Size (mm)	Percent Passing
19	100
4.75	80-100
0.6	20-80
0.15	0-20
0.075	0-8

PART 3: EXECUTION

3.1 Excavation

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

.2 Grade to elevations and dimensions indicated on contract documents or required by the work of this section or related sections.

.3 Ensure that work of this section provides sufficient space to permit erection of forms, site elements and miscellaneous elements of related sections.

.4 Excavation shall ensure that the placement of fill materials are minimized.

.5 Contractor shall phase his operation so that a stable slope at the edge of excavation is maintained at all times. Where sloping of the sides of excavations are not possible the Contractor shall implement appropriate safety measures in accordance with current WCB of BC requirements.

.6 During excavation, stockpile material suitable for backfill in a neat manner and sufficient distance from the trench to avoid slides and cave-ins.

.7 All excavated materials not required or suitable for backfill shall be removed and disposed of as indicated or as directed. Grade as required to prevent surface water from flowing into trenches or other excavations. Remove any accumulated water by pumping or other approved method.

.8 All exposed excavation faces shall be protected from weather with appropriate tarps or plastic sheeting as soon as possible after being cut.

.9 Remove all boulders, rock and stones larger than 150 mm (6") in diameter from excavated surfaces encountered during excavation. Fill cavities created with crushed granular base material compacted to 95% Modified Proctor Density.

.10 Bottom of excavation to be level, free from loose material and debris.

.11 Protect excavations against freezing. Frozen areas shall be thawed and protected from further frost until subsequent work has been completed.

.12 All necessary precautions shall be taken to preserve all materials outside the required excavations in an undisturbed condition.

.13 Costs incurred as a result of deterioration caused by activities or neglect of the Contractor or and fill required for over excavation as a result of action by the contractor are the responsibility of the contractor.

3.2 Placement of Granular Fill Material

.1 Prior to the backfill operation of site excavation ensure the following actions have been completed:

.1 Concrete foundation walls and footings shall have reached specified strength unless otherwise approved by the Owner's Representative.

.2 All backfill materials shall have been inspected and approved by the Geotechnical Engineer.

.3 Each component of the backfill operation shall have been inspected and approved to by the Geotechnical Engineer at the time of placement.

.4 Compaction density tests shall have been completed and tests results reviewed and approved by the Geotechnical Engineer.

.2 Place crushed granular sub–base in maximum 300 mm (1'-0") lifts to depths indicated on drawings. Compact each lift to 95% Modified Proctor Density.

.3 Place granular base in maximum 150 mm (6") lifts to depths shown on the drawings. Compact each lift to 95% Modified Proctor Maximum Density.

.4 Place all native material fill in uniform 300 mm (1'-0") compacted lifts to depths indicated on drawings. Compact each lift to 95% Modified Proctor Density.

.5 Ensure that granular fill material is placed to the full width of the excavation, in uniform lifts, shaping each lift to smooth, even contours.

.6 Ensure the placement and compaction of crushed granular sub-base and granular base does not segregate or degrade the aggregate.

.7 Apply water as necessary during compaction to obtain specified density. If material is excessively moist aerate by scarifying with suitable equipment until moisture content is suitable for compaction.

.8 Mechanical compaction equipment shall be used with extreme caution to prevent any undue pressure on foundation work. Do not use motorized compaction equipment directly adjacent to foundation or retaining walls.

.9 Where backfill is required on both sides of foundation walls it shall be placed and compacted simultaneously on both sides of the wall.

.10 All sub grade whether disturbed or undisturbed, shall be compacted to 95% Modified Proctor Density.

.11 Soft areas or areas that do not meet specified compacted densities shall be over excavated and filled with compacted crushed granular base as required to obtain the specified compaction density.

3.3 Grading Subgrade and Granular Fill

.1 Site sub grade shall be shaped to lines and elevations indicated on contract drawings.

.2 Finished surface of sub grade and granular fill material shall have no irregularities exceeding 10 mm (3/8") when checked with a 3 M straight edge placed in any direction. Correct all sub grade and granular fill surface irregularities by loosening and adding or removing sub grade or granular fill material until surface is within specified tolerance. Correcting sub grade deficiencies by manipulating granular fill material is not acceptable.

.3 Shaping of sub grade shall ensure uniform slope transitions with rounded, smooth profiles between changes in elevations

.4 Ensure that sub grade preparation allows for depth of granular fill and finished materials as indicated on contract drawings.

3.4 Dewatering

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

.2 Pump or otherwise continuously remove all water that has accumulated in excavation during the progress of the Work.

.3 Do not divert water onto adjacent property.

.4 Ensure that sediment control devices are in place as per municipal or provincial regulations prior to the start of dewatering operations. Do not divert dewatering effluent to natural water bodies.

3.5 Cleaning

.1 Clean up and remove from the site, as the work proceeds any debris and waste material or rubbish resulting from the work of this section.

.2 Transport all surplus excavated materials, fill materials, and debris off site to an approval disposal area.

END OF SECTION 31 23 10

Part 1: GENERAL

1.1 DESCRIPTION

.1 Section includes:

.1 Hot-mix asphalt patching
.2 Hot-mix asphalt paving
.3 Hot-mix asphalt overlay

1.2 RELATED WORK

.1	Aggregates and Granular Materials	Section 31 05 17
.2	Excavating, Trenching and Backfilling	Section 31 23 01

1.3 SUBMITTALS

.1 Contractor is to submit a Design Mix of each mix-type for City Representative/Consultant to review and approve prior to ordering and/or placing on site.

1.4 PROTECTION

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

.2 Material Certificates: For each paving material. Include statement that mixes containing recycled materials will perform equal to mixes produced from all new materials.

.3 Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction.

1.5 INSPECTION AND TESTING

.1 A qualified testing agency paid by the Contractor and approved by District of Mackenzie shall be appointed to prepare mix designs, perform Marshall testing, and submit core samples.

.2 For sport court surfaces: Contractor to perform planarity testing to the satisfaction of the Consultant. Contractor to provide the Consultant 48 hours' notice of planarity testing. Contractor to be prepared to test in the following methods:

.1 Flood testing: Contractor to continuously flood court. No bird baths exceeding the thickness of a toonie (1.75mm) are acceptable.

.2 String-line testing: Contractor to tie a taught line at equal heights laterally and longitudinally across the court. No difference in height between line and court greater that 6mm across a 3m distance is acceptable.

Part 2: PRODUCTS

2.1 MATERIALS

.1 Asphalt cement: to CGSB-16.3-M90, Grade 80 – 100.

.2 Reclaimed asphalt pavement (RAP): Crush and screen so that 100% of reclaimed asphalt pavement material passes 37.5mm screen before mixing.

.3 Aggregates: to Section 31 05 17 – Aggregates and Granular Materials and following requirements:

.1 Crushed stone or gravel consisting of hard, durable, angular particles, free form clay lumps, cementation, organic material, frozen material and other deleterious materials.
.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117.

Sieve Designation	**Percent Passing**				
	***Lower Course #1**	***Lower Course #2**	***Upper Course #1**	***Upper Course #2**	***Fine Mix**
25.0 mm	100	--	--	--	--
19.0 mm	--	100	100	--	--
12.5 mm	70-85	84-99	84-99	100	--
9.5 mm	--	73-88	73-88	--	100
4.75 mm	40-65	50-68	50-68	55-75	80-100
2.36 mm	32-53	35-55	35-55	38-58	64-89
1.18 mm	26-44	27-46	27-46	28-47	48-76
0.600 mm	18-36	18-36	18-36	20-36	32-60
0.300 mm	10-26	10-26	10-26	10-26	16-42
0.150 mm	4-17	4-17	4-17	4-17	6-23

0.075	mm	3-8	3-8	3-8	3-8	4-10

.3 Coarse aggregate is aggregate retained on 4.75mm sieve and fine aggregate is aggregate passing 4.75mm sieve when tested to ASTM C136.

.4 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75mm sieve and stockpile separately from coarse aggregate.

.5 Do not use aggregates having known polishing characteristics in mixes for upper courses.

.6 San equivalent: to ASTM D2419. Min: 40

.7 Magnesium Sulphate soundness: to ASTM C88.
Max % loss by mass after five cycles:

.1 Coarse aggregate: 15

.2 Fine aggregate: 18

.8 Los Angeles abrasion: Grading B, to ASTM C131.
Max % loss by mass:

.1 Coarse aggregate, upper course: 25

.2 Coarse aggregate, lower course: 35

.9 Absorption: to ASTM C127
Max % by mass:

.1 Coarse aggregate, upper course: 1.75

.2 Coarse aggregate, lower course: 2.00

.10 Loss by washing: to ASTM C117.
Max % passing 0.075mm sieve:

.1 Coarse aggregate, upper course: 1.5

.2 Coarse aggregate, lower course: 2.0

.11 Flat and elongated particles: (with length to thickness ratio greater than 3):
Max % by mass:

.1 Coarse aggregate, upper course: 10

.2 Coarse aggregate, lower course: 10

.12 Crushed fragments: at least 60% of particles by mass within each of following sieve designation ranges, to have at least 2 freshly fractured faces. Material to be tested according to ASTM C136 and ASTM C117.

Determination of amount of fractured material will be in accordance with Ministry of Transportation and Highways Specification I-11, Fracture Count for Coarse Aggregate, Method “B”, which determines fractured faces by mass.

Passing	Retained On
25mm	12.5mm

12.5mm	4.75mm

.13 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.

.4 Mineral filler:

.1 Finely ground particles of limestone, hydrated lime, Portland cement or other approved non-plastic mineral matter, thoroughly dry and free from lumps.
.2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed to improve mix properties.
.3 Mineral filler to be dry and free flowing when added to aggregate.

2.2 MIX DESIGN

.1 Submit job mix formula to Consultant for review and approval.

.2 Design of mix: by Marshall method to requirements below:

.1 Compaction blows on each face of test specimens: 75
.2 Mix physical requirements:

Property	Unit	Value	Pavement Course
Marshall Stability at 60°C (kN min.)	kN min.	6.4	Lower course
		5.5	Upper course
		5.5	Fine
Flow value:	mm	2.4	All
Air Voids in Mixture	%	13	Lower course 1
		14	Lower course 2
		14	Upper course 1
		15	Upper course 2
		15	Fine
Index of Retained Stability	% min	75	All

.3 Measure physical requirements as follows:

.1 Marshall load and flow value: to ASTM D1559
.2 Air voids: to ASTM D3203
.3 Index of Retained Stability: measure in accordance with Marshall Immersion Test (ASTM D1559)
.4 Do not change job-mix without prior approval of the Consultant. Should change in material source be proposed, new job-mix formula to be submitted to the Consultant for review and approval.

Part 3: EXECUTION

3.1 MIXING TOLERANCES:

.1 Permissable variation in aggregate gradation from job mix (percent of total mass):

.1 4.75mm sieve and larger: 5.5
.2 2.36mm sieve: 4.5
.3 0.600mm sieve: 3.5
.4 0.150mm sieve: 2.5
.5 0.075mm sieve: 1.5

.2 Permissible variation of asphalt cement from job mix, 0.3%

.3 Permissible variation of mix temperature at discharge from plant, 5°C.

3.2 EQUIPMENT

.1 Pavers: mechanical grade-controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown as shown on Contract Drawings.

.2 Rollers: sufficient number of rollers of type and weight to obtain specified density of compacted mix.

.3 Vibratory rollers:

.1 Minimum drum diameter: 1200mm.
.2 Maximum amplitude of vibration (machine setting): 0.5mm for lifts less than 40mm thick.

.4 Haul trucks: of adequate size, speed and condition to ensure orderly and continuous operation and as follows:

.1 Boxes with tight metal bottoms.
.2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
.3 In cool weather or for long hauls, insulate entire contact area of each truck box.
.4 Trucks which cannot be weighed in a single operation on scales supplied will not be accepted.

.5 Hand tools:

.1 Lutes or rakes with covered teeth for spreading and finishing operations.
.2 Tamping irons having mass not less than 12kg and a bearing area not exceeding 310cm2 for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Contract Administrator, may be used instead of tamping irons.
.3 Straight edges, 3.0m in length to test finished surface.

3.3 PREPARATION

.1 Reshape granular roadbed in accordance with Section 31 22 16 – Reshaping Granular Roadbed, Section 32 13 16.1 – Roller Compacted Concreted Paving and Section 32 01 16.8 – Full Depth Reclamation, if required.

.2 When paving over existing asphalt surface, clean pavement surface in accordance with Section 32 01 11 – Pavement Surface Cleaning and Removal of Pavement Markings. When levelling course is not required patch and correct depressions and other irregularities to approval of Contract Administrator before beginning paving operations.

.3 Adjust existing castings to new elevations and protect from asphaltic mix.

.4 When matching new pavement with existing pavement make vertical cut between existing pavement and new pavement as shown on Contract Drawings.

.5 Apply prime coat and/or tack coat in accordance with Section 32 12 13.2 Asphalt Prime and/or Section 32 12 13.1 Asphalt Tack Coat prior to paving.

.6 Prior to laying mix, clean surfaces of loose and foreign material.

3.4 TRANSPORTATION OF MIX

.1 Transport mix to job site in vehicles cleaned of foreign material.

.2 Paint or spray truck beds with light oil, limewater, soap or detergent solution, at least once a day or as required. Elevate truck bed and thoroughly drain. No excess solution will be permitted.

.3 Schedule delivery of material for placing in daylight, unless Contract Administrator approves artificial light.

.4 Deliver material to paver at a uniform rate and in an amount within capacity of paving and compacting equipment.

.5 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within specified range. Temperature of mix upon placement shall not be less than 125°C.

3.5 PLACING

.1 Obtain Consultant's approval of base, existing surface, tack coat, or prime coat prior to placing asphalt.

.2 Place asphalt concrete to thicknesses, grades and lines as shown on Contract Drawings.

.3 Placing conditions:

.1 Place asphalt mixtures only when air temperature is about 5°C. Place overlay pavement only when air temperature is above 10°C.
.2 When temperature of surface on which material is to be placed falls below 10°C, provide extra rollers as necessary to obtain required compaction before cooling.
.3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.

.4 Place asphalt concrete in compacted lifts of thickness as shown on Contract Drawings:

.1 Levelling course(s) to thicknesses required but not exceeding 100mm each.
.2 Lower course in layers not to exceed 100mm each.
.3 Surface course in layers of maximum 60mm each.

.5 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300mm.

.6 Spread and strike off mixture with self-propelled mechanical finisher.

.1 Construct longitudinal joints and edges true to line markings. Position and operate paver to follow established line closely.
.2 When suing pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case permit them to be more than 30m apart.
.3 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
.4 Correct irregularities in alignment left by paver by trimming directly behind machine.
.5 Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.
.6 Do not throw surplus material on freshly screeded surfaces.

.7 When hand spreading is used:

.1 Approved wood for steel forms, rigidly supported to assure correct grade and cross section, may be used. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.
.2 Distribute material uniformly. Do not broadcast material.
.3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. Reject material that has formed into lumps and does not break down readily.
.4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.

.5 Provide heating equipment to keep hand tools free from asphalt. Avoid high temperatures which may burn material. Do not use tools at a higher temperature than temperature of mix being placed.

3.6 COMPACTION

.1 Roll asphalt continuously to average density not less than 97% of 75 blow Marshall density in accordance with ASTM D1559 with no individual test less than 95%.

.2 General

.1 Provide at least two rollers and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller to be pneumatic tired type.
.2 Start rolling operations as soon as placed mix can bear weight of roller with undue displacement of material or cracking of surface.
.3 Operate roller slowly initially to avoid displacement of material. For subsequent rolling do not exceed 5km/h for static steel-wheeled rollers and 8km/h for pneumatic-tired rollers.
.4 For lifts 50mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum 20 impacts per metre of travel. For lifts less than 50mm thick impact spacing should not exceed compacted lift thickness.
.5 Overlap successive passes of roller by at least one half width of roller and vary pass lengths.
.6 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.
.7 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.
.8 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
.9 After traverse and longitudinal joints and outside edge have been compacted have been compacted, start rolling longitudinally at low side and progress to high side.
.10 When paving in echelon, leave unrolled 50 to 75mm of edge which second paver is following and roll when joint between lanes is rolled.
.11 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.

.3 Breakdown rolling:

.1 Commence breakdown rolling immediately following rolling of transverse and longitudinal joint and edges.
.2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
.3 Operate breakdown roller with drive roll or wheel nearest finishing machine. Exceptions may be made when working on steep slopes or super-elevated sections.
.4 Use only experienced roller operators for this work.

.4 Second rolling:

.1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as

closely as possible and while paving mix temperature allows maximum density from this operation.

.2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.

.5 Finish rolling:

.1 Accomplish finish rolling with steel wheel rollers while material is still warm enough for removal of roller marks.

.2 Conduct rolling operations in close sequence.

3.7 JOINTS

.1 General:

.1 Remove surplus material from surface of previously laid strip. Do not dispose on surface of freshly laid strip.

.2 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as specified.

.3 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

.2 Transverse joints:

.1 Offset transverse joint in succeeding lifts by at least 600mm.

.2 Cut back to full depth vertical face and tack face with thin coat of asphalt prior to continuing paving.

.3 Compact transverse joints to provide a smooth riding surface.

.3 Longitudinal joints:

.1 Offset longitudinal joints in succeeding lifts by at least 150mm.

.2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100°C prior to paving of adjacent lane. If cold joint can not be avoided, tack face of adjacent lane with thin coat of asphalt prior to continuing paving.

.3 Overlap previously laid strip with spreader by 100mm.

.4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with a lute or rake.

.5 Roll longitudinal joints directly behind paving operation.

.6 When rolling with static roller, shift roller over onto previously placed lane in order that 100 to 150mm of drum width rides on newly laid lane, then operate roller to pinch and press fines gradually across joint. Continue rolling until thoroughly compacted neat joint is obtained.

.7 When rolling with vibratory roller, have most of drum width ride on newly placed lane with remaining 100 to 150mm extending onto previously placed and compacted lane.

.4 Construct feather joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix. Place and compact joint so that joint is smooth and without visible breaks in grade. Location of feather joint as specified.

.5 Construct butt joints at locations and to details as shown on Contract Drawings.

.6 Wherever practical, locate joints under future traffic markings (paint lines).

3.8 PAVEMENT PATCHING

.1 Ensure temporary and permanent pavement patching done by handwork conforms to all standards specified for machine placed asphaltic concrete.

.2 Subbase and base preparation as specified in Section 32 11 16.1 – Granular Subbase and Section 32 11 23 – Granular Base respectively, unless shown otherwise on Contract Drawings.

3.9 SIDEWALKS, DRIVEWAYS AND CURBS

.1 Hot-mix asphalt concrete sidewalks, driveways and curbs as shown on Contract Drawings.

.2 Machine place where practical.

.3 Ensure placement by handwork conforms to all standards specified for machine placed asphaltic concrete.

.4 Other than requirements relating specifically to Portland cement concrete, ensure hot-mix asphalt concrete sidewalks and curbs comply with all requirements of Section 03 30 20 – Concrete Walks, Curbs and Gutters.

.5 Ensure hot-mix asphalt concrete driveways comply with all requirements of Section 32 12 16 – Hot-Mix Asphalt Concrete Paving.

3.10 FINISHED TOLERANCES

.1 Ensure finished asphalt surface within 6mm design elevation but not uniformly high or low.

.2 Ensure finished asphalt surface does not have irregularities exceeding 6mm when checked with a 3m straight edge placed in any direction.

.3 Water ponding not permitted.

.4 Against concrete gutter, finished asphalt surface to be higher than the gutter by not more than 6mm.

3.11 DEFECTIVE WORK

.1 Correct irregularities which develop before completion of rolling by loosening upper mix and removing or adding material as required.

.2 If irregularities or defects remain after final compaction, remove upper course promptly and lay new material to form a true and even surface and compact immediately to specified density.

3.12 CLEAN-UP

.1 Remove lids or covers from all castings and clean any prime, tack coat or hot-mix asphaltic concrete from frames, lids and covers of all castings.

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 crushed granular paving as indicated in the contract documents.

.2 The work shall include the supply and installation of granular paving as indicated, including:

- .1 Granular Base
- .2 Crushed Granular Paving
- .3 Stabilizer
- .4 Edge Restraint

1.3 Related Work

.1	Excavation and Backfill	Section 31 23 10

1.4 Submittals

.1 Submit a sieve analysis and a one (1) litre sample of crushed granular paving for review.

.2 Submit product information and sample of stabilizer.

1.5 Quality Control

.1 Prior to the start of construction provide a stake layout of all both edges of all crushed granular paving areas for review by the Owner's Representative. Stake spacing to be such that the shapes and forms of the crushed granular paving areas can be clearly seen.

1.6 Protection

.1 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.

PART 2: PRODUCTS

2.1 **Crushed Granular Paving:** shall consist of sound, durable stone particles free from clay, organic material or other deleterious matter as per ASTM C 136.

2.2 **9mm minus crushed stone**

Sieve Size (mm)	Percent Passing by Weight
9.0	100%
4.75	50 -55%
2.36	25 – 28%
1.18	15- 18%

2.3 **Stabilizer:** organic base, water activated polymer that binds particles together forming a homogenous, semi porous surface conforming to ADA (American with Disabilities Act) requirements. Acceptable products include but are not limited to Stalok W/A Binder by Stabilizer Solutions, Phoenix Arizona or approved equal.

2.4 **Edge Restraint:** Shall be manufactured from 100% recycled material, UV stable and capable or retaining curved or straight precast concrete unit paver installations. Acceptable products include; B.E.A.S.T by Brickstop as distributed by Abbottsford Concrete Products, Abbottsford, BC or approved equal.

2.5 **Edge Restraint Spikes:** 300mm (12”) long, galvanized metal spikes.

PART 3: EXECUTION

3.1 **Inspection**

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

3.2 Preparation of Subgrade

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

.2 Compact subgrade to 95% Modified Proctor Density.

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

3.3 Granular Base

.1 Place granular base over sub–grade in maximum 150 mm (6”) lifts compacted to 95% MPD.

3.4 Edge Restraint

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

3.5 Crushed Granular Paving

.1 Owner’s Representative shall review crushed granular base prior to the placement of the crushed granular paving.

.2 Blending Stabilizer: Prior to the placement of material, create a homogeneous mix of stabilizer and crushed granular paving material using the mix ratio recommended by the stabilizer manufacturer.

.3 Place the homogeneous mix of stabilizer and crushed granular paving material to lines and grades indicated on the contract drawings.

.4 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.

.5 Let saturated material stand for at least six (6) hours. Compact material using a 900 – 1,800kg (2-4 ton) double drum roller or 450kg (1,000lbs) single drum roller. Do not compact with any type of vibratory equipment.

.6 Ensure surface material remains moist by applying a light mist of water as required.

3.6 Cleaning

.1 All paved areas or adjacent surface 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 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 labor, 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 Picnic Table

A. Manufacturer / Supplier: Maglin.

B. Model: 200 Series MTB-0210-00031

C. Mounting: Surface mount

D. Frame Colour: RAL 7035 Light Grey

E. Slats Material/Colour: HDPC, Charcoal

F. Quantity: 5 in base bid, 8 optional bid

2.2 Benches

A. Manufacturer: Maglin.

B. Model: 800 series, MBE-0870-00011

C. Mounting: Surface mount

D. Frame Colour: RAL 7035 Light Grey

E. Slats Material/Colour: HDPC, Charcoal

F. Quantity: 2

2.3 Curved Benches

A. Manufacturer: Maglin.

B. Model: Ogden Bench, OGM1900-SCR9

C. Mounting: Surface mount Square Legs – MS1

D. Frame Colour: RAL 7035 Light Grey

E. Slats Material/Colour: HDPE, Charcoal

F. Quantity: 8 optional bid

2.4 Bear Safe Garbage Receptacle

A. Manufacturer: Wishbone.

B. Mode Name: Freedom 32 HFB-32S (All metal with recycled plastic siding)

C. Mounting: Surface mount

D. Fame Colour: Semi-gloss black

E. Recycled plastic colour: Walnut

F: Quantity: 3

2.5 Bike Repair Post

A. Manufacturer: Greenspoke.

B. Model Name: Bike repair post with integral pump, RP-V5

C. Mounting: Surface mount

D. Colours: RAL 6018 GS Green

G. Quantity: 2

2.6 Bike Rack

A. Manufacturer: Maglin.

B. Model: 500 Series, MBR-0500-00003

C. Mounting: Surface mount

D. Colours: RAL 7035 Light Grey

G. Quantity: 2

PART 3: EXECUTION

3.1 INSTALLATION

.1 General:

.1 All furnishings to be laid out for review and approval by landscape architect prior to installation.

.2 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.

END OF SECTION 32 37 00

GENERAL

GENERAL REQUIREMENTS

PART 1:

Refer to Division 1, General Requirements.

1.1 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

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

1.2

.1

RELATED WORK

1.3

Plants and Planting	Section 32 93 10
.1 Hydraulic Seeding	Section 32 92 21

.2

REFERENCE STANDARDS

1.4

.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 Society for Testing and Materials (ASTM)

1.5

.1

DEFINITIONS

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

.3 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.

1.6

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

.1

TESTING

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.

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

Or approved equal testing centre.

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.

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

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

All samples to represent characteristics of the final delivered soil.
.3

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

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

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

.8 **SUBMITTALS AND EVALUATION**

1.7 Action Submittals: Submit analysis to Owner's Representative for review and acceptance not
.1 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,
.6 Manganese, Iron, Zinc and Calcium.
Texture Analysis and distribution of gravel, coarse sand, medium sand, and fine sand in
.3 addition to silt and clay.

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

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

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

1.8 Acceptance of material at source does not preclude future rejection if material fails to conform
.1 to requirements specified following onsite analysis, or if its field performance is found to be unsatisfactory.
.2

DELIVERY, STORAGE, AND HANDLING

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

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.

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.

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.

.3 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

.4 environmental regulations.

.5 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.

.6

CONTAMINATED ONSITE SOIL

1.9 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

.1 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:

2.1 ## SOIL TYPES

.1

AT GRADE SOIL FOR BEDS

.2 On site or imported soil shall be friable "A Horizon" topsoil to the requirements of the Canadian Landscape Standard Level 1-3P in addition to this:

.3

.4 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".

.5

.6 Soil shall be of a sandy loam or loamy sand texture as specified by Owner's Representative.

Containing between 3% and 15% organic matter (dry weight basis), organic matter not to

2.2 contain large quantities of Mushroom Manure or Yard Waste.

.1 Salinity: Maximum saturation extract conductivity of 2.5 mmho/cm.

PH: 6.0-7.5 – unless planting is noted as specified for a PH 7.5-8.5.

LAWN AREA SOILS

On site or imported soil shall be friable "A Horizon" topsoil to the requirements of the Canadian Landscape Standard Level 1-3H/L in addition to this:

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”.

Containing between 3% and 15% organic matter (dry weight basis), organic matter not to contain large quantities of Mushroom Manure or Yard Waste.

Containing min 75% Coarse Sand.

.2 Salinity: Maximum saturation extract conductivity of 2.5 mmho/cm.

.3 PH: 6.0-7.5 – unless planting is noted as specified for a PH 7.5-8.5.

.4

.5 **BIO-RETENTION SOILS**

.6 Specified in applications where a soil with high sand content is required to create a structure which retains moisture to prolong drainage, conserve water and act as a screen to filter

2.3 runoff. Sites with in-situ soil infiltration rates of 5cm per hour or greater immediately prior to

.1 the initial placement of the media, bio-retention media is recommended.

Imported soil shall be friable “A Horizon” topsoil to the requirements of the Canadian Landscape Standard, used at grade and off-site - as per Level 1-3P in addition to this:

.2 Soil texture to be sandy clay loam with 5-15% Silt content, 2-5% Clay and 70-90% Coarse Sand of particle size 0.002-0.05mm.

.3

Containing between 10% and 15% organic matter (dry weight basis), organic matter not to

.4 contain large quantities of Mushroom Manure or Yard Waste.

.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 7.5-8.0.

.7 Fertilizers should not be added to Bio-retention soils.

.8

Approved product: “ecoMedia” from Veratec, Chilliwack, BC
Or pre-approved equal.

2.4

.1 **MULCH**

2.5 Refer to Section 32 93 10 Plants and Planting.

.1

AMENDMENTS

.2

.3 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:

.4 Manure: Not to be used in the amendment of soils.

Organic Matter: Owner’s Representative does not allow use of any paper fibre amended

.5 compost products. Shall be derived from organic source free of sewage biowaste, heavy

.6 metals, contaminants, animal or plant chemical additives or supplements.

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.

Peat moss: Not to be used.

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.

Dolomite Lime: Approved commercial brands for horticultural purposes, coarsely ground; containing not less than 20% calcium by weight.

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.

.7

.8 **FERTILIZERS**

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.

2.6

.1 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

DRAINAGE MEDIUM

2.7 Drain Rock: Shall consist of clean round stone or crushed rock. Acceptable material includes 19 mm (3/4") drain rock or torpedo gravel.

.1

.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.

2.8

.1 **FILTER FABRIC**

Needled, non-woven polypropylene mat. Nilex 4545 by Nilex Geotechnical Products Inc., Burnaby, BC or pre-approved equal.

PART 3:

3.1

.1 **EXECUTION**

.2 **SUBGRADE PREPARATION**

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.

.3

.4

.5 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.

.1

Provide at least two days (48 hours) notice in advance of each required review.

All excavation shall be undertaken in accordance with Municipal Rules and Regulations.

On Grade Planting Area:

Scarify compacted subgrade to a minimum depth of 200mm (8") immediately before

placing growing medium.
Verify that subgrades are at the proper elevations before placing growing medium
Remove debris, roots, branches stones in excess of 50mm dia. and other deleterious materials as directed by Owner's Representative.
Remove any soil contaminated with calcium chloride, toxic materials or petroleum products.
Remove any materials that protrude 25mm (1") above the surface.

.2 Dispose of removed material off site.

.3 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.

.4

.5

.6

.7

PLACING GROWING MEDIUM

Do not place growing medium until Owner's Representative has reviewed all planters or sub grades.

3.2

.1 Ensure that root barrier and irrigation lines to be installed have been reviewed by Owner's Representative prior to the placing of growing medium.

.2 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.

.3 Except where Contract Drawings show otherwise, place to the following min. / max. depths and levels (measured after initial settling of growing medium):

.4

.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.

.4 Urban Agriculture 450mm (18") or to within 25mm or 1" of the top of the planter.

.5 Wildflower/Perennial mix on grade 300mm (12") minimum depth.

.6 Green Roof – For Extensive Green Roof on slab 150mm (6") minimum depth.

.5

.1 On slab depth of growing medium to achieve finished grades in all cases. Growing medium depths are not to exceed maximum allowed for by the Structural Engineer. Voiding, sand fill or additional growing medium may be used where required build-up over the drainage layer exceeds the required minimum depths stated above.

.2 For Lawn Areas flush with adjacent surfaces after initial settlement.

.3 For Planting Areas as detailed on Contract Drawings. Crown all planting beds.

.6 Refer to Contract Drawings for top of slab and finished elevations, as applicable.

Crown or slope for positive surface drainage as shown on the drawings.

APPLICATION OF AMENDMENTS

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.

3.3 Addition of amendment components shall be at the rates indicated in the growing medium analysis recommendations via the following methods:

.1 Fertilizers

.2 This material shall be applied with mechanical spreaders over the entire planting area Rake fertilizers into top 50mm (2") minimum of the placed growing medium.

.3 Lime

.1 This material shall be applied with mechanical spreaders over the entire planting area

.2 and mixed thoroughly into the top 100mm (4") of the growing medium prior to fine

.4 grading.

.1 Do not apply by hand.

Ensure lime does not come in contact with the nitrogen - phosphate - potash fertilizers

.2 during amending process.

.3 Organic Matter

.5 Organic matter shall be top-dressed and cultivated into the top 150 -200mm (6"-8") of the

.1 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

.2 be 13mm (1/2").

.3 Eliminate rough spots and low areas to ensure positive drainage.

.4 Leave surface smooth, uniform, firm against deep foot printing, with a fine loose texture.

.5 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.

3.5 Limit foot traffic through soil grade to prevent plating and compaction. Use plywood to create

.1 temporary paths where soil grade is exposed to frequent traffic.

.2 **WEED CONTROL**

3.6 Ensure all weeds and weed roots that have germinated during the course of work of this Section have been eliminated from growing medium.

.1 Provide Owner's Representative with a written methodology outlining of weed removal for approval seven (7) days prior to starting weed removal operations.

MULCHING

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.

CLEANING

All excess materials and other debris resulting from growing medium preparation and placement operations shall be disposed off site.

3.7 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.

.1

.2

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 reinforcing steel as indicated in the contract documents.

1.3 RELATED WORK

.1	Growing Medium	Section 32 91 13
.2	Plants and Planting	Section 32 93 10

1.4 REFERENCE STANDARDS AND REQUIREMENTS OF REGULATORY AGENCIES

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

.1 BCSLA/BCLNA British Columbia Landscape Standard
.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 dealer guarantee statements of composition of the mixture and the percentages of purity and germination of each variety of grass seed.

.2 Submit the original seed containers which clearly identify the manufacturer’s guarantee of seed analysis.

.3 Submit completed Schedule A - Application Record to the Owner’s Representative.

.4 Provide all product data for seed, mulch, tackifier and fertilizer as required and as requested by the Owner's Representative.

.5 Submission in writing if requested by Owner's Representative fourteen (14) days prior to

commencing Work of this Section:

.1 Size of truck slurry in litres.
.2 Amount of material to be used per tank based on size of slurry tank.
.3 Number of tank loads required per hectare to achieve specified slurry mixture per hectare.

1.6 **Protections**

.1 Protect all seeded areas against trespassing and from damage at all times until Acceptance. If any seeded areas are damaged, they shall be repaired as required to satisfaction of Owner's Representative.

.2 Comply with COV pesticide/herbicide control regulations regarding application of herbicides to control noxious weeds. Ensure all manufacturer's recommendations regarding application are strictly adhered to.

1.7 **Testing and Approvals**

.1 Notify Owner's Representative at least forty eight (48) hours before installing seed for inspection of finished grades. Do not hydroseed until grades are approved by Owner's Representative.

.2 Obtain approval in writing from the Owner's Representative for application of any chemical vegetation controls. Comply with applicable federal, provincial and municipal legislation and regulations.

1.8 **Conditions for Acceptance**

.1 The conditions for acceptance of hydroseeded lawn areas and for turning over the hydroseeded areas to the Vancouver Park Board for subsequent maintenance are:

.1 Substantial Performance for the entire project shall have been declared.
.2 Hydroseeded lawn areas shall have been maintained as specified for a min. of 55 days. Hydroseeded lawn shall be mown as specified (to a height of 38mm) no more than two days before inspection for Acceptance.
.3 The hydroseeded lawn shall be uniformly healthy, in a vigorous growing condition, representative of a dense stand of grass, with all deficiencies corrected to the approval of the Owner's Representative. Lawn shall have no evidence of noxious weeds.

.2 Inspection and Acceptance by the Board: Notify the Owner's Representative at least 48 hours in advance to schedule inspection of the entire landscape ready for Acceptance. Acceptance by the Board will only be given provided Maintenance as per Item 3.4 has been carried out and other Conditions of Item 1.8 have been met.

1.9 **Time of Seeding**

.1 The seeding shall be done during periods which are most favourable for the establishment of a healthy stand (of grass) and at times designated by the Board in accordance with the construction schedule and activities and coordinated with the local weather conditions.

.2 No seeding shall be done when the soil is frozen, covered by frost or when there is standing or flowing water on the site, nor if the wind speed is greater than 5 km/h.

.3 The seeding operations shall be completed before September 30, of the calendar year.

1.10 **Guarantee**

.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.

PART 2: **PRODUCTS**

2.1 **GENERAL**

.1 Product Handling

.1 All grass seed, hydraulic mulch fertilizers and related materials shall be stored in a dry, weatherproof storage place and shall be protected from damage by heat, moisture, rodents or other causes until time of use. Care shall be taken that labels and other identification(s) are not removed or defaced in any fashion.

2.2 **FERTILIZER**

.1 Granular Fertilizer: Standard approved brands delivered in original containers, bearing manufacturer guaranteed analysis, dry and free-flowing, organic base, conforming to the applicable Provincial Fertilizer Laws, not less than 19% Nitrogen, 19% Phosphoric Acid and 19% Potash (19-19-19), or as otherwise required based on growing medium test results and time of application.

.2 Slow-Release Fertilizer: Prills designed to release nutrients over a period of months. Agriform 16-7-12 plus iron or equivalent.

2.3 **Grass Seed**

.1 Shall be fresh, clean, new crop certified Canada #1 or better seed, in accordance with Government of Canada “Seeds Act”, with a minimum germination of 75% and a minimum

purity of 97%. Supplied in standard containers with the following information provided: suppliers name and address, lot number/year of production, net weight (mass), names and percentages of individual seed species and percentage of pure seed. Product to be used shall be Interior Forestland Mix by Premier Pacific Seeds. The mix shall be composed of the following varieties in the proportions and testing the minimum percentages of purity and germination indicated:

.1 50%Intermediate Wheatgrass
.2 22% Perennial Ryegrass
.3 13% Hard Fescue
.4 11% Annual Ryegrass
.5 3% Canada Blue Grass
.6 1% Red Top

As supplied and mixed by: a recognized, pre-approved seed distributor acceptable to the Owner.

.2 Areas into which any other varieties of seed have been introduced will not be accepted. The Owner reserves right to test seed for purity and germination rate.

2.4 **Mulch**

.1 Hydroseeding Mulch: Hydroseeding solution shall contain a mulch of dry virgin wood cellulose fibre specifically designed for hydraulic seeding, containing no growth or germination inhibiting factors, and dyed green with a water activated non-toxic dye for visual metering during application; "Ecofibre" as manufactured by Canfor or pre-approved equivalent. In addition:

.1 The Owner does not accept any mulches made from recycled materials such as paper, saw dust, cardboard or pulp residue.
.2 Mulch shall be capable of dispersing in water to form a homogeneous slurry and remaining in such a state when agitated or mixed with other specified materials. In addition it shall be capable of forming an absorptive mat ground cover allowing water percolation into underlying growing medium.
.3 It shall be free of weeds and other foreign material and shall be supplied in packages bearing the manufacturer’s label clearly indicating weight and product name.

2.5 **Trackifier**

.1 M-Binder (Mesh Organic Soil & Mulch Binder)

2.6 **Water**

.1 Clean potable water (as supplied by Municipality) free of any impurities which would inhibit germination or otherwise adversely affect growth or be harmful to the environment.

2.7 Weed Control

.1 Manual weed control is the preferred method in COV and may be the only permitted methodology. 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. Do not use herbicides containing sodium chlorate unless specifically authorized by the Owner's Representative. Do not use herbicides containing 2, 4, 5,-T in public areas or where there is a possibility of contaminating ditches draining to irrigation or potable water and only as permitted by the COV.

2.8 Approved Equals

.1 All items as specified or pre-approved equals.

PART 3: EXECUTION

3.1 SOIL PREPARATION

.1 Grades:

.1 Areas to be seeded shall be at grades shown at the time of seeding, free of "humps and hollows". Crown or slope for surface drainage and eliminate all low spots or depressions. Ensure that growing medium is placed to required depths and tolerances as specified and detailed in 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 02920 Growing Medium Preparation and Placement.

.2 Restore all areas to be seeded that are misshapen or eroded to specified condition, grade, slope as directed just prior to seeding. Minor adjustment and refinement of finish grade to be made as directed by Owner's Representative.

.3 Obtain Owner's Representative's approval of finish grading prior to proceeding.

.4 Ensure smooth finish on all surfaces and finished grades as shown on the drawings and as specified herein.

.2 Clearing: Remove all weeds, briars, debris and other refuse and deleterious materials which may be detrimental to the growth of the grass.

.3 Cultivation: as required to minimum depth of 100mm.

.4 Moisture: ensure areas to be seeded are moist to minimum depth of 150mm before seeding.

3.2 APPLICATION

.1 Apply with equipment designed for hydraulic seeding, a uniform solution in water of:

.1 Seed as specified 24.4kg/1000 square meters:
.2 Fertilizer Type and Rate as required by soil testing analysis.
.3 Fibre Mulch 250kg/1000 square meters
.4 Tackifier Not required on flat areas or slopes up to 25%
6 kg/1000 sq. meters on slopes from 26%-35%.
(increase to 8 kg/1000 sq. meters on slopes greater than 35%)

.2 Ensure uniform distribution of the solution over the entire area, with adequate discharge pumps, hoses and gun nozzles.

.3 Take precautions to protect planting beds, walks, roads, buildings and other site features such as signs, guardrails, fences, and utilities against spraying with the solution. Thoroughly clean any surface which is sprayed with the solution where not intended to the satisfaction of the Owner's Representative.

.4 Do not perform work under adverse field conditions such as wind speeds over 5 km/h, frozen ground or ground covered with snow, ice or standing water.

.5 Apply seed in a uniform workmanlike and continuous fashion until completed. Seed which has been in the hydraulic seeder more than 2 hours shall be considered dead and must be replaced.

.6 Submit completed Schedule A - Application Record to the Owner's Representative on a daily basis.

.7 No vehicular traffic will be permitted on areas to be seeded. All unreachable work or work under difficult control conditions shall be completed with use of hoses.

.8 Ensure a minimum overlap of 450mm between applications to form uniform surfaces.

3.3 SUPPLEMENTARY FERTILIZER APPLICATION

.1 Prior to Acceptance, at a time approved by the Owner's Representative, apply fertilizer formulation as recommended for the season at manufacturer's recommended rates evenly to all sodded areas. Water thoroughly.

3.4 MAINTENANCE

.1 Perform maintenance of the hydroseeded areas from time of seeding (date of installation) to date of Acceptance by the Board. Work to include: watering, cultivation, fertilizing, cutting, weeding, and all other measures necessary to ensure germination and

development of a uniform, dense, healthy stand of grass.

.2 Begin maintenance immediately after installation and continue until Acceptance by the Board of all hydroseeded lawn areas. Maintenance shall consist of all measures necessary to keep lawn healthy, in a vigorous growing condition and all other measures necessary to ensure germination and development of a uniform, dense, healthy stand of grass. Maintenance shall include, but shall 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 lawn areas shall be neatly trimmed. Heavy clippings shall be removed immediately after mowing and trimming.

.2 Watering shall be carried out when required and with sufficient quantities to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.

.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 standards specified herein.

.6 Any seeded areas showing deterioration or bare spots shall be repaired immediately. All areas shall be top dressed and over seeded with a seed mix matching the original seed mix.

.7 All seeded areas shall be adequately protected with warning signs, temporary wire, twine or mesh fences as dictated by Owner's Representative. Fencing shall be maintained in good condition to provide a continuous barrier until Acceptance. Except as otherwise required by the work of this Contract, the fencing shall be removed from the site upon Acceptance/Assumption by the Owner.

3.5 CLEANING

.1 Remove from the site all surplus materials and other debris resulting from seeding operations.

.2 Flush all walks, pavement and any area surface sprayed with solution clean to the satisfaction of the Owner's Representative.

SCHEDULE A – HYDROSEED APPLICATION RECORD (SAMPLE)

Project Name/Owner's Contract No.: _____

Owner's Representative: _____ Weather Conditions: _____

Date: _____

Contractor Foreman: _____ Size of Crew: _____

Month: _____

Time	Load No.	Seed Mix/ Flower Mix	Fertilizer	Mulch	Tackifier

END OF SECTION 32 92 21

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 plant material 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	Sodding	Section 32 92 23

1.4 Quality Assurance

.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 Source Quality Control

.1 Seven (7) days prior to the Owner's Representative review of plant material at source the Contractor shall confirm in writing availability of plant material noted on Plant List.

.2 Plant material will be supplied from nurseries who are certified by the Clean Plants program, Canadian Nursery Certification Institute (CNCI), current certification standard http://cleanplants.ca/. The certification shall include but is not limited to the requirements of the current active module(s), e.g. P. Ramorum module. The certification must extend to all fields and allied nursery operations where plant material is sourced. Only nurseries, fields and allied nursery operations that are certified will be permitted to supply plant material for this project.

.3 Plant Material Review at the source nursery

.1 Contractor request for review of the plant material at source nursery to be a minimum of seven (7) days prior to scheduled review.

.2 Owner's Representative shall make one (1) visit to source nursery for review of plant material for entire project.

.3 If review in more than one location becomes necessary, the Contractor shall reimburse the Owner's Representative for the additional time required at the current hourly rates of the Staff personnel.

.4 Shipping of plant material to project site shall not proceed until Owner's Representative has reviewed the plant material at the source nursery.

.5 All plants are subject to review and may be rejected for failure to comply with this specification at any time until Acceptance. Immediately replace rejected material and remove from the site at no cost to the Owner.

.6 Trees required for the work **must be reviewed and tagged by the Owner's Representative at (the place of growth) before being dug.** Inspection and tagging at the place of growth shall not affect the right to reject such trees on or after delivery thereof to the site.

.7 Plants required for the work **must be reviewed by the Contractor before being prepared for delivery.** Inspection shall not affect the right to reject such plants on or after delivery thereof to the site.

.8 **Plants arriving on site must be reviewed by the Owner's Representative prior to off-loading.** Provide minimum 48 hours notice to schedule review.

.9 The Contractor or his authorized representatives shall be present during all required reviews as specified or as may be required.

.4 Plant Material Review at Project Site

.1 All plant material shall be reviewed at the project site by the Owner's Representative prior to planting.

.2 Plant material that is rejected by the Owner's Representative shall be immediately removed from the site and replaced at the Contractors expense.

.5 Imported Plant Material

.1 Plant material imported from out of province and out of country shall be accompanied with necessary federal and provincial permits and import licenses.

.2 The Contractor shall conform to all federal and provincial laws and regulations with regard to horticultural inspection of domestic and imported plant material.

.6 Condition of Plant Material

.1 Plant rootballs and containers shall be completely free of noxious weeds and volunteer plants including, but not limited to, Horsetail and Morning Glory.

.7 Plant material grown or supplied in Fabric Containers are not acceptable.

1.6 Submittals

.1 Confirmation Plant List

.1 Contractor shall provide in writing to the Owner's Representative a minimum of seven (7) days prior to review of plant material at the source nursery a plant list confirming the quantity, botanical name, common name and size of plants specified.

.2 Prior to the review of plant material by the Owner's Representative the Contractor shall submit written documentation with CNCI certification stamp stating that the nursery has undergone all components of a certification program and has been audited to verify that all components are properly implemented. The documentation submitted shall include but is not limited to the nurseries CNCI Clean Plants certification number.

.3 Substitutions

.1 Contractor shall provide in writing to the Owner's Representative a minimum of seven (7) days prior to review of plant material at the source nursery a list of proposed substitutions for review.

.1 Substitutions in plant material will not be considered unless written proof is submitted thirty (30) days prior to scheduled installation stating a specified plant cannot be obtained within the specified area of search.

.2 Plant substitutions shall be of similar genus and species and of equal or greater size as those originally specified. The list shall contain the following information:

.1 Botanical name, common name of the specified plant

.2 Botanical name, common name of the proposed substitute plant

.3 Pot size, plant size and calliper of trees to be substituted

.3 Upon submission of such proof, a proposal will be considered for using the nearest equivalent size or variety with an equitable adjustment of the Contract price.

.4 Planting Schedule

.1 Contractor shall provide in writing to the Owner's Representative upon award of the Contract a detailed planting schedule outlining dates and duration of planting operations.

.2 Revisions to the Planting Schedule as a result of delays of any kind shall be submitted to the Owner's Representative in a timely manner prior to the start of planting operations.

.5 Composted Mulch: Contractor to submit a one (1) litre sample of Composted Mulch to the Owner's Representative for review prior to shipment to the site.

.6 Prepared Growing Medium: Contractor to submit a one (1) litre sample of the Prepared Growing Medium to the Owner's Representative for review prior to shipment to the site.

.7 Antidesicant: Contractor to submit three (3) copies of manufacturer product data and specification for Owner's Representative review.

1.7 Acceptance

.1 The conditions for Acceptance of landscape areas and for turning over the landscape areas to the Owner for subsequent maintenance are:

.1 Growing medium quality, fertility levels, depths and surface grading have been completed to the requirements of Section 32.91.13.

.2 Plant quantities, sizes, quality and locations are as shown in the Contract Documents or as otherwise approved by the Owner's Representative.

.3 Substantial Performance for the complete project shall have been declared.

.4 All plants shall be installed at the correct elevation relative to finished grade, healthy, in a vigorous growing condition and established to the satisfaction of the Owner's Representative.

.5 Trees will be assessed for acceptance only when in leaf, and not when in a dormant state.

.6 All deficiencies with regard to landscape work shall have been rectified.

.7 All trees are staked where required.

.8 **Landscape areas shall have been maintained for at least 55 days.** All planted areas are free of all visible weeds and substantially free from underground weed seeds or parts thereof, to the requirements of Section 32 01 90 Landscape Maintenance (as Applicable).

.9 Mulch has been placed as required. All areas not to receive mulch are in a cultivated, loose, friable condition where water can freely permeate the surface.

.2 The date of Acceptance shall be as determined by the Owner's Representative base upon the Inspection for Acceptance. Contractor shall request inspection for Acceptance, giving at least 48 hours notice.

1.8 Warranty

.1 Replace for a period of one (1) year after Substantial Performance of the project, all unsatisfactory plant material **and continue to replace such plant material until the replacement is acceptable to the OWNER'S REPRESENTATIVE**, at no cost to the Owner. This warranty will apply to all plant material, whether supplied by Contractor or Owner.

.2 This guarantee is based on adequate maintenance by the Owner after Acceptance. The Contractor will not be responsible for plant loss due to extreme climatic conditions such as abnormal freezing temperatures or hail which occur after Acceptance. The Contractor shall be responsible for plant loss due to inadequate acclimatization of plants for their planted location.

.3 Adequacy of acclimatization and existence of extreme climatic conditions shall be as determined by an **independent Owner's Representative** on the basis of plant variety, location, recorded temperatures for the locale, time of planting and other factors pertinent to the situation.

1.9 Plant Material Replacements

.1 The Contractor shall remove from the site and immediately replace any plant material that has been determined by the Owner's Representative to have died or failed to grow in a satisfactory manner during the warranty or maintenance period.

.2 The Contractor shall extend the warranty on this replacement plant material for one (1) year from the date of replanting.

.3 The Contractor shall continue such replacement and warranty of plant material until the Owner's Representative has determined that the 'Conditions for Final Acceptance' have been met.

1.10 Permits

.1 Obtain and pay for all permits required for the work, including such permits as may be required for planting and related work on municipal property (e.g. street trees).

PART 2: PRODUCTS

2.1 General

.1 Area of Search: Area of search for specified plant material shall include the Lower Mainland of British Columbia, Vancouver Island, Washington and Oregon States, except as noted on the plant list.

.2 Provenance: All plant material used on this project shall be hardy in this climate. Plant types have been selected with this as a criteria. This Contractor shall guarantee that plant material supplied has equal provenance, i.e.: it is developed from cuttings or seeds collected in an area of similar climatic characteristics. Submit proof of equal provenance to Owner's Representative upon request.

2.2 Plant Material

.1 Plant material shall be of the sizes and quantities as shown in plant lists on Landscape Drawings and shall be nursery grown unless specifically described as "collected". **All "non-specimen" plantings specified in the Plant List(s) are specified according to the Canadian Nursery Trades Association Canadian Standards for Nursery Stock and the BCLNA Standard for Container Grown Plants**.

.2 In particular, plant material shall conform to the following CNTA Standards:

.1 "Nursery stock shall be true to name, type and form and representative of their species or variety. In addition they shall be of the size and grade and quality stated".

.2 "Quality shall be normal for the species when grown under proper cultural conditions viable, substantially free from pests and disease, and undamaged".

.3 "Roots shall not be subject to long exposure to drying winds, sun or frost, between digging and delivery".

.4 Root balls and soil in containers shall be free from pernicious perennial weeds."

.5 Roots shall be transplanted or root pruned at least once within the year prior to planting.

.6 Take precautions during digging, handling and shipping of plant material to avoid injury to plants and root systems.

.7 Plants for use when symmetry is required shall be matched as nearly as possible.

.8 Plants shall not be pruned prior to delivery.

.9 All plants shall be measured when the branches are in the normal position. Measurements shall be as set out in the BCLNA Standard for Container Grown Plants. Calliper of trees shall be measured 12 inches above the ground.

.10 Trees shall have straight trunks with a single leader intact. There shall be no abrasion of the bark and no fresh cuts of limbs over 1-1/4" that have not completely calloused over.

.11 Where trees are to be in a formal arrangement or occur in consecutive order, they shall be carefully measured as to height and spread and tagged with a number before delivery to the site. These trees shall be correspondingly identified on plan to assure symmetry and expeditious handling.

.12 Plants larger in size than specified in the itemized plant list may be used if approved; but the use of larger plants shall not increase the Contract price. If the use of larger plants is approved, the ball of earth or spread of roots shall be increased in proportion to the size of the plant.

.13 The size specified is the size of plant required at the time of delivery to the construction site. Sizes shown are minimum sizes.

.3 Container dimensions shall be as defined in the B.C. Landscape Standard 1997 Edition.

2.3 Tree Ties

.1 Flat woven polypropylene material. 20 mm (3/4”) wide, 544 Kg. (1200lb), break strength. Arbor Tie by Deep Root, or approved equal. Submit sample for approval to protect bark or other types approved by the Owner. Generally they shall be of a material that will not damage the bark. Tree tie material shall be at least 25mm(1") in width and shall remain pliable in all weather conditions. They shall permit a reasonable degree of movement by the tree under normal loading conditions/forces such as wind without detrimental effects. Rubber tree buckles, or galvanized wire with rubber hose will not be accepted.

2.4 Burlap

.1 Shall be untreated, free from toxic contaminants and of sufficient strength to hold the rootball in a compact, stable mass that does not move relative to the main stem(s) of the tree or shrub.

2.5 Wire Baskets

.1 Non-galvanized metal basket designed and manufactured for the purpose of tree moving. Basket shall be shaped to ensure that the root ball will allow a stable planting condition in accordance with standards noted.

2.6 Water

.1 potable and free of minerals that are detrimental to plant growth.
.2 Gator bag product to be provided for each tree. Bags to be attached to staking with tamperproof stainless steel chain.

2.7 Composted Mulch

.1 9mm (3/8”) Composted Mulch, black/brown in colour with no cedar or redwood bark or wood material manufactured by Yard Works, Richmond, BC, Eco-Soil ,Langley BC Fraser Richmond Bio-Cycle, Richmond, B.C. or pre-approved equal.

2.8 Anti-desiccant

.1 Wax-like emulsion that will provide a transpiration reducing film over the plant surface. Moisturin by GSI Horticultural, Bend, Oregon, (541) 383-0222 or approved equal.

2.9 Tree Trunk Protection

.1 Extrusion mold process, polyethylene with UV protectors: "Arborgard" manufactured by DeepRoot products Canada, Inc., Vancouver, B.C., or pre-approved equal.

2.10 Tree Guy Anchors/ Tree Guy System

.1 Direct burial or screw type disc guy anchor and guy system. The Arrow Anchor by Tree-Guy/ Tree Guy System, Santa Anna, California (800) 624-1116, or approved equal.

2.10 Stakes and Stake Fasteners

.1 **Fir, standard or better, 75mm x 75mm x 3000mm long.** Stake fasteners shall be hot dipped galvanized or stainless steel.

2.11 Flagging Tape

.1 30mm (13/16") wide 'Red' PVC flagging tape by Identi-Tape, Boulder, CO or approved

PART 3: EXECUTION

3.1 Planting Season

.1 Plant only during the season or seasons that are normal for such work, as determined by weather conditions and as approved by the Owner's Representative. Plants planted before or after any stipulated dates will be rejected.

.2 Do not plant during freezing, abnormally hot, dry or wet weather or when damaging climatic conditions can be anticipated.

.3 The Contractor will be responsible for death or deterioration of plants caused by exposure to damaging climatic conditions, planting under conditions itemized above or inadequate acclimatization of plant material.

3.2 Planting Schedule

.1 All planting operations shall be done in a timely manner in accordance to the 'Planting Schedule'.

.2 'Planting Schedule' shall be updated as required by the Contractor to coincide with status of site and coordination with other trades. Provide the Owner's Representative with up dates to the schedule as required throughout the planting process.

3.3 Delivery

.1 Dig and handle all plant material in a manner suitable for each species to prevent injury to or removal of fibrous roots. All plant material delivered with broken or loose root balls or containers will be rejected by the Owner's Representative and replaced by the Landscape Contractor at no additional cost to the Owner.

.2 Take precautions to avoid burning of plants by sun or wind during handling and transporting.

.3 Keep root balls and container soil moist prior to delivery by covering with bark mulch, wet straw or soil and water as required to ensure moist root balls.

.4 Coordinate the delivery of plant materials with work of other trades and other site activities.

.5 Off load the plant materials at the site as designated by the Owner's Representative.

.6 All plant material shall be acclimatized to the final location before delivery and planting. The Contractor will be held responsible for plant losses caused by inadequate acclimatization.

3.4 Plant Layout

.1 Locate plants according to the Planting Plan for approval of plant location and orientation. Notify the Owner's Representative, giving 48 hours notice, when plant layout will be ready for review. At this time the Owner's Representative may make adjustments in plant locations and orientation prior to planting.

.2 Stake location of all major trees for approval to positioning. Notify the Owner's Representative at least 48 hours before planting of major trees. **The Owner's Representative must be present** during planting of major trees to ensure proper orientation and location.

.3 Anti-desiccant shall be applied only as directed by the Owner's Representative. Application of anti-desiccant shall be in accordance with manufacturer's instructions.

.4 Coordinate planting operations with other trades and project schedule.

3.5 Excavation

.1 Existing Utilities; The Contractor is responsible for confirming the location and extent of existing utilities prior to the start of all planting operations. All attempts should be made to ensure that utility services are maintained to all on and off site parties through out the entire planting operation.

.2 For all trees, excavate tree pits with vertical sides, depth to be of sufficient size to contain root ball, min 600mm x 10m^2 surface area of growing medium or as detailed, directed by Owner's Representative.

.3 Scarify the sides of tree pits.

.4 **Test all tree pits for poor drainage as directed by Owner's Representative**. Fill each tree pit with a minimum of 20 litres (5 gallon) of water. Water should freely drain through subsoil within ten (10) minutes. If poor drainage or percolation is encountered report this condition immediately to the Owner's Representative for acceptable remedial measures. Measures such as auguring holes through the impervious layers and backfilling with approved clean rounded drain rock or sand, raising the planting grade, or adding dedicated drain lines connected to the subsurface drainage system will be considered.

.1 Notify Owner's Representative if tree pits in any soil condition do not drain freely or if tree pit fills with ground water.

.2 There shall be no standing water in the bottom of tree pit at time of planting.

.5 Protect bottom of tree pit(s) against freezing.

.6 Ensure tree pits and plant beds are kept well drained and free of contaminants and construction debris.

.7 Excavate hole in growing medium sufficient to receive root ball. Excavation of the subgrade below the root balls of trees shall be only as necessary to permit the bottom of the root ball to sit on undisturbed material or compacted fill such that the top of the root ball remains at the proper finished grade. Disturbed subgrade or fill below the root ball shall be compacted to prevent settlement of the tree after planting. Remove excess material from the site.

.8 Remove excavated subsoil material from site, or use on site in an approved manner. Obtain prior approval from Owner's Representative.

3.6 Planting Procedure

.1 Planting operations shall be carried out under conditions that are conducive to healthy, vigorous growth of plant material.

.2 Planting operations shall not be carried out when the growing medium is frozen, mixed with ice and/or snow, saturated or compacted to levels that exceed this specification.

.3 Plant material shall be planted vertical, straight and plumb at locations staked in field and or noted on landscape plans.

.4 Ensure orientation of plant material will give best appearance in relation to views from adjacent buildings, roads, walks or use areas.

.2 Install all plants at height grown in Nursery. Allow for settling of the growing medium after planting. The grade that the plant was grown in the nursery shall be used as the indicator for proper growing medium and plant elevation relationship. Top of root ball elevation shall match the elevation of adjacent growing medium elevation.

.3 Plants shall be set plumb in the planting beds or in the center of the pits, except where the plant's character requires variation. Obtain approval from Owner's Representative.

.4 Backfill around root ball with prepared growing medium, tamping and watering to ensure firm support for the plant and eliminating all air pockets around the root ball. Ensure water penetration into the root balls during planting procedures.

.5 Remove all string, rope, burlap and other restricting elements out to the perimeter of the root ball. Cut all wire basket handles flush with the top ring or fold back down into the planting hole. Do not remove wire baskets. Ensure no wires from the basket protrude into the top 100mm of the growing medium.

.7 Ensure a 150mm (6") deep saucer around all trees for the full width of the planting pit.

3.7 Fertilizer Application

.1 Place fertilizer as per recommendations of soil analysis and to requirements of Section 32 91 13.

3.8 Tree Stabilization

.1 Stake and Tie trees immediately after planting if specified and only as directed by the Owner's Representative. Trees damaged as a result of delayed staking shall be replaced.
.2 Trees shall stand plumb on completion of this operation.
.3 Stakes and ties shall be installed such that injury to bark will not occur.
.4 Ensure guy pins and stakes are placed out beyond the root ball. Trees that have had root balls penetrated by guy pins and stakes will be rejected.

3.9 Tree Trunk Protection

.1 Trees in lawn areas shall have trunk protection.
.2 Place tree trunk protection around base of tree trunk as per manufacturer instructions.
.3 Trees 100mm (4") calliper or less shall have one protector. Do not interlock ends of tree protector.
.4 Trees greater than 100 mm (4") calliper shall have a minimum of two interlocked protectors. Do not interlock outside ends.

3.10 Tree Rings

.1 Trees in lawn areas shall have 750mm (30") tree rings cut around the base of each tree. The tree rings shall be true circles centered on the trunk of the tree.
.2 Have sod removed and area mulched as per specifications.
.3 Trees in seeded areas shall have 750mm (30") tree rings cut around the base of each tree once seeded areas have been accepted by the Owner's Representative. The tree rings shall:

.1 Be true circles centered on the trunk of the tree.
.2 Have grass removed and area mulched as per specifications.

3.11 Pruning

.1 Prune trees and shrubs after planting operation only as directed by Owner's Representative.
.2 Prune only as directed by Owner's Representative.
.3 Tree pruning is to be performed in accordance with the best practices published on the International Society of Arboriculture's (ISA) website (www.treesaregood.org).

.4 Branch removal should be limited to necessary clearance pruning for public and electrical safety and the removal of dead, diseased, and/or defective wood to improve tree health and/or structure.

.6 Each shrub planted shall be pruned to preserve the natural character of the plant and in a manner appropriate to its particular requirements in the landscape design.

.7 All soft wood sucker growth and all broken or badly bruised branches shall be removed with a clean cut.

.8 All pruning shall be done with proper, sharp pruning tools. All pruning cuts to be made protecting the branch collar.

.9 All pruning cuts shall be made with pruning saws or hook and blade pruning tools designed and manufactured for pruning operations. Anvil-type pruning tools shall not be used in any pruning operations.

.10 Do not damage the branch collar.

.11 Do not damage the leader or lead branches. Plants which have had the main leader or lead branches damaged or removed will be rejected and replaced by the Contractor at no cost to the Owner.

.12 Do not remove minor twig branches along the main structural branches.

3.12 Applying Mulch

.1 Prior to the application of composted mulch;

.1 Reset all plants that have settled so that relationship of nursery grade of root ball to finish grade of growing medium is as per specification

.2 Manually remove all weeds and weed roots from root balls and adjacent growing medium.

.3 Remove all deleterious material and debris from planting areas.

.4 All fine grading is complete, the growing medium is loose and friable

.5 The Owner’s Representative has reviewed of all planting areas.

.2 Spread composted mulch to minimum depth of 50 mm (2”).

.1 Ensure finish composted mulch layer is a minimum of 12mm (1/2”) below adjacent hard landscape surfaces and edges.

.2 Ensure mulch is kept 125 mm (5”) away from tree trunks and 75 mm (3”) away from stems of shrubs.

3.13 Maintenance

.1 Begin maintenance at time of planting and continue for a minimum of fifty-five (55) days or until Acceptance which ever is greater, at which time the Owner will take over maintenance.

.2 If for any reason the Contractor elects, on his own without the written consent of the Owner's Representative to suspend maintenance operations he is to provide the Owner's Representative written notice of such action. Any damages or requirement for the replacement of plant material that as a result of the suspension of maintenance operations shall be the borne by the Contractor at no cost to the Owner.

.3 Maintenance of plant material includes but is not limited to watering at intervals sufficient to maintain healthy, vigorous growth, weeding of plant beds and tree pits, cultivating of growing medium, pruning, only if requested, treatment of insects, moulds, fungi or disease to the Level 2 "Groomed' as per the CSLA Landscape Standard, Current Edition or as directed by Owner's Representative.

.4 Plant material shall be deep watered at least once per day when temperatures exceed 25 degrees Celsius (77 degrees F).

.5 Contractor to ensure adequate moisture in plant root zone prior to winter freeze-up.

.6 Ensure tree guards, stakes, flagging tape on tree guy wire and tree ties are kept secure, taught and in proper repair.

3.14 Finish Grading

.1 All planted areas and all growing medium shall be fine graded after placing to the finished elevations and contours as detailed and specified herein. Surfaces shall be true to intended grades, smooth, uniform, and firm against deep foot printing, with a fine loose surface texture. Ensure all rough spots and low areas are eliminated to ensure positive surface drainage. Adjust grades to accommodate for mulch as specified/detailed.

3.15 Cleaning

.1 All excess materials and other debris resulting from planting operations shall be removed from the job site.

.2 Flush all walks and paved areas and rake all lawn areas clean to the satisfaction of the Owner's Representative.

END OF SECTION 32 93 10