Part 1 General

1.1 SECTION INCLUDES

.1 This Specification covers the protection of all existing trees. The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all Work hereinafter specified.

1.2 DEFINITIONS

The following definitions shall apply:

.1 TREE PROTECTION AREA: Generally, a tree protection area should consist of the ground encompassing from 1.0 (minimum) to 1.5 times the distance between the trunk and dripline, or as shown in the table below, whichever is greater. Areas of ground covered by pavement, buildings, or other permanent structures where the presence of roots is minimal or negligible may be excluded at the discretion of the Departmental Representative and Landscape Architect.

Trunk Diameter	Minimum Protection Area Radius
< 100 mm	1.8 m
110–400 mm	2.4 m
410– 500 mm	3.0 m
510– 600 mm	3.6 m
610–700 mm	4.2 m
710–800 mm	4.8 m
810–900 mm	5.4 m
910–1000 mm	6.0 m

With groups of trees or where an array effect is present, there may be discontinuous (non-overlapping) perimeters of tree protection areas, which result in difficult to maintain or ineffective tree protection fencing. In these cases, even though tree protection areas do not overlap, they should be treated as though they do if the distance between the perimeters of such areas is less than 10M. In effect, this will artificially enlarge the area of tree protection, but will result in a more clearly defined, manageable area.

.2 DRIPLINE: The outermost edge of the tree's canopy or branch spread. The area within a tree's dripline is all the ground under the total branch spread.

.3 CRITICAL ROOT ZONE: Generally, all of the ground area included in the dripline.

.4 DIAMETER (CALIPER): The size (millimeters) of a tree's trunk is measured at:

.1 150mm above grade for trunk diameters up to and including 100mm;

.2 600mm above grade for trunk diameters from 100mm up to and including 200mm; and

.3 1.2M above grade for trunk diameters greater than 200mm.

.5 ARBORIST: An individual who has obtained accreditation from the Manitoba Arborists Training and Examination Program or the International Society of Arboriculture Arborist Certification Program (ISA) and possesses a valid Manitoba Arborists License.

Part 2 Products

2.1 MATERIALS

.1 Tree Protection Barrier Fence

.1 Moulded Mesh Vinyl Construction Fence, Snow Fence or other similar product. - Rolled; 1.2m high; Commercial Grade; Colour: Orange

.2 Steel T-Bar Stakes; 1.8m high; c/w tie holes; Galvanized, Painted or Powder Coated. In sufficient quantity to hold the fence taught and erect without slumping.

.3 Steel Tie Wire; heavy gauge

Part 3 Execution

3.1 TREE PROTECTION AREA

.1 Existing trees and planted areas shall be protected and preserved as noted on the drawings. The Protection Area shall be as described above, unless otherwise approved by the Departmental Representative and Landscape Architect.

.2 Motorized equipment and trailers, including tractors, bobcats, bulldozers, trackhoes, trucks, cars, and carts shall not be allowed access within tree protection areas. Should access be necessary within designated tree protection areas, the existing grade shall be covered with 150 -200mm of wood mulch to help distribute the weight of equipment and to minimize soil compaction and rutting. Plywood and/or mulch is not acceptable bridging material for driving over exposed tree roots. Exposed tree roots shall not be driven over. The Departmental Representative and Landscape Architect must approve the access and driving surface prior to its use.

.3 Materials and supplies shall not be stockpiled or stored within the tree protection area. Should temporary storage be necessary within designated tree protection areas, the existing grade shall be covered with double, overlapping sheets of ¾ inch thick plywood, or 150 -200mm of wood mulch to help distribute the weight of materials or supplies and to minimize soil compaction.

.4 No objects or materials may be leaned against or supported by a tree's trunk, branches, or exposed roots. The attachment or installation to trees of any sign, cable, wire, nail, swing, or any other material that is not needed to help support the natural structure of the tree is prohibited. Standard arbouricultural techniques such as bracing or cabling that are performed by professional arbourists are acceptable upon approval by the Departmental Representative and Landscape Architect.

.5 Appropriate tree pruning and/or removal permits must be secured prior to beginning work.

3.2 TREE PROTECTION FENCING

.1 Tree protection areas and fencing locations shall be approved by the Departmental Representative and Landscape Architect prior to construction. Layout and staking shall be done by the Contractor.

.2 T-Bar stakes to be driven a minimum 600mm into the ground at a maximum of 3m intervals. Wooden stakes and Steel Rebar are not considered alternatives for T-Bar Stakes.

.3 Fencing should be installed to completely surround the limits of tree protection areas, and should extend at least 3.0M beyond the designated construction limits.

.4 Tree protection fencing must be installed prior to any site activity and shall remain in good condition until its removal is authorized by the Departmental Representative and Landscape Architect.

3.3 TREE PROTECTION

.1 All trees within and immediately adjacent to the proposed construction areas will require 1x6x8' wood planks strapped to the tree trunk to completely protect the tree trunk from impact damage (smaller trees will be similarly protected using proportionally sized wood planks).

.2 Further to item 2.1.1, all trees within or immediately adjacent to the proposed construction area will have a 1.0m (minimum) radius protective zone calculated from the circumference at the base of the trunk which will remain free of digging, trenching, grade changes, stock piling of materials and soil compaction throughout the duration of the Contract.

.3 Should the demands of construction require an unfenced Tree Protection Area, protective fencing must be installed for the area described in 2.3.2.

3.4 OVERHEAD BRANCH AND LIMB PROTECTION

.1 Further to 2.1.1, tree limbs and branches overhanging the construction area shall not be damaged. The Contractor shall be responsible for ensuring that the above ground portions of trees are not damaged during Work.

.2 Should pruning be required, the Contractor shall contact the Departmental Representative and Landscape Architect for approval. Pruning work must be using proper pruning techniques by a licensed Arbourist.

3.5 EXCAVATION

.1 During all excavation a representative of the Departmental Representative and Landscape Architect shall be present at all times unless otherwise agreed upon.

.2 The Departmental Representative and Landscape Architect shall be notified prior to any trenching or excavation known or suspected to involve cutting of more than:

.1 Two (2) roots, 75mm or more in diameter; and/or

.2 Four (4) roots between 50mm and 75mm in diameter. The Departmental Representative and Landscape Architect shall be notified immediately in the event that roots in excess of that described above are cut, torn, ripped, or otherwise injured.

.3 Should root pruning be required the Contractor must ensure proper root pruning techniques are employed by a licensed Arbourist.

.3 Upon approval by the Departmental Representative and Landscape Architect, prior to any excavation, removal of sidewalk, or other activity that will result in removal of soil and tree roots, all tree roots within work area will be pruned to a depth of 350mm. Pruning shall occur with a Dosko Root Pruner, or equivalent, in accessible areas, and by hand in areas inaccessible to the root pruning machine. Proper root pruning techniques must be used and employed by a licensed Arbourist.

.4 All work under the Dripline of any tree shall be done by hand or by other methods which will prevent breakage or other injury to branches and roots.

.5 Where it is necessary to excavate within the critical root zone of existing trees, contractor shall use all possible care to avoid injury to trees and tree roots. Excavation, in areas where 50mm diameter and larger roots occur, shall be done by hand with approved hand tools. Where possible, tree roots 50mm inches or larger in diameter shall be tunnelled or bored under and shall be covered with moistened burlap to prevent excessive drying.

.6 Wherever roots are exposed smaller than two 50mm in diameter, such roots extending through the excavation shall be hand pruned. All excavated areas within critical root zones shall be closed within twelve (12) hours - if this is not possible, the excavation walls shall be covered with burlap and kept moistened. Prior to backfilling, the Contractor shall contact the Departmental Representative and Landscape Architect to inspect the condition and treatment of roots larger than 50mm in diameter injured by excavation.

3.6 NOTIFICATION

.1 The Departmental Representative and Landscape Architect is to be notified 3 business days in advance of any large equipment to be working in the vicinity of existing trees. The Contractor shall provide adequate personnel on foot to supervise equipment operators in the vicinity of the trees to ensure that no damage occurs.

.2 Special care is required during excavation to ensure existing tree root structure is not damaged. Should root pruning be required the Contractor must ensure proper root pruning techniques are employed by a licensed Arbourist.

3.7 CLEANING

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

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 74 19 - Construction/Demolition Waste Management And Disposal

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C117-[95], Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.

.2 ASTM C131-[96], Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.3 ASTM C136-[96a], Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D422-[63(1998)], Standard Test Method for Particle-Size Analysis of Soils.

.5 ASTM D698-[00a], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600kN-m/m^3).

.6 ASTM D1557-[00], Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft^3) (2,700kN-m/m^3).

.7 ASTM D1883-[99], Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.

.8 ASTM D4318-[00], Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

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

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

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal.

.2 Divert unused granular material from landfill to local facility as approved by Landscape Architect.

Part 2 Products

2.1 MATERIALS

.1 Granular sub-base material: in accordance with CW specification 3110-R17, Sub-Grade, Sub-Base and Base Course

Part 3 Execution

3.1 PLACING

.1 Place granular sub-base after sub grade is inspected and approved by Landscape Architect.

.2 Construct granular sub-base to depth and grade in areas indicated.

.3 Ensure no frozen material is placed.

.4 Place material only on clean unfrozen surface, free from snow or ice.

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

.6 Place granular sub-base materials using methods which do not lead to segregation or degradation.

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

.8 Place material to full width in uniform layers not exceeding 150mm compacted thickness. Landscape Architect may authorize thicker lifts (layers) if specified compaction can be achieved.

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

.10 Remove and replace portion of layer in which material has become segregated during spreading.

3.2 COMPACTION

.1 Compaction equipment to be capable of obtaining required material densities.

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

.3 Compact to density of not less than 98% corrected maximum dry density /maximum dry density in accordance with [ASTM D698] [ASTM D1557]].

.4 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.

.5 Apply water as necessary during compaction to obtain specified density.

.6 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Landscape Architect.

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

3.3 PROOF ROLLING

.1 For proof rolling use standard roller of [45400] kg gross mass with four pneumatic tires each carrying [11350] kg and inflated to [620] kPa. Four tires arranged abreast with centre to centre spacing of [730] mm maximum.

.2 Proof roll at level in sub-base as indicated. If non standard proof rolling equipment is approved, Landscape Architect to determine level of proof rolling.

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

.4 Where proof rolling reveals areas of defective subgrade:

- .1 Remove sub-base and subgrade material to depth and extent as directed by Landscape Architect.
- .2 Backfill excavated subgrade sub-base material and compact in accordance with this section.
- .3 Replace sub-base material and compact.

.5 Where proof rolling reveals areas of defective sub-base, remove and replace in accordance with this section at no extra cost.

3.4 SITE TOLERANCES

.1 Finished sub-base surface to be within 10mm of elevation as indicated but not uniformly high or low.

3.5 PROTECTION

.1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by Landscape Architect.

END OF SECTION

Approved: 2005-03-31

Part 1 General

1.1 SECTION INCLUDES

.1 Requirements and procedures for installing precast concrete unit pavers by hand.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 32 11 19 – Granular Sub-base

.3 Section 32 16 15 – Concrete Walk and Curbs.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).

.1 ASTM C136-[01], Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTM C979-[99], Standard Specification for Pigments for Integrally Colored Concrete.

.2 Canadian Standards Association (CSA International).

.1 CSA A23.1/A23.2-[00], Concrete Materials and Methods of Concrete Construction/Method of Test for Concrete.

.2 CSA A179-[94], Mortar and Grout for Unit Masonry.

.3 CSA-A231.2-[95], Precast Concrete Pavers.

.4 CSA A283-[00], Qualification Code for Concrete Testing Laboratories.

1.4 SUBMITTALS

.1 Product Data:

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

.2 Submit following sampling and testing data:

.1 Sieve analysis for gradation of bedding and joint material.

.2 Unit paver sampling and testing.

.3 Evaluation of cleaning and sealing compound.

.2 Samples:

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

.2 Submit full size sample of each type, size pavers.

.3 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: company or person specializing in precast concrete paver installations with 5 years documented experience.

.2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.4 Mock-ups:

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control

.2 Install 3 x 3m area mock-up.

.3 Mock-up will be used:

.1 To judge workmanship, substrate preparation, operation of equipment and material application.

.2 To determine surcharge of bedding layer, joint sizes, lines, laying pattern[s], colour[s] and texture.

.3 Locate where directed by Departmental Representative.

.4 Allow 24 hours for inspection of mock-up before proceeding with work.

.5 When accepted, mock-up will demonstrate minimum standard of quality required for this work. [Approved mock-up may remain as part of finished work. Remove mock-up and dispose of materials when no longer required and when directed by Departmental Representative.

.5 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

.2 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 CONCRETE PAVERS

.1 Concrete pavers: to CSA-A231.2 and as follows:

.1 Size: as indicated.

.2 Shape: as indicated.

.3 Colour: as indicated.

.4 Standard end, corner, border units as required.

.2 Manufactured in moulds, with spacers, suitable for installation and delivered on site in cubes of laying panels in protective wrapping.

.3 Pigment in concrete pavers: to ASTM C979.

2.2 BEDDING AND JOINT MATERIAL

.1 Joint Sand: Polymeric Sand

.2 Bedding sand: clean, non-plastic, free from deleterious or foreign matter, natural or manufactured from crushed rock or gravel. Do not use limestone screenings or stone dust.

.3 Gradation: to CSA-A23.1, Table 4 - Grading Limits for Fine Aggregate, and CSA A179 as follows:

Sieve Designation	% Passing for Bedding Sand	Joint Sand
10 mm	[100]	
5 mm	[95-100]	[100]
2.5 mm	[80-100]	[95-100]
1.25 mm	[50-90]	[60-100]
630 microns	[25-65]	
600 microns		[35-80]
315 microns	[10-35]	
300 microns		[15-20]
160 microns	[2-10]	
150 microns		[2-15]

2.3 EDGE RESTRAINTS

.1 Edge restraints shall be as indicated on Drawings.

.2 Structural curb:

.1 Concrete curb: to Section 32 16 15 – Concrete Walk and Curbs.

.3 PVC or medium density polyethylene, industrial and flexible type edging, manufactured for use in paver installation, complete with connectors and pre-manufactured anchoring locations for spikes.

.1 Anchoring: to manufacturer's instructions. Galvanized, spiral, steel anchor spikes 9.5mm diameter x 254mm length, 1 per 300mm of edging and at 100mm each side of joints.

2.4 CLEANING COMPOUND

.1 Clear, organic solvent, designed and recommended by manufacturer for cleaning concrete pavers of contamination encountered.

.2 Acid based chemical detergent, designed and recommended by manufacturer for removal of contamination encountered on pavers.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 STRUCTURAL SURFACE

.1 Verify that structural surfaces conform to levels and compaction required for installation of unit pavers. If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.

.2 Verify that top of structural surface (top of base) does not exceed plus or minus 10mm of grade over 3m straightedge.

.3 Ensure that structural surface is not frozen or standing water is present during installation.

3.3 STRUCTURAL CURBS

.1 Verify that structural curbs conform to elevations and alignments required for installation of unit pavers. If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.

3.4 INSTALLATION OF EDGE RESTRAINTS

.1 Install restraints true to grade, in accordance with manufacturer's recommendations.

3.5 PLACING OF BEDDING MATERIAL

.1 Ensure bedding material is not saturated or frozen at all times until installation is complete.

.2 Spread and screed material on structural surface to achieve 25mm compacted thickness after vibrating pavers in place. Do not use joint sand for bedding sand.

.3 Do not disturb screeded material. Do not use bedding material to fill depressions in structural surface.

3.6 INSTALLATION OF CONCRETE PAVERS

.1 Lay pavers to pattern[s] indicated. Joints between pavers: as recommended by manufacturer.

.2 Use appropriate end, edge and corner stones. Saw cut pavers to fit around obstructions and at abutting structures.

.3 Use a low amplitude, high frequency plate compactor capable of at least 22 kN centrifugal compaction force to vibrate pavers into bedding sand.

.4 Inspect, remove, and replace chipped, broken and damaged pavers.

.5 Sweep dry joint sand material into joints.

.6 Settle sand by vibrating pavers with plate compactor.

.7 Continue application of joint material and vibrating of pavers until joints are full. Do not vibrate within 1 m of unrestrained edges of pavers.

.8 Sweep off excess joint material when installation is complete.

.9 Final surface elevations not to exceed plus or minus 10mm under 3m long straightedge.

.10 Surface elevation of pavers: 3 to 4mm above adjacent drainage inlets, concrete collars or channels.

.11 ENSURE CONFORMANCE OF FINAL ELEVATIONS.

3.7 CLEANING

.1 Carry out cleaning at times and conditions recommended by manufacturer of cleaning compound.

.2 Remove and dispose of loose, extraneous materials from surfaces to be cleaned.

.3 Apply cleaning compounds appropriate for removal of various contaminants encountered in accordance with manufacturer's recommendations.

.4 Final surface to be free of contamination.

3.8 CLEANING

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

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 Section 32 11 19 – Granular Sub-Base

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C 136-96a, Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTM C 117-95, Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.3 ASTM E 11-95, Specification for Wire - Cloth Sieves for Testing Purposes.

.4 ASTM D 4318-98, Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.5 ASTM D 698-91, Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb. (2.49-kg) Rammer and 12-in (304.8-mm) Drop.

.2 Canadian General Standards Board (CGSB)

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

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

1.3 PROTECTION

.1 Prevent damage to buildings, landscaping, curbs, sidewalks, trees, and adjacent property. Make good any damage.

.2 Provide access to building at all times. Coordinate paving schedule to minimize interference with normal use of premises.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

Part 2 Products

2.1 MATERIALS

.1 Granular Sub-Base:

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

.2 Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1 rather than ASTM E 11.

.2 Table:

Sieve Designation	% Passing
75 mm	100
4.75 mm	25-85
0.425 mm	5-30
0.075 mm	0-10

.3 Granular base:

.1 Crushed stone or gravel: hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.2 Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1 rather than ASTM E 11.

.3 Table

Sieve Designation	% Passing
19 mm	100
12.5 mm	70-100
4.75 mm	40-70
2.00 mm	23-50
0.425 mm	7-25
0.075 mm	3-8

.4 Liquid Limit ASTM D 4318 Maximum 25

.5 Plasticity Index ASTM D 4318 Maximum 6

.4 Granular topping:

.1 Screenings: hard, durable, crushed limestone particles or black granite (as indicated on drawings), free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.2 Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117.

Sieve Designation	% Passing
9.5 mm	100
4.75 mm	50-100
2.00 mm	30-65
0.425 mm	10-30
0.075 mm	5-10

.3 Filter Fabric: Filter cloth to be Terra Fix 270R, or approved equal.

Part 3 Execution

3.1 SUBGRADE

.1 Ensure that the subgrade preparation conforms to levels and compaction required to allow for installation of granular base.

3.2 FILTER FABRIC

.1 Install Filter Fabric as indicated on drawings. Filter Fabric to be Terra Fix 270R, or approved alternate.

3.3 GRANULAR BASE

.1 Granular base material to be 20mm Crushed Limestone Down with a minimum thickness of 150mm.

.2 Spread and compact granular base material in uniform layer not exceeding 150mm compacted thickness.

.3 Compact to a density of not less than 100% Standard Density in accordance with ASTM D 698.

3.4 GRANULAR TOPPING

.1 Place Crushed Limestone to a compacted thickness of 50mm where indicated on drawings.

.2 Place Crushed Granite to a compacted thickness of 75mm where indicated on drawings.

3.5 FIELD QUALITY CONTROL

.1 Inspection and testing of crushed stone surfacing will be carried out by designated testing laboratory as required.

.2 Costs of tests will be paid by the Contractor if required.

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 This Specification shall cover the complete supply, and installation of concrete walks and curbs including infill sections as specified herein and as shown on the Drawings. The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

1.2 RELATED SECTIONS

1. Section 01 33 00 - Submittal Procedures.
2. Section 03 10 00 - Concrete Forming.
3. Section 03 20 00 - Concrete Reinforcing
4. Section 03 30 00 - Cast-in-Place Concrete
5. Section 32 11 16.01 – Granular Sub-Base

1.3 REFERENCES

.1 Canadian Standards Association (CSA).
.1 CAN/CSA-A23.1-[94], Concrete Materials and Methods of Concrete Construction.

.2 Canadian General Standards Board (CGSB).
.1 CAN/CGSB-1.2-[M89], Boiled Linseed Oil.
.2 CAN/CGSB-3.3-[M89], Kerosene.

.3 American Society for Testing and Materials (ASTM).
.1 ASTM D698-[91], Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3) (600 kN-m/m3).
.2 ASTM A1064 / A1064M - 16 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

4. Department of Justice Canada (Jus).
.1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
.2 Canadian Environmental Protection Act, 1999 (CEPA), c. 33.
.3 Fisheries Act (R.S.C., 1985, c. F-14)

.5 City of Winnipeg
.1 Waterway By-Law no. 5888/92
.2 Best Management Practices Handbook for Activities in and Around the City's Waterways and Watercourses. Nov.2005

1.4 SHOP DRAWINGS

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

.2 Indicate layout, pattern and relationship of paving joints to fixtures and project formed details. Indicate all reinforcing including sizing, layout and tie-in to existing members.

1.6 QUALITY ASSURANCE

1. Qualifications

    1. Installer: Company or person specializing Portland cement concrete paving with 5years documented experience.

2. Certificates.
    1. Submit manufacturer's test data and certification that following material meets requirements of this section prior to starting concrete work:
        1. Portland Cement.
        2. Blended Hydraulic Cement.
        3. Supplementary Cementing Material.
        4. Admixtures.
        5. Joint Sealants.
        6. Curing Materials.
        7. Joint Filler.

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

    3. Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

    4. Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

    5. Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.7 DELIVERY, STORAGE AND HANDLING

1. Packing, shipping, handling, and unloading:
    1. Unload cement and store in weathertight bins or silos that protect cement from dampness and contamination and provide easy access for inspection and identification of each shipment.
    2. Deliver and stockpile aggregates in an area that will not impede construction or encroach over the limits of construction. Do not stockpile within tree protection zones in accordance with Section 32 01 90.33 Tree and Shrub Preservation.
    3. Stockpile 100% of total required amount of each size of aggregate prior to commencing mixing operation.

2. Storage and protection:
    1. Store admixtures, curing compounds and miscellaneous materials as recommended by manufacturer.

2 Products

2.1 MATERIALS

.1 Concrete mixes and materials: to Section 03 30 00 - Cast-in-Place Concrete.

.2 Reinforcing steel and mesh: to Section 03 20 00 - Concrete Reinforcing.

.3 Curing Compound: to Section 03 30 00 - Cast-in-Place Concrete.

.4 Granular base: Profile as shown on the drawings, aggregate information as shown in section

.5 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water soluble soap.

3 Execution

3.1 GRADE PREPARATION

.1 All excavations within the riparian area must adhere to local, provincial and federal regulations.

.2 Construct embankments using excavated material free from organic matter or other objectionable materials. Dispose of surplus and unsuitable excavated material off site.

.3 Place fill in maximum 150 mm layers and compact to at least 95% of maximum density to ASTM D698.

3.2 GRANULAR BASE

.1 Obtain Departmental Representative’s approval of subgrade before placing granular base.

.2 Place granular base material to lines, widths, and depths as indicated.

.3 Compact granular base to at least 95% of maximum density to ASTM D698.

3.3 REINFORCMENT

.1 Reinforce concrete slab infill with galvanized steel welded wire mesh (WWR).

.2 Install dowels to join new sections to existing. Dowels to be epoxy coated (green) 15M rebar. Drill into existing concrete and fill with adhesive bonding material. Embed dowel to a minimum depth of 300mm leaving minimum 450mm exposed in new concrete pour area.

3.4 CONCRETE

.1 Obtain Departmental Representative’s approval of granular base and reinforcing steel prior to placing concrete.

.2 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.3 Immediately after floating, give pavement surface uniform finish match existing concrete sections.

.4 Provide edging with 10 mm radius edging tool.

.5 Slip-form pavers equipped with string line system for line and grade control may be used if quality of work acceptable to Departmental Representative can be demonstrated. Hand finish surfaces when directed by Departmental Representative.

3.5 TOLERANCES

.1 Finish surfaces to within 3mm in 3 m as measured with 3m straightedge placed on surface.

3.6 EXPANSION AND CONTRACTION JOINTS

.1 Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals matching existing surfaces to a maximum distance of 3.0 m.

.2 Install expansion joints in consultation with Departmental Representative.

.3 Install expansion joints around manholes and catch basins and along length adjacent to catch basins, buildings, or permanent structure.

.4 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

.5 Install joint filler in expansion joints in accordance with Section 03300 - Cast-in-Place Concrete.

.6 Seal expansion joints with sealant approved by Departmental Representative.

3.7 CURING

.1 Cure concrete by adding moisture continuously in accordance with CAN/CSA-A23.1 to exposed finished surfaces for at least 1 day after placing, or sealing moisture in by curing compound approved by Departmental Representative.

.2 Where burlap is used for moist curing, place two pre-wetted layers on concrete surface and keep continuously wet during curing period.

.3 Apply curing compound evenly to form continuous film. In accordance with manufacturer's requirements.

3.8 BACKFILL

.1 Allow concrete to cure for seven [7] days prior to backfilling.

.2 Backfill to designated elevations with material approved by Departmental Representative. Compact and shape to required contours as indicated on drawings.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This specification shall cover the supply and/or installation of site furnishings. The Contractor shall furnish all labour, materials, equipment and services necessary to complete the Work as shown on the drawings and specified herein. These items shall include:

.1 The Contractor shall be responsible for the supply, safe storage and handling of all miscellaneous metal materials as set forth in this Specification.

.2 All materials supplied under this Specification shall be of a type approved by the Consultant, and shall be subjected to inspection and testing by the Consultant.

.3 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

.4 All materials supplied under this Specification shall be of a type approved by the Consultant, and shall be subjected to inspection and testing by the Consultant

.5 Metal Work performed under this specification shall cover supply, fabrication, powder coating, transportation, handling and installation of miscellaneous metal, including all miscellaneous metal elements and incidental component/fasteners, as specified herein.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 19 - Construction/Demolition Waste Management And Disposal.

.3 Section 05 50 00.2 – Metal Fabrication - Landscape

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM A240/A240M-[15b], Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

.2 ASTM A269-[02], Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.3 ASTM A307-[02], Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.4 ASTM A500/A500M-[13], Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

.5 ASTM A1008/A1008M-[15], Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

1.4 PROTECTION

.1 Prevent damage to other trees, landscaping, benches, buildings, pavement, surface and underground utility facilities.

1.5 SUBMITTALS

.1 Shop Drawings

.1 Contractor to submit shop drawings for review and approval prior to any fabrication.

1.6 SAMPLES

.1 Submit to Consultant submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Work affected by submittal shall not proceed until review by the Consultant.

.3 Present samples and mock-ups in the same units as the contract documents.

.4 Notify Consultant, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.5 Contractor's responsibility for errors and omissions in submission is not relieved by the Consultant's review of submittals.

.6 Provide: Shop Drawings for all furnishings for review and approval.

1.7 QUALITY CONTROL

.1 Inspection

.1 All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Consultant including all operations from the selection and production of materials through to final acceptance of the specified Work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given. The Consultant reserves the right to reject any materials or Works that are not in accordance with the requirements of this Specification.

.2 Qualifications of Contractor

.1 The Contractor shall produce evidence that his plant is recently fully approved by the C.W.B. to the requirements of CSA Standard W47.1-1983, Division 2.

.2 The Contractor shall produce evidence that all welding operators to be employed on the Work are currently qualified by the C.W.B. at the time of fabrication and in the processes in which they are to be employed on the Work. Such qualifications shall have been issued within two years of the commencement of fabrication.

.3 The Contractor shall also produce evidence relative to each operator, that he has been executing satisfactory welding in the required processes within the six-month period previous to the award of this Contract.

.3 Quality And Details of Welds

.1 The quality and details of welds shall be in accordance with A.W.S. D1.1, Subsection 9.25.

.2 Welds shall have no cracks, inadequate penetration or lack of fusion, and shall have no other defects exceeding the A.W.S. D1.1, Subsection 9.25. Fusion type defects referred to in Subsection 9.25 shall be interpreted as slag inclusions and similar generally elongated defects.

.3 Welds to be ground smooth and be free of snags or inclusions.

.4 Testing

.1 All materials, welding procedures, shop drawings and steel Work fabrication will be inspected by the Consultant to ascertain compliance with the Specifications and Drawings.

.2 All welds will be visually inspected.

.3 The Consultant shall have access to all the fabricator's normal quality control records for this Contract.

.4 Weld inspection will be carried out in accordance with the requirements of A.W.S. Dl.l.

.5 Welds that are found by any of the inspection methods to be inadequate and unsatisfactory shall be repaired in accordance with A.W.S. D1.1 and then re-tested. The cost of the repairs, and of the tests that reveal inadequate and unsatisfactory welds shall be paid for by the Contractor.

.6 No repair shall be made until agreed to by the Consultant.

.5 Unacceptable Work

.1 Any Work found to be unacceptable shall be immediately brought to the attention of the Consultant and shall be corrected in accordance with A.W.S. D1.1, Subsection 3.7.

Part 2 Products

2.1 GENERAL

.1 Smooth all cut edges and ensure that all material is free from burrs, cracks, defects and other imperfections.

2.2 MATERIALS

.1 Custom Outdoor Bench mounted on Limestone Boulders.

.1 Limestone Base shall be existing rough cut rectangular boulders.

.2 Framework Shall be HSS cold rolled steel square tube and hot rolled steel flat bar. Powder coated Paint: Black.

.3 Wood Members shall be Ipe wood slats, FSC certified.

.4 Fasteners shall be steel, tamper proof with powder coated heads to match framework.

.5 Epoxy Grout, all weather resistant.

.2 Enameltec Signage. (Porcelain Enamel on ASTM A424 Steel Plate.)

.1 Holes tapped for anchoring to steel support.

.2 Graphic Material to be supplied

.3 Fabrication, Assembly and Installation as per manufacturer's specifications.

.1 Manufacturer: PG Bell. 420 Main Street East. Milton, ON. L9T 5G3. 1.800.663.8543

.2 Equivalent Product Manufacturers.

.3 Bollards and Fittings

.1 Bollard - Fixed, Embedded

.1 Steel Pipe

.2 Powder-coated – Black.

.2 Bollard – Removable

.1 Steel Pipe

.2 Powder-coated – Black

.3 Chain Accessories

.1 3/8" Bollard Chain Eyes

.2 Quick Link Connector

.3 Bollard Chain 5/16"

.4 Fabrication, Assembly and Installation as per manufacturer's specifications.

.1 Manufacturer: Reliance Foundry. Unit 207, 6450 – 148 Street, Surrey, BC. V3S 7G7. 1.888.735.5680

.2 Equivalent Product Manufacturers.

Part 3 Execution

3.1 CONSTRUCTION METHODS

.1 Bench Installation

.1 Installation of site furnishings shall be as shown on drawings and as per manufacturer's specifications.

.2 Bench tops shall be pre-assembled off site. All welds to be ground smooth and all bolt holes to be tapped prior to powder coating.

.3 Install bench on-site. Drill holes in existing limestone block to match bench frame exactly. Do not drill within 100mm of any edge of any boulder. Size anchor bolts accordingly. Use weather resistant epoxy in anchor bolt holes to provide permanent fix to limestone.

.2 Signage Installation

.1 Install Signage Supports as per Section 05 50 00.2

.2 Attach Signage to supports as per manufacturer's specifications

.3 Bollard Installation

.1 Auger footing to depth below frost line. Remove all debris from hole including dewatering as required.

.2 Install all pre-fabricated pipe bollards plumb and level. Embed Bollard into Concrete minimum 600mm, maintaining required height above ground.

.3 Install all pre-fabricated pipe bollards plumb and level. Embed Bollard into Concrete minimum 600mm, maintaining required height above ground.

.4 Shipping

.1 Structural members shall be loaded in such a manner that they can be transported and unloaded at their destination without being excessively stressed, deformed or otherwise damaged.

.5 Handling and Storage of Materials

.1 Material to be stored shall be placed on skids above the ground. It shall be kept clean and properly drained. Long members shall be supported on skids placed near enough to prevent injury from deflection.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 32 92 19.13 – Mechanical Seeding

.2 Section 32 92 23 – Sodding

.3 Section 32 93 09 – Planting Bed Preparation

.4 Section 32 93 10 – Trees, Shrubs and Groundcover Planting

1.2 REFERENCES

.1 Agriculture and Agri-Food Canada

.1 The Canadian System of Soil Classification, Third Edition, 1998.

.2 Canadian Council of Ministers of the Environment

.1 PN1340-[2005], Guidelines for Compost Quality.

.3 Canadian Green Building Council (CaGBC)

.1 LEED Canada-NC Version 1.0-[December 2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System For New Construction and Major Renovations.

.4 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 DEFINITIONS

.1 Compost:

.1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.

.2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.

.3 Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below (25) (50)), and contain no toxic or growth inhibiting contaminates.

.4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category (A) (B).

1.4 QUALITY ASSURANCE

.1 Pre-installation meetings: Conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Divert unused soil amendments from landfill to official hazardous material collections site approved by Departmental Representative.

.3 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

Part 2 Products

2.1 TOPSOIL

.1 Topsoil for seeded areas: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.

- .1 Soil texture based on The Canadian System of Soil Classification, to consist of medium texture that may include sandy loam, sandy clay loam.
- .2 Contain no toxic elements or growth inhibiting materials.
- .3 Finished surface free from:
  - .1 Debris and stones over 50 mm diameter.
  - .2 Course vegetative material: 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

2.2 SOIL AMENDMENTS

.1 Peatmoss:

- .1 Derived from partially decomposed species of Sphagnum Mosses.
- .2 Elastic and homogeneous, brown in colour.
- .3 Free of wood and deleterious material which could prohibit growth.
- .4 Shredded particle minimum size: 5 mm.

.2 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

.1 Grades on the area to receive topsoil, which have been previously established in conformance with the Construction Drawings and/or other applications, shall be maintained in true and even grade.

.2 Topsoil shall be free of roots, trees, stones, construction materials, debris, foreign non-organic objects and other deleterious materials over 30mm in diameter.

.3 The topsoil shall be applied to a minimum of 150mm compacted depth for seeding areas. Unless otherwise specified on drawings.

.4 The placed topsoil shall be incorporated with the fractured subgrade after placement and groomed with suitable equipment. The contractor shall fine grade and loosen the topsoil, eliminating rough spots and low areas to ensure positive drainage

.5 Spread topsoil in uniform layers not exceeding 150 mm for proper compaction.

.6 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.3 FINISH GRADING

.1 Grade to eliminate rough spots and low areas and ensure positive drainage.

.1 Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.

.1 Leave surfaces smooth, uniform and firm against deep footprinting.

3.4 ACCEPTANCE

.1 Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.5 CLEANING

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

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

.1 This Specification shall cover the complete supply, and installation of native seed mix as specified, herein and as shown on the Drawings. The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

1.2 RELATED SECTIONS

.1 Section 02911 – Topsoil Placement and Grading

.2 City of Winnipeg Specification CW 3520-R7 - Seeding

1.3 REFERENCES

.1 Agriculture and Agri-Food Canada.

.1 The Canadian System of Soil Classification, Third Edition, 1998.

.2 Canadian Council of Ministers of the Environment.

.1 PN1340-[2005], Guidelines for Compost Quality.

.3 Canadian Green Building Council (CaGBC).

.1 LEED Canada-NC Version 1.0-[December 2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System For New Construction and Major Renovations.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Section 01330 - Submittal Procedures.

.2 Quality control submittals:

.1 Maintenance Schedule: submit a schedule providing all aspects related to the establishment of desired vegetation. These aspects include weed control, erosion and sedimentation control and foreseeable remedial action.

1.5 QUALITY ASSURANCE

.1 Construction meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

Part 2 Products

2.1 SEED

.1 The Contractor shall source all required seed for cover crops and native grass mixes.

.2 Any seed that is sourced by the Contractor shall be reviewed by the Departmental Representative and the Departmental Representative shall have the authority to approve or reject any seed lot submitted by the Contractor

.3 Permanent cover seed shall consist of the species listed below.

.1 A blend composed of one hundred percent (100%) Kentucky Bluegrass or a mixture of ninety five percent (95%) Kentucky Bluegrass and five percent (5%) Creeping Red Fescue

.4 All seed shall be purchased on a pure live seed (PLS) basis.

.5 Mixes will be created in a PLS basis

3 EXECUTION

3.1 SEED BED PREPARATION

.1 Verify that grades are correct as determined/set by others. If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.

.2 Contractor shall maintain positive drainage to the final topsoil grades as to ensure there are no new rough spots or low areas that could retain water.

.3 The Contractor shall not alter the final topsoil grades which would prevent positive drainage.

.4 Topsoil will be placed on site and require immediate erosion and sediment control measures to be in place prior to final seeding of grasses.

.5 If broadcast seeded, consolidate mechanically seeded areas by rolling area if soil conditions warrant or if directed by Departmental Representative with approved equipment.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Use biodegradable erosion control blankets, only.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal. Only non bio-degradable products shall be removed (metal pins, wood stakes, sten log etc)

3.3 SEED PLACEMENT

.1 Broadcast seeding techniques are to be used where an approved seed drill cannot access areas to be seeded within the Grass Planting area (i.e. walls, trees, immovable structures). In this case soil must be harrowed, prior to broacast seed. Upon completion of seeding the area shall be raked and packed to the satisfaction of the Departmental Representative.

.3 The Contractor shall seed the Grass/permanent vegetation and should be completed no later than second week of September of the seeding year pending weather conditions adverse to seeding. In the event of unforeseen circumstances or inclement weather/site conditions, notify Departmental Representative and a contingency or dormant planting may be possible with Departmental Representative approval and adjusted seed mix.

.4 For broadcast seeded areas use equipment and methods acceptable to Departmental Representative, this will require an increase in the quantity of seed required.

.5 Consolidate mechanically seeded areas by rolling area if soil conditions warrant or if directed by Departmental Representative with equipment approved by Departmental Representative immediately after seeding.

3.4 PROTECTION OF SEEDED AREAS

.1 The Contractor is responsible to ensure temporary exclusion fencing is in place for two seasons to limit pedestrian access, goose grazing, construction traffic or any form of traffic that could potentially interfere at any time with plant establishment activities associated with the Grass planting areas.

.2 The fenced exclusion zone must be established and maintained to preclude any pedestrian or construction traffic through the re-vegetation sites from the start of the seeding and weed/erosion control programs until the grass has become established.

.3 All activity on seeded areas must be restricted through establishment period through temporary 0.6m high erosion control fence (or approved equal)

.4 Fencing to be maintained throughout maintenance and warranty period. Upon final acceptance, fence to be removed by cutting fabric below final grade and removal of stakes such that no evidence of the fence on the surface remains. Ensure a gate is installed for mower and equipment access.

3.6 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following operations from time of installation until acceptance.

.1 Water seeded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 100 mm.

.2 repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.

.3 Maintain seeded areas weed free.

.4 Cut grass to 50 mm when or prior to it reaching height of 75 mm. Remove clippings which will smother grassed areas.

.5 Fertilize areas as required. Spread half of required amount of fertilizer in one direction and remainder at right angles.

.6 Approval of remedial measures developed by the Contractor shall be at the discretion of the Departmental Representative

3.7 MAINTENANCE DURING WARRANTY PERIOD

.1 Perform following operations from time of acceptance until end of warranty period:

.1 Water seeded grass areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.

.2 Repair and resod dead or bare spots to satisfaction of Departmental Representative.

.3 Cut grass to 50 mm during normal growing conditions.

.4 Remove clippings after each cutting.

3.8 ACCEPTANCE

.1 Seeded Areas will be accepted by Departmental Representative provided that:

.1 The grass meets the conditions, criteria and has been maintained inaccordance with CW 3520-R7 - Seeding

.2 All seeded areas to be considered finally established once data collection analyses show adequate seedling density.

.3 Suggested actions will be based on seedling densities in the planting year, and acceptable to Departmental Representative.

.4 The final establishment inspection will be made after the stand has been subjected to one winter season. Final approval will be at the discretion of the Departmental Representative at the end of the Warrantee period.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 19 - Construction/Demolition Waste Management And Disposal

.3 Section 32 91 21 - Topsoil Placement and Grading

.4 City of Winnipeg Specification CW 3510-R9 - Sodding

1.2 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

1.3 SCHEDULING

.1 Schedule sod laying to coincide with preparation of soil surface.

.2 Schedule sod installation when frost is not present in ground.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal

.2 Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.

.3 Do not dispose of unused fertilizer into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

Part 2 Products

2.1 TURFGRASS SOD

.1 The Contractor shall supply turfgrass sod with a mineral soil layer containing a minimum of 70% inorganic soil. Salinity rating shall be less than 2.5mmhos/cm. The pH range shall be between 6.0-8.0. Sod supplied shall have been sown in nursery fields with Canada Certified No. 1 or Canada Certified No. 2 grass seed meeting the following certified seed blends or mixtures:

.1 A blend composed of one hundred percent (100%) Kentucky Bluegrass or a mixture of ninety five percent (95%) Kentucky Bluegrass and five percent (5%) Creeping Red Fescue.

.2 Water

.1 Water shall be potable and free of minerals that may be detrimental to sod growth.

.3 Fertilizer

.1 To Canada "Fertilizers Act" and "Fertilizers Regulations".

.2 Complete, synthetic, slow release with 65 % of nitrogen content in water-insoluble form.

2.2 SOURCE QUALITY CONTROL

.1 Obtain approval from Departmental Representative of sod at source.

.2 When proposed source of sod is approved, use no other source without written authorization by the Departmental Representative.

Part 3 Execution

3.1 PREPARATION

.1 Verify that grades are correct and prepared in accordance with Section 32 91 21 - Topsoil Placement and Grading. If discrepancies occur, do not commence work until instructed by Departmental Representative.

.2 Do not perform Work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.

.3 Fine grade surface free of humps and hollows to smooth, even grade, to contours and elevations indicated, to tolerance of plus or minus 8 mm, for Turfgrass Nursery Sod surface to drain naturally.

.4 Remove and dispose of weeds; debris; stones 25 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site.

3.2 SOD PLACEMENT

.1 Lay sod within 24 hours of being lifted if air temperature exceeds 20°C.

.2 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

.3 Roll sod as directed by Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.3 SOD PLACEMENT ON SLOPES AND PEGGING

.1 Install and secure geotextile fabric in areas indicated, in accordance with manufacturer's instructions. Start laying sod at bottom of slopes.

3.4 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following operations from time of installation until acceptance.

.2 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 100 mm.

.3 Cut grass to 50 mm when or prior to it reaching height of 75 mm. Remove clippings which will smother grassed areas.

.4 Maintain sodded areas weed free.

.5 Fertilize areas as required. Spread half of required amount of fertilizer in one direction and remainder at right angles.

3.5 ACCEPTANCE

.1 Turfgrass Nursery Sod areas will be accepted by the Departmental Representative provided that:

.1 The grass meets the conditions, criteria and has been maintained in accordance with CW 3510-R9 - Sodding

.2 Sodded areas are properly established.

.3 Sod is free of bare and dead spots.

.4 No surface soil is visible from height of 1500mm when grass has been cut to height of 50 mm.

.5 Sodded areas have been cut minimum 2 times prior to acceptance.

.2 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

3.6 MAINTENANCE DURING WARRANTY PERIOD

.1 Perform following operations from time of acceptance until end of warranty period:

.1 Water sodded Turf Grass Nursery areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.

.2 Repair and resod dead or bare spots to satisfaction of Departmental Representative.

.3 Cut grass and remove clippings as directed by Departmental Representative to height as follows:

.1 Turf Grass Nursery Sod:

.1 50 mm during normal growing conditions.

3.7 CLEANING

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

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

.1 This specification shall cover planting bed preparation. The work to be done by the Contractor under this specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all work as specified.

1.2 RELATED SECTIONS

.1 Section 32 37 00 – Trees and Shrub Planting

.2 Section 32 91 19.13 – Topsoil Placement and Grading

1.3 SAMPLES

.1 Provide sample of wood chip mulch prior to delivery on site for a visual inspection and approval by Landscape Architect.

Part 2 Products

2.1 MATERIALS

.1 Planting Soil - General: black top soil, a fertile friable natural loam containing by volume not less than 4% and no more than 25% of organic matter for clay loams, and not less than 2% and no more than 25% for sandy loams, with an acidity value ranging from pH 6.0 to 8.0. Planting soil is to be free of any mixture of subsoil, clay lumps and free of stones and other extraneous matter. It is not to contain couch or crab grass rhizomes. Planting Soil – to be supplied by others only.

.2 Wood Chip Mulch: Locally available wood chip mulch, free of dirt, stones and deleterious materials. Mulch of Willow or Poplar shall not be used.

.3 Water: potable and free of minerals which may be detrimental to plant growth.

.4 Geotextile: geotextile shall be Propex 315-ST as supplied by Nilex, or approved equal.

Part 3 Execution

3.1 PLANTING BED PREPARATION

.1 Contractor shall co-ordinate site excavation works with landscaping to ensure minimal additional excavation for shrub beds. All remaining areas to be excavated shall be to the shape shown on the drawings. Beds shall be excavated to the finished depth (including mulch) shown on drawings.

.2 Excavation shall be filled with soil mixture. After filling, excavation of top of bed shall be level with surrounding grade. Soil should be firmly compacted and indicated soil depths shall be depths after light compaction.

.3 All areas and locations provided for planting shall be staked according to layout shown on the drawings. Excavation shall not proceed until the layout has been inspected and approved by the Departmental Representative. Excavation shall not be undertaken until all underground utilities have been located and protected.

3.2 PLANTING TRENCH

.1 Planting Trench shall be excavated to the finished depths and widths as shown on drawings.

.2 Sub-grade shall be scarified to the depth specified on the drawings.

.3 Excavation shall be filled with supplied soil mixture. After filling, top of soil shall be level with surrounding grade, as determined by the Departmental Representative. Soil should be lightly compacted and indicated soil depths shall be depths after light compaction.

3.3 INSTALLATION OF MULCH

.1 Mulch shall be spread to depths as indicated on drawings over entire planting bed area, taking care not to damage the plants.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This specification shall cover the supply, installation and maintenance of trees, shrubs and groundcovers. The Contractor shall furnish all labour, materials, equipment and services necessary to complete the work as shown on the drawings and specified herein.

1.2 RELATED WORK

.1 Section 32 93 09 - Planting Bed Preparation

.2 Section 32 91 19.13 Topsoil Placement and Grading

1.3 REFERENCES

.1 Install trees, shrubs and ground covers work in accordance with the Canadian Standards for Nursery Stock Current Edition, published by the Canadian Nursery Trades Association, except where specified otherwise.

1.4 SOURCE QUALITY CONTROL

.1 All plant material shall be randomly inspected at the source upon request of the Departmental Representative or designate. In addition, Contractor shall inspect all plant material at the source to ensure quality prior to delivering to site.

.2 Trees are to be grown in nurseries under proper cultural practices as recommended by the Canadian Nursery Trades Association.

.1 Only those trees that have been grown for at least the four (4) previous years in local Manitoba nurseries located in an Agriculture Canada Plant Hardiness Zone designation of 2(b). Trees that have grown in plant hardiness zones 1 and 4 or greater will be rejected.

1.5 MAINTENANCE

.1 The Contractor shall be responsible for the maintenance of the planted material for a period of 30 Days from the date of Substantial Performance. Any areas planted after September 15th, the maintenance period will commence on May 15th of the following year or such date as mutually agreed upon by all parties. Defective plants shall be replaced within three (3) days of notification to the Contractor.

.2 Water to maintain soil moisture conditions for optimum growth and health of plant material specific to each species, without causing erosion.

.3 Reform damaged watering saucers.

.4 Remove weeds regularly throughout maintenance period.

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

.6 If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Departmental Representative prior to application.

.7 Apply fertilizer as directed by manufacturer’s specifications.

.8 Remove dead, broken or hazardous branches from plant material.

.9 Keep trunk protection and tree supports in proper repair and adjustment as required.

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

.11 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

1.6 WARRANTY

.1 The Contractor shall, at his/her expense, warrant the Work against any and all defects or deficiencies resulting from insect infestation, disease and mechanical damage due to improper handling, installation or maintenance, for a period of two (2) years from the date of the Substantial Performance.

.2 End-of-Warranty inspection will be conducted by the Departmental Representative.

.3 The Departmental Representative reserves the right to request material replacement or extend the Contractor's Maintenance responsibilities for an additional two (2) years if, at the end of the 2 year Warranty Period, leaf development and growth are not sufficient to ensure future survival of the plant material.

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

1.7 REPLACEMENTS

.1 During the Maintenance Period, the Contractor shall remove from Site any plant material that has died or failed to grow satisfactorily as determined by the Departmental Representative and replace as per Specifications within a maximum ten (10) day period from notification.

.2 The Contractor shall extend Maintenance and Warranty on replacement tree for a period equal to the original Maintenance and Warranty Periods.

.3 The Contractor shall continue such replacement, maintenance and warranty until tree is acceptable.

Part 2 Products

2.1 MATERIALS

.1 Water

.1 Water shall be potable and free of contaminants which may be detrimental to plant growth.

.2 Trunk Protection

.1 Plastic: Perforated spiralled strip.

.2 Plastic: Corrugated Weeping Tile Pipe, Split.

.3 Fertilizer

.1 Fertilizer shall be a slow release formulation of low nitrogen and high phosphorus e.g. 10-50-12. Apply quantities at rates stated by product manufacturer.

.4 Planting Soil

.1 As per specification 32 93 09 - Plant Bed Preparation.

.5 Root Ball Burlap

.1 150 g Hessian burlap, biodegradable.

.6 Anti-desiccant

.1 Wax-like emulsion to provide film over tree leaf surfaces reducing evaporation but permeable enough to permit transpiration.

.7 Wound Dressing

.1 Horticultural accepted non-toxic, non-hardening emulsion.

.8 Wire Baskets

.1 Horticultural accepted product designed to carry the weight and to contain a burlap-covered root ball. Minimum diameter basket size is to conform to the same minimum diameter of the tree root ball for the respective minimum tree caliper sizes.

2.2 PLANT MATERIAL

.1 Plant material to be selected at source and tagged by Departmental Representative or designate prior to delivery to site.

.2 Nomenclature of specified trees is to conform to the International Code of Nomenclature for Cultivated Plants and is to be in accordance with the approved scientific names given in the latest edition of the Standardized Plant Names.

.3 Trees are to be characteristically developed for their species and structurally sound, well branched, healthy and vigorous and densely foliated when in leaf. The tree is to have a healthy, well developed, fibrous root system which may be verified through a testing procedure that destructively samples one or more randomly selected root balls.

.4 Trees are to have been root pruned regularly, but not later than one growing season prior to arrival on Site. The Contractor may be required to furnish documentation to the client on their root-pruning program. Trees in excess of 75 mm caliper are to have been half root pruned during each of two successive growing seasons, the latter at least, one growing season prior to arrival on Site.

.5 All parts of the trees, especially the lower branches, are to be moist and show live, green cambium tissue when cut.

.6 Trees are to have only one, sturdy, reasonably straight and vertical trunk, and a well balanced crown with fully developed leader.

.7 Trees are to be free of disease, insect infestation, rodent damage, sun scald, frost cracks, abrasions, unhealed scars, scars exceeding 5 cm in diameter, major forks or crooks in the trunk, broken branches, or angled leaders. Trees having the above defects will not be accepted by the Departmental Representative.

.8 Trees having a leader which has developed at a sharp angle to the trunk as a result of pruning or trunk damage will not be accepted.

.9 Trees exhibiting suppressed, weakly developed branches due to competition from other closely spaced trees in the nursery will not be accepted. Trees exhibiting dead branches will not be accepted.

.10 Any tree that has come out of dormant stage and is too far advanced will not be accepted unless prior approval obtained. Approval is required for any tree which has been held in cold storage.

.11 Balled and burlapped trees in excess of a 3 m height must have been dug with large firm ball. Roots in root balls must be comprised of 75% fibrous and feeder root systems. Secure root balls with burlap, heavy twine and rope. For trees 75 mm or more in caliper, wrap ball in double layer of burlap and drum lace with minimum 10 mm diameter rope. Protect root balls against sudden changes in temperature and exposure to heavy rainfall.

.12 Tree spade dug trees are to be dug with mechanized digging equipment with hydraulic spade. Lift root ball from hole, place in wire basket designed for purpose and lined with burlap. Tie basket to ball with heavy rope. Take care not to injure trunk of tree with wire basket ties or rope.

2.3 TREE QUANTITY AND SIZE

.1 Trees are to be planted at the quantities and caliper listed on the Plant Lists which are shown on the drawings. Any variation from the specified quantity is to be clearly identified on the Schedule of Prices. Any variations to species, size or caliper of specified trees will require a request for approval from the Departmental Representative.

.2 The layout of planting locations will be approved on-site by the Departmental Representative prior to installation.

.3 The Contractor shall supply trees as indicated in the Schedule of Prices and Plant Lists.

.4 Trees are to conform to the measurements specified in the on drawing Plant Lists, except that trees larger than specified may be used if approved by the Departmental Representative.

.5 Trees are to be measured when the branches are in their normal position. Height dimensions specified are to refer to the main body of the tree and not from branch tip to root base. Where trees have been measured by caliper or diameter, reference is to be made

to the diameter of the trunk measured 15 cm above the ground as the tree stands in the nursery prior to lifting. Caliper of tree shall be appropriately designed on a permanently fixed tag on one of the branches.

2.4 SHIPMENT AND PRE-PLANTING CARE

.1 Coordinate shipping of trees and excavation of holes to ensure minimum time lapse between digging and planting.

.2 Tie branches of trees securely, and protect trees against abrasion, exposure and extreme temperature change during transit. Avoid binding of trees with rope or wire which would damage bark, break branches or destroy natural shape of tree. Give full support to root ball of trees during lifting.

.3 Cover tree foliage with tarpaulin, and protect bare roots by means of dampened straw, peat moss, saw dust or other acceptable material to prevent loss of moisture during transit and storage.

.4 Remove broken and damaged roots with sharp pruning shears. Make clean cuts, and cover cuts over 10 mm diameter with a tree wound dressing.

.5 Keep roots moist and protected from sun and wind. Heel-in trees which cannot be planted immediately in shaded areas and water well.

Part 3 Execution

3.1 WORKMANSHIP

.1 Location of trees will be staked out or painted on Site by the Contractor. Locations shall be approved by the Departmental Representative prior to installation.

.2 Apply anti-desiccant in accordance with material manufacturer's instructions with prior approval of the Departmental Representative.

.3 Coordinate operations. Keep Site clean and planting holes drained. Immediately remove soil or debris spilled onto street pavement, grass or sidewalk.

3.2 PLANTING TIME

.1 Plant deciduous trees during dormant period before buds have broken. Trees noted for spring planting only, must be planted in dormant period.

.2 When permission has been obtained from the Departmental Representative to plant deciduous trees after buds have broken, spray plants with anti-desiccant to slow down transpiration prior to transplanting.

.3 Plant only under conditions that are conducive to health and physical conditions of trees.

.4 Provide planting schedule to Departmental Representative. Extending planting operations over long period using limited crew will not be accepted.

.5 The Contractor must obtain all above and below ground clearances from all the utilities as well as the appropriate District Operations Branch in a timely manner so as not to jeopardize the schedule of the complete tree planting Contract.

3.3 EXCAVATION

.1 Refer to Section 32 93 09 – Planting Bed Preparation for preparation of planting beds.

.2 Excavate planting pits as indicated by stakes or paint marks.

.3 Protect bottom of excavations against freezing.

.4 Remove water which enters excavations prior to planting. Ensure source of water is not ground water and notify Departmental Representative.

3.4 INSTALLATION

.1 Planting shall be done during periods of suitable weather conditions and in accordance with locally accepted practice.

.2 Trees are to be planted within forty eight (48) hours of excavation from the nursery.

.3 No tree pit is to be left open at the end of the Contractor's Work Day. Planting program is to be planned to ensure that all approved trees delivered to the Site at designated planting locations are installed and thoroughly watered the same day as delivery.

.4 Loosen bottom of planting hole to depth specified on drawing. Cover bottom of each excavation with minimum of 150 mm topsoil mixture, incorporate with subgrade material.

.5 Plant trees vertically. Orient trees to give best appearance in relation to structure, roads and sidewalks.

.6 Place trees to depth equal to depth they were originally growing in nursery.

.7 With balled and burlapped root balls and root balls in wire baskets, loosen burlap and cut away the top 1/3 without disturbing root ball. Do not pull burlap or rope from under root ball. Non-biodegradable wrapping must be removed.

.8 Tamp planting soil around root system in layers of 150 mm eliminating air voids. Frozen or saturated planting soil is unacceptable. When 2/3 of planting soil has been placed, fill hole with water. After water has completely penetrated into soil, complete backfilling.

3.5 TRUNK PROTECTION

.1 Install trunk protection prior to installation of tree supports when used.

3.6 PRUNING

.1 The Contractor shall provide a Manitoba Certified Arborist for each Work crew or Work Site.

.2 Prune trees after planting to compensate for loss of roots suffered during transplanting. Postpone pruning of those trees where heavy bleeding may occur, until in full leaf.

Employ clean sharp tools and make cuts flush with main and secondary branch collars, smooth and sloping as to prevent accumulation of water.

.3 Remove projecting stumps on trunks or main branches. Remove dead and injured branches and branches that rub causing damage to bark. Trim out crown of trees without changing their natural shape. Do not damage lead branches or remove smaller twigs along main branches.

.4 Treat cuts in excess of 20 mm diameter and damaged parts with application of industry approved tree wound dressing.

3.7 WATERING

.1 Trees are to be watered during the planting procedure as described previously, and once a week thereafter, or more frequently if required, during the growing season.

.2 A complete record is to be kept of each series of waterings for all planted trees noting: 1) location, and 2) date of watering. This record shall be sent bi-weekly to the Departmental Representative.

.3 Apply 40 litres of water per 25 mm caliper per application using deep root feeder or low/pressure nozzle and hose. The water stream must not gouge out a hole in the soil and mulch.

END OF SECTION