

Part 1 General

1.1 WORK INCLUDES

.1 This specification covers pavement removal, excavation, preparation of sub-grade, supply and placement of sub-base and base course Materials, and boulevard grading for pavements, slab renewals, curbs, miscellaneous concrete slabs, sidewalks and other related Works.

1.2 DEFINITIONS

- .1 Sub-grade – the natural in-situ Material.
- .2 Sub-base – where required, the layer of Material provided between the sub-grade and the base course, including the drain pit Material.
- .3 Base course – the layer of Material immediately underlying the pavement.

1.3 RELATED SECTIONS

- .1 Section 31 32 19 – Geotextiles
- .2 Section 32 91 13 – Topsoil and Finish Grading

Part 2 Products

2.1 SUB-BASE MATERIALS

- .1 Sub-base Material of the type(s) shown on the Drawings or indicated in the Specifications will be supplied in accordance with the following requirements:
 - .1 Suitable site sub-base Material will be of a type approved by the Contract Administrator.
 - .2 Clay borrow sub-base Material will be of a type approved by the Contract Administrator.
 - .3 Crushed sub-base Material will be well-graded and conform to the following grading requirements:

TABLE - Crushed Sub-Base Material Grading Requirements

CANADIAN METRIC SIEVE SIZE	PERCENT OF TOTAL DRY WEIGHT PASSING EACH SIEVE	
	50mm MAX. AGG.	150 mm MAX. AGG.
150 000	100%	90% - 100%
100 000		75% - 90%
50 000		50% max.
25 000		
5 000		

80	5% - 18%	
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- .1 150 millimetre crushed limestone Material when subjected to the abrasion test will have a loss of not more than 40% when tested in accordance with grading 1 of ASTM C535, Test for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .2 50 millimetre crushed limestone Material when subjected to the abrasion test will have a loss of not more than 40% when tested in accordance with grading A of ASTM C131, Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

2.2 BASE COURSE MATERIAL

- .1 Base course Material of the type(s) shown on the Drawings or indicated in the Specifications will be supplied in accordance with the following requirements:
 - .1 Base course Material will be approved by the Contract Administrator.
 - .2 Base course Material will consist of sound, hard, crushed rock or crushed gravel and will be free from organic or soft Material that would disintegrate through decay or weathering.
 - .3 The base course Material will be well graded and conform to the following grading requirements:

TABLE – Crushed Sub-Base Material Grading Requirements

CANADIAN METRIC SIEVE SIZE	PERCENT OF TOTAL DRY WEIGHT PASSING EACH SIEVE	
	50mm MAX. AGG.	150 mm MAX. AGG.
150 000	100%	90% - 100%
100 000		75% - 90%
50 000	25% - 80%	50% max.
25 000		
5 000		
80	5% - 18%	

- .4 Base course Material when subjected to the abrasion test will have a loss of not more than 35% when tested in accordance with grading B of ASTM C131, Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .5 The Material passing the 315 sieve will have a liquid limit not greater than 25 and a plasticity index not greater than 6.
- .6 Where base course is being placed under an asphaltic concrete pavement, the aggregate retained on a No. 5 000 sieve will contain not less than 35% crushed aggregate as determined by actual particle count. Crushed aggregate will be considered as that aggregate having at least one fractured face.

2.3 LIME OR PORTLAND CEMENT

- .1 Use either Lime or Type 10 normal Portland Cement for drying the sub-grade.
- .2 Supply Lime in accordance with CSA A82.43.
- .3 Supply Portland Cement in accordance with CSA A5.

2.4 IMPORTED FILL MATERIAL

- .1 Imported fill Material will consist of low to medium plastic clays or mixtures of sand and clay, uniform in texture.
- .2 The fill Material shall be free of wood, vegetation, concrete rubble or stones larger than 25 millimetres in diameter.

Part 3 Execution

3.1 PAVEMENT REMOVAL

- .1 Remove existing concrete pavement, including curbs and asphalt overlays at locations as shown on the Drawings or as directed by the Contract Administrator. Remove all pavements to a combined thickness of 300 millimetres, unless otherwise indicated in the Specifications.
- .2 Remove existing asphalt pavement including asphalt curbs at locations as shown on the Drawings or as directed by the Contract Administrator. Remove pavement to a maximum thickness of 150 millimetres, unless otherwise indicated in the Specifications.
- .3 Saw-cut the existing pavement full-depth along the limits designated for removal.
- .4 Utilize backhoe type equipment unless approved otherwise by the Contract Administrator
- .5 Dispose of Material in accordance with 02 07 20.

3.2 EXCAVATION

- .1 Excavate in-situ Material to the depth to accommodate the pavement structure as shown on the Drawings or as directed by the Contract Administrator.
- .2 Stockpile suitable in-situ Material and suitable site sub-base Material at locations on site as directed by the Contract Administrator.
- .3 Dispose of surplus suitable site Material and unsuitable Material such as frost heaving clays, silts, rocks and rubble in accordance with 02 07 20.
- .4 Strip and stockpile topsoil from the site in a manner which will prevent contamination of topsoil with underlying soil Materials. Stockpile the stripped topsoil at locations on site for later use.
- .5 The limits of excavation will be taken as a vertical plane 450 millimetres beyond the limits of the proposed pavement except when slip form paving equipment is specified for placement of the concrete pavement, the limits of excavation will be increased to a vertical plane 750 millimetres beyond the limits of the proposed pavement.

- .6 During excavation, the Contractor will be advised by the Contract Administrator as to which areas have an unsuitable sub-grade. Extend the excavation either to the lower limit of the unsuitable Material or to a depth as directed by the Contract Administrator.
- .7 Remove wooden poles, concrete bases, or tree stumps encountered under pavements to the top of subgrade or 1 metre below the bottom of the pavement surface, whichever depth is greater.
- .8 Backfill and compact over-excavated areas with sub-base Material approved by the Contract Administrator.
- .9 Excavate additional Material beyond the boulevard grading and ditch grading limits as directed by the Contract Administrator.

3.3 PREPARATION OF SUB-GRADE AND PLACEMENT OF SUB-BASE MATERIAL

- .1 Compact the sub-grade after the bottom of the excavation has been approved by the Contract Administrator.
- .2 Place and compact suitable site sub-base Material before placing any new sub-base Material, as directed by the Contract Administrator.
- .3 Compact areas of suitable sub-grade Material, the full width of the excavation, to a minimum of 95% Standard Proctor Density.
- .4 Place and compact sub-base Materials in layers to a depth of 3 times the maximum aggregate size or as directed by the Contract Administrator. Compact to a minimum of 100% Standard Proctor Density, for the full width of the excavation, and each layer must be levelled and approved by the Contract Administrator before the succeeding layer may be placed.
- .5 Re-compact or replace any layer, which has been rejected as directed by the Contract Administrator.
- .6 When excess water has been applied, either by sprinkling operations or by precipitation, to cause local or continuous pondage, soil compaction will not be permitted until sufficient soil drying has occurred, creating a condition lending itself favourably to compacting operations. Exercise necessary precautions to protect compacted areas against excess wetting from any natural or artificial sources of water application.
- .7 Should excess moisture from continuous or heavy precipitation threaten to unduly delay the completion of the Contract. Apply in writing to the Contract Administrator requesting permission to use Lime or Portland Cement to dry out the clay sub-grade or sub-base Material at specific location(s).

3.4 PLACEMENT OF SUB-BASE MATERIAL WITH GEOTEXTILE FABRIC

- .1 Install separation/reinforcement fabric in accordance with 31 32 19.
- .2 For stable sub-grades, place and compact sub-base Material to a minimum depth of 100 millimetres.
- .3 For unstable sub-grades, place and compact sub-base Material to a minimum depth for 300 millimetres or greater thickness as directed by the Contract Administrator.

- .4 Place sub-base Material by end-dumping methods and level with front-end loader type of equipment as approved by the Contract Administrator to avoid damage to the geotextile fabric and minimize sub-grade failures.
- .5 Avoid sudden stops or sharp turns by construction equipment during placement of sub-base Materials.
- .6 Construction traffic will not be allowed to travel on the placed sub-base Material until approved by the Contract Administrator.

3.5 PLACEMENT OF BASE COURSE MATERIAL

- .1 Place and compact base course Material to a minimum 75 millimetres thickness for pavement and approaches to a minimum of 100% Standard Proctor Density for the full width of the excavation unless otherwise shown on the Drawings or as directed by the Contract Administrator.
- .2 Level the compacted base course to the finished base course elevation.
- .3 Maintain the finished base course until the pavement is placed.
- .4 Place and compact base course Material as a levelling course to a maximum thickness of 50 millimetres for sidewalks and miscellaneous concrete slabs, to 90% Standard Proctor Density.
- .5 Place and compact base course Material immediately beneath pavement forms to provide firm support.

3.6 PLACEMENT OF IMPORTED FILL

- .1 Place fill Materials to satisfy the grading requirements of boulevard and ditches.
- .2 Supply Material in accordance with Section 2.5 of this specification.
- .3 Compact to a minimum of 90% Standard Proctor Density.

3.7 QUALITY OF SUB-GRADE, SUB-BASE AND BASE COURSE LAYERS

- .1 Determine the Standard Proctor Density for the sub-grade, sub-base and base course Materials at the optimum moisture content in accordance with ASTM Standard D698. The field density of each sub-grade, sub-base and base course layer will be a percentage of the applicable Standard Proctor Density, in accordance with in Sections 3.3, 3.4 and 3.5 of this specification.
- .2 Utilize quality control tests to determine the acceptability of the sub-grade, sub-base and base course layers, as placed and compacted before the succeeding layer may be applied.
- .3 Verify the field density of the compacted layers by Field Density Tests in accordance with ASTM Standard D1556, Test for Density of Soil in Place by the Sand-Cone Method, or ASTM Standard D2922, Test of Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- .4 The frequency and number of tests will be as directed by the Contract Administrator.

- .5 Fill promptly, holes made by the removal of samples from the layers with appropriate Material and thoroughly compact so as to conform in every way with the adjoining Material.
- 3.8 REMOVAL OF EXISTING CONCRETE BASES
- .1 Remove existing concrete bases as shown on the Drawings or as directed by the Contract Administrator.
 - .2 Remove to a depth of 1.0 metre below finished grade.
 - .3 Dispose of Material in accordance with 02 07 20.
 - .4 Backfill holes remaining with base course Material and compact to the satisfaction of the Contract Administrator.

END OF SECTION

Part 1 **General**

1.1 SUMMARY

.1 Work in this Section shall include but is not limited to:

.1 Stone Pavers

1.2 RELATED SECTIONS

.1 Section 05 50 00 – Metal Fabrications

.2 Section 31 32 19 – Geotextiles

.3 Section 32 11 23 - Aggregate Base Course

1.3 QUALITY ASSURANCE

.1 Installation shall be by a contractor and crew with at least five years of experience installing stone pavers on projects of similar nature.

.2 Contractor shall conform to all local, state licensing and bonding requirements.

.3 Tolerances:

.1 Installation Tolerances: Do not exceed 1/4 inch in 10 feet any direction from level or slopes indicated when tested with a 10 foot straightedge.

.4 Acceptability of Appearance: The following list of defects shall be considered as unacceptable and shall be replaced with a new unit at no additional cost:

.1 Pavers not being within the approved color range.

.2 Extreme non-uniformity of surface texture

.3 Foreign Material embedded in the face.

.4 Chipped, ragged or extreme irregular edges. Minor irregularity incidental to the usual method of manufacturer or slight chipping resulting from handling and delivery may be acceptable provided such defects are minor in scope and do not affect the overall appearance of the Work.

.5 Mock Up: Before commencing general installation, install precise stone pavers with steel edging in an area scheduled to receive pavers for purpose of establishing appearance and workmanship standards required for the Project. Mock-up areas shall be minimum of 3 metres in length.

.1 Approved Work will become the standard of quality for remaining Work.

.2 Do not begin general installation until mock-up area has been approved by the Contract Administrator.

1.4 REFERENCES

.1 CAN3-A231.2-M85

.2 ASTM C902-84 Specification for Pedestrian and Light Traffic Paving Brick

.3 ASTM C136-84a Method for Sieve Analysis of Fine & Coarse Aggregates

- .4 ASTM C117-87 Test method for Material finer than 0.075mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .5 ASTM E11-87 Specification for Wire-Cloth Sieves for Testing Purposes.
 - .6 CAN/CGSB-8.1-88 Sieves, Testing, Woven Wire, Inch Series.
 - .7 CAN/CGSB-8.2-M88 Sieves, Testing, Woven Wire, Metric.
 - .8 ASTM D698-78 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.
- 1.5 SAMPLES
- .1 Submit samples in accordance with Section 01 33 00.
- 1.6 SUBMITTALS
- .1 Product Data: For each type of manufactured Material and product indicated.
 - .2 Full size samples of stone paving slabs to indicate full range of colour and shape selections.
 - .3 3' length sample of galvanized steel edging
- 1.7 DELIVERY STORAGE AND HANDLING
- .1 Deliver stone pavers to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by fork lift or clamp lift. Unload pavers at job site in such a manner that no damage occurs to the product.
 - .2 Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.
- 1.8 ENVIRONMENTAL CONDITIONS
- .1 Do not install pavers during heavy rain or snowfall.
 - .2 Do not install pavers over frozen base Materials.
- Part 2 **Products**
- 2.1 Materials
- .1 Arborg Buff Limestone Paving Slabs:
 - .1 50mm thick x 254mm wide x 600 min length (up to 1000mm length) Arborg Buff Limestone slabs provided by Mariash Quarry or approved equal, joints fit tight, cut edges to fit tight at building face and adjacent Materials, as required.
 - .2 Custom Galvanized Edge
 - .1 127mm x 127mm bent steel with pre-drilled holes for rebar stakes every 300mm set flush to adjacent Materials and 25mm above top edge of stone or mulch. Site weld all seams.

Part 3 Execution

3.1 EXCAVATION

- .1 Excavation shall be understood to mean the required excavation of in-situ Material, the stockpiling of suitable site sub-base Material and topsoil, and the hauling and disposal of all unsuitable site Material such as frost heaving clays, silts, rock, rubble, rubbish, and any surplus suitable site sub-base Material, unless otherwise specified herein.
- .2 The limits of excavation shall be taken as a vertical plane 450mm beyond the limits of the proposed pavement, unless otherwise specified on the Drawings or in the Specifications for the Work.
- .3 The Contractor shall initially only proceed with the common excavation. Common excavation shall be understood to mean that part of the excavation down to a depth such that after compaction the sub-grade will be at the elevation of the bottom of base course for a lean concrete base and compacted granular base, as shown on the Drawings.
- .4 During the course of common excavation, the Contractor will be advised by the Contract Administrator as to which areas have an unsuitable sub-grade. In the areas of unsuitable sub-grade, whether in a homogeneous mass or in isolated pockets, the excavation shall be extended either to the lower limit of the unsuitable Material or to a depth of one metre below the elevation of the bottom of base course for a compacted granular base, unless otherwise specified in the Specifications for the Work. Additional excavation of unsuitable Material may be required as directed by the Contract Administrator.
- .5 The sides of the excavation shall be cut in a vertical plane, except when the excavation extends more than one metre below the bottom of base course. In that case the sides of the excavation may be sloped into the excavation provided that the sides remain at least 150 mm outside of the limits of the proposed pavement.
- .6 Areas over-excavated by the Contractor shall be backfilled and compacted in accordance with this Specification by the Contractor at his own expense, using sub-base Material as specified by the Contract Administrator.
- .7 Excavation of solid bedrock, glacial till, boulders, loose rock, concrete rubble and foundations which are located within the limits of excavation and which require the use of additional or unconventional excavation equipment shall be measured and paid for in addition to the unit price for excavation.

3.2 DISPOSAL OF MATERIAL

- .1 Disposal of Material shall be understood to mean the removal of a Material from the site, hauling of the Material along a route approved by the Contract Administrator, and the unloading and grading of the Material in a manner satisfactory to the Contract Administrator at a legal disposal site.
- .2 If a disposal site is not otherwise indicated in the Specifications for the Work, the Contractor shall locate a legal disposal site and identify a haul route to be approved by the Contract Administrator.
- .3 Any Material dropped or spilled on any streets during the hauling operations shall be promptly cleaned up by and at the expense of the Contractor, to the satisfaction of the Contract Administrator.

3.3 PREPARATION OF SUB-GRADE, LEAN BASE, MORTAR OR SAND-BASE

- .1 The bottom of the excavation shall be inspected and approved by the Contract Administrator before the Contractor may begin compaction of the sub-grade.

- .2 In areas of suitable sub-grade Material, the full width of the bottom of the excavation shall be thoroughly mixed and compacted to a minimum of ninety-five (95%) of Standard Proctor Density.
- .3 In areas of unsuitable sub-grade Material, Material must be bridged, a layer of crushed sub-base Material of not less than 300mm in compacted thickness, or greater thickness as directed by the Contract Administrator, shall be placed immediately over the unsuitable sub-grade Material and compacted to a minimum or ninety percent (95%) of Standard Proctor Density.
- .4 Unless otherwise specified, the supplied and placed sub-base Material shall be compacted in layers not exceeding 150mm in compacted thickness to a minimum of one hundred percent (100%) of Standard Proctor Density, for the full width of the excavation, and each layer shall be trimmed level and inspected, tested and approved by the Contract Administrator before the succeeding layer may be applied.
- .5 In sub-base construction the Contractor shall use up the suitable site sub-base Material before placing any other type of sub-base Material, unless otherwise authorized by the Contract Administrator in writing.
- .6 Suitable sub-grade Material, suitable site sub-base Material and clay borrow sub-base Material shall be compacted at the optimum moisture content or at a moisture content up to two percent above the optimum moisture content.
- .7 Any layer which has been rejected by the Contract Administrator shall be either re-compacted or removed and replaced by and the expense of the Contractor to the satisfaction of the Contract Administrator.
- .8 Any Material that has been placed over a compacted layer, which has not been inspected, tested and approved by the Contract Administrator, shall be removed by and at the expense of the Contractor.
- .9 The compacted sub-grade or final compacted layer of sub-base Material shall be trimmed to the elevation of the bottom of compacted granular base course as shown on the Drawings, to the satisfaction of the Contract Administrator.
- .10 The compaction requirement specified herein shall extend to a minimum depth of 150mm below the surface being compacted. If necessary, water sprinkling shall be carried out in such a manner as to provide a uniform soil wetting distribution over the area to be compacted.
- .11 When excess water has been applied, either by sprinkling operations or by precipitation, to cause local or continuous ponding, soil compaction shall not be permitted until sufficient soil drying has occurred, creating a condition lending itself favourably to compacting operations. The Contractor shall, as much as is practicable, exercise the necessary precautions to protect compacted areas against excess wetting from any natural or artificial sources of water application.
- .12 Should excess moisture from continuous or heavy rainfall threaten to unduly delay the completion of the Contract, the Contractor may apply in writing to the Contract Administrator requesting permission to use lime or Portland cement to dry out the clay sub-grade or sub-base Material at specific location(s), with the provision that the placing of the lime or Portland cement shall be done in such a manner as may be approved by the Contract Administrator and that the cost of placing the lime or Portland cement will be borne entirely by the Contractor.
- .13 The compacted granular base shall be placed to a minimum thickness of 100mm. The surface shall be smooth, true to line, grade, and cross-section.
- .14 No paving stones shall be placed until construction of the underlying layers has been approved by the Contract Administrator.

3.4 PROTECTION

- .1 General: Provide final protection and maintain conditions in a manner acceptable to installer, which ensures paver Work being without damage or deterioration at time of Final Acceptance.

3.5 INSTALLATION OF STONE PAVERS

- .1 Install stone pavers as shown on Drawings. Stone pavers are to be installed to grades shown on grading plan within 1/4" tolerance.
- .2 Work shall commence with edge stones along the longest straight section of curb or property line and Work towards the opposite edge. Edge stones shall be used around any structure within the sidewalk limits and along the limits of the sidewalk.
- .3 Sawn or sheared edges or stone slabs shall be true, even and undamaged.

3.6 QUALITY CONTROL

- .1 Inspection
 - .1 All workmanship and all Materials furnished and supplied under this Specification are subject to close and systematic inspection by the Contract Administrator 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 preciously given. The Contract Administrator reserves the right to reject any Materials or works, which are not in accordance with the requirements of this Specification.
- .2 Corrective Action
 - .1 The Contractor shall, at their own expense, correct such Work or replace such Materials found to be defective under this Specification in an approved manner to the satisfaction of the Contract Administrator.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Work in this Section shall include but is not limited to
 - .1 1/4" Buckshot Mulch, grey in color, no reds or browns
 - .2 3/4" Down Crushed Limestone

1.2 RELATED SECTIONS

- .1 Section 32 11 23 – Aggregate Base Course
- .2 Section 32 14 10 – Unit Paving

1.3 QUALITY ASSURANCE

- .1 Sources: The crushed stone surfacing shall be obtained from a single source and be of the same type Material to assure uniformity of quality and appearance. Deliver all project stone Materials to an approved holding area prior to commencement of Work for review by the Contract Administrator.
- .2 Deliver Materials to the Site only when the Work area is ready and surfacing can begin.
- .3 Store and handle gravel and related Materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, or other causes.
- .4 Store cementitious Materials off the ground, under cover, and in a dry location.
- .5 Store aggregates, covered and in a dry location, where grading and other required characteristics can be maintained and contamination avoided.
- .6 Handling:
 - 1. Handle Materials in a safe and professional manner. Use tools, equipment and methods designed and suitable for the task being performed.
 - 2. Comply with all applicable safety standards, requirements, and practices, including those for using safety glasses or goggles.

1.4 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00.
 - .1 List of Materials and sources for products to be installed under this section. Include a description of the components of the Material.
 - .2 A half cubic foot of 1/4" Buckshot Mulch, grey in color, no reds or browns

Part 2 Products

2.1 MATERIALS

- .1 1/4" Buckshot Mulch, grey in color, no reds or browns
- .2 3/4" Down Crushed Limestone

Part 3 Execution

3.1 EXAMINATION

- .1 Verify the following:
 - .1 Support Work and Site conditions are ready to receive Work of this Section.
 - .2 Items in other Sections are properly located and sized.

3.2 GRADING

- .1 Removal of Materials beyond indicated subgrade elevations or dimensions without specific direction of the Contract Administrator is not authorized. Unauthorized excavation, as well as remedial Work directed by the Contract Administrator shall be at the Contractor's expense.
- .2 Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified areas. Compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades. Finish surfaces free from irregular surface changes.
- .3 Material Storage: Stockpile satisfactory excavated Materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage in accordance with Section 32 11 23

3.3 COMPACTION

- .1 General: Control soil compaction during construction providing minimum percentage of density specified for area classification. Do not allow equipment traffic to overly compact areas beyond specified percentages. Remediate over compaction as directed by the Contract Administrator including ripping, regrading and re-compaction or over-excavation and in-kind replacement per plan.
- .2 Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages for maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D1557; and not less than the following percentages of relative density; determined in accordance with ASTM 2049, for soils which will not exhibit a well defined moisture density relationship (cohesionless soils).
 - .1 Import aggregate base Material for Crushed Stone Surface- 95%.
 - .2 Crushed Stone Surface Top Course - 95%
- .3 Moisture Control:
 - .1 Where sub-grade or lift of soil Material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil Material, to prevent free water appearing on surface during or subsequent to compaction operations.
 - .2 Before compaction moisten or aerate each layer as necessary to provide optimum content. Compact each layer to required percentages of maximum dry density or relative dry density for each area classification.
 - .3 Do not perform compaction operations on excessively wetted soils.

- 3.4 CRUSHED STONE SURFACING BASE BACKFILL
- .1 Provide a minimum 100mm compacted lift of specified Crushed Stone Surfacing Base Aggregate true to the elevations either described or implied in the Contract Drawings or as required to match adjacent existing pavements, and a minimum of 150mm beyond the horizontal layout lines of pavement as indicated on the Contract Drawings.
- 3.5 CRUSHED STONE SURFACING TOP COURSE
- .1 Provide a 100mm compacted lift of specified Crushed Stone Surfacing Top Course Crushed Rock true to the elevations either described or implied by the Contract Drawings or as required by the Contract Administrator.
- .2 Shape the crushed stone area to the desired grades and shape surfaces so as to provide natural run-off and drainage.
- .3 Tolerances
- .1 Installation Tolerances: Do not exceed 1/8" in 10 feet any direction from level or slopes indicated with a 10 foot straight edge
- 3.6 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 Contract Administrator 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 Contract Administrator reserves the right to reject any Materials or Works which are not in accordance with the requirements of this Special Provision.
- .2 Corrective Action
- .1 The Contractor shall, at their own expense, correct such Work or replace such Materials found to be defective under this Specification in an approved manner to the satisfaction of the Contract Administrator.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This section includes the procurement and installation of the following Site and Street Furnishings

- .1 Bicycle Racks
- .2 Stone Benches

1.2 RELATED SECTIONS

.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

.2 Contractor shall visit the Site and verify all data and dimensions and report any errors, omissions or discrepancies to the Contract Administrator prior to any installation.

.3 Related Sections include the following:

- .1 Division 32 - Exterior Improvements
- .2 Section 01 33 00 - Submittal Procedures

1.3 SUBMITTALS

.1 Submit Product Data in accordance with Section 01 33 00 and a minimum of 60 days before beginning Work, unless indicated otherwise.

.2 Product Data: Submit product data for each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and field-assembly requirements.

.3 Material Certificates: Submit product data for Site and Street Furnishings, signed by manufacturers.

.4 Maintenance Data: Submit product data for Site and Street Furnishings to include in maintenance manuals.

.5 Warranties: All items should be warrantied for two years from defects in Materials and workmanship.

.6 Submit shop drawing for stone bench in accordance with Section 01 33 00.

Part 2 Products

2.1 MANUFACTURERS

.1 Bicycle Racks:

- .1 Bicycle racks shall be "Bola" with stainless steel finish, as supplied by Landscape Forms. To be installed in ground mount, as per manufacturer's instructions. Quantity as per Drawings

.1 Contact: Landscape Forms, www.landscapeforms.com, 800-430-6209

2.2 MATERIAL

.1 Custom Tyndall Stone Bench

.1 Monolithic Tyndall stone bench 550mm x 550mm x 1100mm length, grey in color, all sides sawn finish, quantity as per Contract Drawings

2.3 GENERAL

.1 Comply with Specifications and manufacturer's data. Where these may be in conflict, the more stringent requirements govern.

Part 3 Execution

3.1 EXAMINATION

- .1 Contractor shall visit the Site and verify all data and dimensions and report any errors, omissions or discrepancies to the Contract Administrator prior to any installation.
- .2 Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.
- .3 All locations for Site furnishings to be approved by Contract Administrator on-Site prior to attachment.
- .4 Proceed with installation only after satisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- .1 Comply with manufacturer's written installation instructions, unless more stringent requirements are indicated. Complete field assembly of Site and Street Furnishings, where required.
- .2 Unless otherwise indicated, install Site and Street Furnishings after landscaping and paving have been completed.
- .3 Install Site and Street Furnishings level, plumb, true, and securely anchored at final locations to be located on site by the Contract Administrator.
- .4 Benches:
 - .1 The seat of each bench shall be horizontal along the length of the bench with the height from the middle of each bench (along its length and at the front of the seat) to be 550mm above the finished grade as taken from the center of the bench. Contractor to ensure that each bench shall sit level along its length and width.
 - .2 Concrete surface at base of bench and 2" perimeter around base of bench to be treated with concrete waterproofing sealer. Mask perimeter to ensure clean and even application.

3.3 CLEANING

- .1 After completing Site and Street Furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION

Part 1 General

1.1 GENERAL CONDITIONS

- .1 The General Conditions and Standard Provisions attached hereto shall apply to and be a part of this Specification.

1.2 DESCRIPTION

- .1 This Specification shall cover the supply and placing of topsoil for areas to be sodded or seeded.
- .2 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 an incidental to the satisfactory performance and completion of all Work as shown on the Drawings and hereinafter specified.

1.3 RELATED SECTIONS

- .1 Section 31 22 13 – Rough Grading
- .2 Section 32 92 13 – Sodding
- .3 Section 32 15 40 – Stone Surfacing

Part 2 Products

2.1 GENERAL

- .1 The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification.
- .2 Topsoil will be subject to tests for nitrate, phosphate, potassium, sulphate, pH, E.C. (salinity) and volume of organic matter by a testing laboratory designated by the Contract Administrator.
- .3 The Contract Administrator will collect as many samples as are deemed necessary to ensure that a good representation of the entire topsoil shipment is provided for the soil analysis report.

2.2 TOPSOIL

- .1 All topsoil required shall consist of a screened clay-textured or loam-textured dark topsoil, a fertile, friable material neither of heavy clay nor of very light sandy nature containing by volume, a minimum of four (4%) percent for clay loams and two (2%) percent for sandy loams to a maximum twenty-five (25%) percent organic matter (peat, rotted manure or composted material) and capable of sustaining vigorous plant growth. Topsoil shall be free of subsoil contamination, roots, stones over 25mm in diameter, baler twine or subsoil clay lumps over 25mm in diameter and other extraneous matter. Topsoil shall not contain quackgrass rhizomes, Canada thistle roots or other noxious weeds. Upon delivery or thirty (30) days following delivery, salinity rating shall be less than 4.0mm hos/cm on a saturated paste basis. The pH range shall be between 6.0 - 8.0.
- .2 Topsoil may be either on-site topsoil or imported topsoil.

- .3 On-site topsoil which has been stockpiled, can be reused providing that it is shredded or screened prior to being re-spread and that it meets the requirements specified above for topsoil.
- .4 Topsoil shall not be blow-in dirt taken from wind erosion sites and topsoil shall not be taken from fields abandoned to corn production where such soil may contain soil incorporated herbicides, such as eradican and atrazine with lasting residual effects.
- .5 The Contractor shall inform the Contract Administrator of proposed source of topsoil to be supplied. The Contract Administrator reserves the right to reject topsoil not conforming to the requirements of this Specification.

2.3 FERTILIZER

- .1 Chemical fertilizer with an N-P-K analysis of 1-2-1 ratio at a rate to provide 48 kg actual Nitrogen, 96 kg actual Phosphate and 48 kg actual Potassium per hectare.
- .2 Fertilizer to be complete synthetic slow release fertilizer with maximum 35% water-soluble nitrogen.
- .3 Fertilizer shall be standard commercial brands meeting the requirements of the Canada Fertilizer Act and the Canadian Fertilizer Quality Assurance Program.
- .4 All fertilizers shall be granular, pelletized or pill form, and shall be dry and free flowing.

2.4 MULCH

- .1 ¼" Buckshot Mulch per 32 15 40.

2.5 WATER

- .1 To be potable and free of minerals which may be detrimental to plant growth.

Part 3 Execution

3.1 SITE SAFETY AND TRAFFIC CONTROL

- .1 Where Work is to be done in boulevard and median areas adjacent to roadways, the Contractor shall maintain traffic and ensure that protection is afforded to the road user and that the Contractor's operations in no way interfere with the safe operation of traffic.
- .2 The Contractor shall supply, erect and maintain all applicable traffic control devices in accordance with the provisions of the latest edition of the Manual of Temporary Traffic Control in Work Areas on City Streets issued by the Public Works Department of the City of Winnipeg.

3.2 PREPARATION OF EXISTING GRADE

- .1 Subsoil shall be graded in accordance with Specification 32 11 23 to eliminate uneven areas and low spots, ensuring positive drainage. Any soil contaminated by toxic materials shall be removed and disposed off Site.

- .2 All surface debris, roots, vegetation, branches and stones in excess of 25mm shall be removed.
- .3 Grades on the area to receive topsoil that have been previously established in conformance with the Construction Drawings and/or other applicable specifications shall be maintained in a true and even grade.
- .4 Prior to placing topsoil, all sub-grade areas within athletic fields and all athletic field "run out" areas as identified on the Construction Drawings shall be scarified to a minimum depth of 75 mm.

3.3 PLACING OF TOPSOIL

- .1 The Contractor shall not commence placement of topsoil until the sub-grade has been inspected and approved by the Contract Administrator.
- .2 The Contractor shall provide the Contract Administrator with a minimum of two working days notice for inspection of required grading.
- .3 The topsoil mix shall be applied to a minimum of 75 mm compacted depth for areas requiring sod and a 100 mm compacted depth for seeding areas. All areas shall be rolled with a mechanical roller of a minimum weight of 220kg and a minimum width of 760mm.
- .4 Topsoil shall be manually spread around trees, shrubs and other obstacles.
- .5 The Contractor shall ensure that topsoil does not come in contact with new asphaltic concrete pavement that is less than 2 weeks old.

3.4 PLANTING BED PREPARATION

- .1 All areas to be excavated shall be to the shape shown on the drawings. Beds shall be excavated to the finished depth (including bark 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 lightly 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 Contract Administrator. Excavation shall not be undertaken until all underground utilities have been located and protected.
- .4 The Contractor shall provide a planting bed with a crisp spade edge (where appropriate), complete with topsoil and bark mulch as indicated on the Drawings.

3.5 APPLICATION OF FERTILIZER

- .1 The Contractor shall provide the Contract Administrator with a report for each Work Site indicating the fertilizer formulation used, the rate of application and the date of application.
- .2 Fertilizer shall be spread uniformly over the entire area of topsoil at a rate to provide 48 kg actual Nitrogen, 96 kg actual Phosphate and 48 kg actual Potassium per hectare.

3.6 FINISH GRADING AND ROLLING

- .1 The area shall be fine graded and the topsoil loosened. Eliminate rough spots and low areas to ensure positive drainage. Prepare a loose friable bed by means of cultivation and subsequent raking.
- .2 Topsoil shall be rolled with a mechanical roller of a minimum weight of 220kg, minimum width of 760mm roller, to consolidate it in areas to be seeded or sodded, leaving the surface smooth, uniform, firm against deep foot printing and to the satisfaction of the Contract Administrator.

3.7 INSTALLATION OF MULCH

- .1 1/4" Buckshot Mulch shall be spread to a consistent depth over entire planting bed area, taking care not to damage the plants, to finished elevation indicated on Drawings.

3.8 SITE CLEAN-UP

- .1 All sidewalks, streets, approaches, driveways and properties near the Work Site shall be kept clean at all times by the Contractor.
- .2 Upon completion of the project, the Contractor shall immediately remove all excess material and debris from the Work Site.

END OF SECTION

Part 1 **General**

1.1 WORK INCLUDED

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 and in accordance with this section.

1.2 RELATED SECTIONS

- .1 Section 31 22 13 – Rough Grading
- .2 Section 32 91 13 – Topsoil and Finish Grading

1.3 MAINTENANCE

- .1 The Contractor shall be responsible for the maintenance of sod from the time of installation and for thirty (30) days from the date of Total Performance.

1.4 WARRANTY

- .1 The Contractor shall guarantee the sod against any and all defects or deficiencies resulting from insect infestation, disease and mechanical damage due to improper handling, installation of initial maintenance, for a period of one (1) year from the date of the Certificate of Total Performance. Sod damaged by vandalism or reasons beyond the control of the Contractor shall be replaced by the Client.
- .2 End-of-Warranty inspection will be conducted by the Contract Administrator.

Part 2 **Products**

2.1 GENERAL

- .1 The Contractor shall be responsible for the supply, safe storage and handling of all Materials set forth in this Specification.
- .2 Sod will be subject to tests for nitrate, phosphate, potassium, sulphate, pH, E.C. (salinity), mineral soil layer thickness and its organic matter content by a testing laboratory designated by the Contract Administrator.
- .3 Tests conducted to determine the thickness of the mineral soil layer of the sod and it's percent of organic matter shall be done in accordance with standard operating procedures approved by the Contract Administrator for both receiving, and analysing sod samples.
- .4 Any sod placed on the Work Site that in the opinion of the Contract Administrator does not conform to the Specification detailed herein, shall be rejected by the Contract Administrator and replaced by and at the expense of the Contractor.

2.2 TOPSOIL

- .1 Topsoil shall be supplied in accordance with Section 32 91 13.

2.3 TURF GRASS SOD

- .1 The Contractor shall supply turf grass sod with a mineral soil layer containing a minimum of seventy (70%) percent inorganic soil. Upon delivery or thirty (30) days following delivery, the salinity rating shall be less than 4.0 mm hos/cm on a saturated paste basis. 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 and mixed by percentage (%) of weight to meet the following certified seed blends or mixtures:

- .1 For general park areas, boulevards, medians and interchange areas, sod shall contain:
- .1 A blend composed of one hundred (100%) percent Kentucky Bluegrass (100% Class 1 or Class 2 cultivars as specified in Clause 2.3.2, 3 cultivars in equal proportion); or
- .2 A mixture of ninety-five (95%) percent Kentucky Bluegrass (100% Class 2 cultivars as specified in Clause 5.3.3, 3 cultivars in equal proportion) and five (5%) percent Creeping Red fescue.

- .2 Wherever Kentucky Bluegrass is specified, the proportion of the cultivars to be included in the blend shall adhere to the following:

Class 1 Cultivars – specified blend of Class 1 cultivars shall consist of equal proportions of any three of the following:

Able 1	Absolute	Allure	Award	Baron
Bartitia	Blacksburg	Blackstone	Caliber	Challenger
Chateau	Estate	Explorer	Kelly	Liberator
Limousine	Midnight	Misty	Northstar	NuGlade
Pick 151	Pick 8	Platini	Quantum Leap	Rambo
Rugby II	Serene	Shamrock	SR 2000	Total Eclipse
Touchdown	Unique	VB 16015	Wildwood	

Class 2 Cultivars – specified blend of Class 2 cultivars shall consist of equal proportions of any three of the following:

A34	Abbey	Alpine	America	Apollo
Arcardia	Ascot	ASP 200	Banff	Baronie
Baruzo	Bluechip	Cardiff	Champagne	Chicago
Classic	Compact	Conni	Coventry	Crest
Cynthia	Dragon	Eclipse	Fortuna	Glade
Goldrush	Haga	Huntsville	Impact	Indigo
Jefferson	Kenblue	Langara	Lipoa	Livingston
Marquis	Mercury	Moonlight	Nimbus	NuBlue
NuStar	Odyssey	Park	Pepaya	Pick 3
Pick 4	Pick 855	Princeton 105	Raven	Rugby
Seabring	Sodnet	SR 2100	SR 2109	Washington

- .3 Any variations to the above referenced seed blends or mixtures shall be approved by the Contract Administrator prior to placement of sod.

- .4 Turf grass sod shall be free of disease, turf damaging insects and any grass species, strains or cultivars other than specified herein.
- .5 At the time of delivery, the turf grass sod shall:
 - .1 not contain more than ten (10) broadleaf weeds per fifty (50) square metres;
 - .2 have been mowed to a height of 50 mm prior to delivery and be of sufficient density that no surface soil will be visible;
 - .3 have a uniform inorganic soil layer thickness of not less than 12 mm and not greater than 19 mm and shall be consistent throughout all loads delivered to the Work Site;
 - .4 have the organic thatch layer within the sod not exceed an uncompressed thickness of 12 mm and in all cases, the final rolled and compacted topsoil/sod growing medium shall be maintained at not less than 100 mm in depth.
- .2 Herbicides
 - .1 Herbicides shall be standard commercial products registered for sale and use in Canada under the Pest Control Products Act in accordance with City of Winnipeg Weed Control Standards and Procedures.
- .3 Insecticides
 - .1 Insecticides shall be standard commercial products registered for sale and use in Canada under the Pest Control Product Act in accordance with City of Winnipeg Weed Control Standards and Procedures.

Part 3 Execution

3.1 GENERAL

- .1 The Contractor shall not commence sodding operations until the finished topsoil surface has been inspected and approved by the Contract Administrator.
- .2 The Contractor shall provide the Contract Administrator with a minimum of two Working Days notice for inspection of the finished topsoil surface.

3.2 TOPSOIL AND FINISH GRADING

- .1 Preparation of the finished topsoil surface shall be completed in accordance with Section 32 91 13.
- .2 To prevent the formation of depressions or water pockets, the Contractor shall smooth out any undulations or irregularities in the topsoil surface prior to placing the sod.

3.3 PLACEMENT OF SOD

- .1 The sod shall be placed evenly and closely packed together, leaving no open joints and no overlap on adjacent pieces of sod. Joints in adjacent rows shall be staggered. A full row of sod, not less than 450 mm in width shall be placed along the perimeter of the sodded area, parallel to planting or walkway areas.

- .2 Where big roll sod is to be placed, the Contractor shall ensure that any reinforcement netting that may be used to assist with the harvesting and/or placement of the sod roll is removed before final placement of the sod.
- .3 On embankments, sod shall be placed lengthwise across the face of the slope. On slopes of 1 vertical to 3 horizontal (18 degrees) or steeper, in every second row on the slope and at the foot of the slope, each piece of sod shall be pegged with two minimum 250 mm long wooden pegs driven into the soil layer of the sod.
- .4 For slopes of 1 vertical to 2 horizontal (26 degrees) or steeper, each piece of sod in every row shall be pegged as indicated above.
- .5 Small, broken or irregular pieces of sod will be rejected.
- .6 All visible joints, low, bare or dead spots shall be repaired to the satisfaction of the Contract Administrator prior to the commencement of the Thirty (30) Day Maintenance Period described in Clause 3.7.
- .7 Sodding operations shall be completed within two Working Days after placing the sod. This shall be deemed to include watering, rolling, and repairing any visible joints and low, bare or dead spots within the sodded area.
- .8 Sod shall not be placed in a frozen state, or when any other conditions unfavourable to the successful transplanting of sod exist.
- .9 The Contractor shall not place sod after September 15 unless the Contract Administrator gives written approval to proceed.
- .10 Should the Contract Administrator provide written approval to, or direct the Contractor to place sod after September 15, and termination of the sod maintenance period is not achieved in accordance with Clause 3.10 in that same year, the Contractor will not be held responsible for sod damage over the winter due to winter-kill, ice damage, sand/salt applications on adjacent streets or from snow removal or spring clean up equipment. When the Contract Administrator provides written approval, or direction to the Contractor to place the sod after September 15, the owner will assume all costs related to the spring replacement of sod damaged over the winter provided that the layover was due only to the late season start and not defective sod or maintenance not conforming to this Specification.
- .11 Where the Contractor places sod prior to September 15, and termination of the sod maintenance period is not achieved in accordance with Clause 3.10 in that same year, the Contractor shall be responsible for replacement of any sod damaged over the winter due to winter-kill, ice damage, sand/salt applications on adjacent streets, or from snow removal or spring clean up equipment.

3.4 WATERING AND ROLLING

- .1 Immediately after placement of sod, the Contractor shall water the area in sufficient quantities and frequencies required to obtain root development and sod growth. All costs to provide water for sodded areas shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.
- .2 After the sod and topsoil has dried sufficiently to prevent damage, the areas shall be rolled (the edges pounded if necessary) with a mechanical roller minimum weight of

220kg and minimum width of 760mm to form a uniform even surface and level with adjoining existing grades, sidewalks and curbs. Heavy rolling to correct irregularities in grade will not be permitted. Sodded areas near existing fixtures that are unable to be rolled shall be thoroughly tamped to ensure a good bond between topsoil and sod.

3.5 COMMENCEMENT OF THIRTY (30) DAY MAINTENANCE PERIOD

- .1 Immediately after the sod has been placed to the satisfaction of the Contract Administrator, the Contractor shall provide and pay for continuous maintenance of the sodded area until the criteria specified for termination of the maintenance period in has been met.
- .2 The Contract Administrator will not allow the Thirty (30) Day Maintenance Period to commence until the following requirements are met:
 - .1 Written approval has been granted by the Contract Administrator to place sod if after September 15.
 - .2 The nursery sod supplied meets the seed mixture requirement specified herein
 - .3 The sod is free of bare and dead spots.
 - .4 The nursery sod does not contain more than 10 broadleaf weeds per 50 square metres.
 - .5 Sodded area has been rolled to form a firm, uniform even surface.
 - .6 The sod has sufficient shoot density that no surface soil is visible within sod.
 - .7 The height of the top growth of the sod is between 50 - 60 mm.
 - .8 The sodded area is free of any visual obstructions such as leaves.
 - .9 Sodded area is free of any turf damaging insects.
- .3 Any deficient, damaged or vandalized areas shall be re-sodded by the Contractor within three Working Days after receiving notification from the Contract Administrator and the area so re-sodded, shall be further maintained until it meets the criteria specified in Clause 3.10.
- .4 In situations where the start of the Thirty (30) Day Maintenance Period is not granted by the Contract Administrator before the end of a growing season, the Thirty (30) Day Maintenance Period will commence on May 15 of the following year or such date as is mutually agreed upon by all parties, at which time all sodded areas must meet the requirements listed above.

3.6 MAINTENANCES OF SODDED AREA

- .1 The Contractor shall mow the turf area at regular intervals to a height of between 50 - 60 mm. Do not cut more than thirty (30%) percent of the grass height at any one mowing. Remove clippings that will smother grassed areas.
- .2 The Contractor shall water sodded areas in sufficient quantities and frequencies required to maintain sod growth. All costs to provide water for sodded areas shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.
- .3 The Contractor shall clean and remove all dead vegetation, leaves, debris and snowmold from turf areas to encourage healthy and uniform grass growth.

- .4 Given the need for weed control, the Contractor shall have in his possession a Pesticide Applicator's License and a Pesticide Use Permit for pesticide applications related to this Specification.
 - .5 The Contractor shall apply herbicide when broadleaf weeds start developing in competition with grass. Apply herbicide in accordance with the City of Winnipeg Weed Control Standards and Procedures, manufacturer's instructions and the Manitoba Agriculture Guide to Crop Protection and Herbicide Recommendations for Landscape Applicators, latest editions and the following criteria:
 - .1 Use 2,4-D Amine or MCPA Amine herbicide for susceptible broadleaf weeds.
 - .2 Use a mixture containing 2,4-D Amine or MCPA Amine, Mecoprop and Dicamba for 2,4-D resistant plants.
 - .3 Do not apply to newly seeded turf until after the second or third mowing.
 - .4 Do not water within 24 hours after application.
 - .5 Apply when winds are less than 20 km/h and air temperature is above 10° (degrees) Celsius.
 - .6 Avoid use of pure Dicamba solutions near trees and shrubs.
 - .6 Given the need for insect control, the Contractor shall have in his possession a Pesticide Applicator's License and a Pesticide Use Permit for pesticide applications related to this specification. Use standard commercial products in accordance with the manufacturer's instructions and the Manitoba Agriculture Guide to Crop Protection (latest edition) for the particular insect/insects involved.
 - .7 Copies of the Pesticide Applicator's License and the Pesticide Use Permit must be submitted to the Contract Administrator prior to commencement of pesticide application.
 - .8 All persons handling pesticides shall be fully aware of toxicological rules and regulations governing their use.
 - .9 The Contractor shall inform the Contract Administrator immediately of any dangerous occurrence.
- 3.7 SPRING CLEAN-UP
- .1 Where termination of the sod maintenance period has not been achieved in accordance with Clause 3.10 prior to the end of a growing season, the Contractor shall complete all operations related to the clean up of the work area in the following spring. This shall include the cleaning and removal of all dead vegetation, leaves, debris, snowmold and any sand or gravel resulting from winter sanding/deicing operations from turf areas to encourage healthy and uniform grass growth.
 - .2 All costs for spring clean up operations shall be borne by the Contractor if in the previous year, the termination of the sod maintenance period, in accordance with Clause 3.10 was not achieved in that same year or where the damage was due to defective sod or maintenance not conforming to this Specification.
- 3.8 TERMINATION OF MAINTENANCE PERIOD
- .1 The Contract Administrator will terminate the sod maintenance period after the following criteria has been met:

- .1 The Work Site is clean and the sodded area is free of any visual obstructions such as leaves.
 - .2 The sod is free of bare and dead spots and without more than 10 broadleaf weeds per 50 square metres.
 - .3 Grass roots are well anchored into the underlying topsoil and the sodded area has established into a healthy, vigorously growing condition.
 - .4 Sodded areas are free of visible joints.
 - .5 The sod has sufficient shoot density that no surface soil is visible when the grass has been cut to a height of 50 – 60 mm.
 - .6 Sodded area has been cut to a height of 50 – 60 mm within two Working Days before the final inspection.
 - .7 Sodded area is free of any turf damaging insects.
- .2 If the sodded area does not meet the above criteria, the deficient area shall be resodded within three Working Days after receiving notification from the Contract Administrator and maintained by and at the expense of the Contractor in accordance with Clauses 3.7 and 3.8 herein.
 - .3 In situations where the termination of the maintenance period is not granted by the Contract Administrator before the end of a growing season, the maintenance period will commence as described in Clause 3.7.

3.9 SITE CLEAN-UP

- .1 During both the placement and maintenance of sod, all sidewalks, streets, approaches, driveways and properties near the sodding operation shall be kept clean at all times by the Contractor.
- .2 Upon completion of the project, the Contractor shall immediately remove all excess Material, debris and equipment from the Work Site.

END OF SECTION

- Part 1 General**
- 1.1 **WORK INCLUDES**
- .1 Installation of trees and shrubs.
- 1.2 **RELATED SECTIONS**
- .1 Section 32 91 13 – Topsoil and Finish Grading
- .2 Section 32 15 40 – Stone Surfacing
- 1.3 **QUALITY CONTROL**
- .1 All plant material shall be randomly inspected at the source upon request of the Contract Administrator.
- .2 Trees and Shrubs are to be grown in nurseries under proper cultural practices as recommended by the Canadian Nursery Trades Association.
- .3 Only those trees will be accepted which 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 (a or b) or 3 (a or b) and within a 250 kilometre radius of Winnipeg. Trees that have grown in plant hardiness zones 1 and 4 or greater will be rejected.
- 1.4 **MAINTENANCE**
- .1 The Contractor shall be responsible for the maintenance of the planted material for a period of one (1) year from the date of the Certificate of Total 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.
- 1.5 **WARRANTY**
- .1 Further to the General Conditions, the Contractor shall, at his/her own expense, maintain 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 Certificate of Total Performance. Nursery stock damaged by vandalism or reasons beyond the control of the Contractor, so far as is reasonable or practicable, shall be replaced by the client.
- .2 End-of-Warranty inspection will be conducted by the Contract Administrator.
- .3 The Contract Administrator reserves the right to request material replacement or extend the Contractor's Maintenance responsibilities for an additional one (1) year if, at the end of the ninety (90) day Warranty Period, leaf development and growth are not sufficient to ensure future survival of the plant.

1.6 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 Contract Administrator and replace as per Specifications within a maximum ten (10) day period from notification.
- .2 The Contractor shall extend Maintenance and Warranty on replacement plants for a period equal to the original Maintenance and Warranty Periods.
- .3 The Contractor shall continue such replacement, Maintenance and Warranty until plant material is acceptable.

Part 2 **Products**

2.1 MATERIALS

- .1 Water: potable and free of minerals which may be detrimental to plant growth.
- .2 Planting Soil: as per Section 32 91 13
- .3 Root Ball Burlap: 150 g Hessian burlap, biodegradable.
- .4 Anti-desiccant: wax-like emulsion to provide film over tree leaf surfaces reducing evaporation but permeable enough to permit transpiration.
- .5 Wound Dressing: horticulturally accepted non-toxic, non-hardening emulsion.
- .6 Wire Baskets: horticulturally accepted product designed to carry the weight and to contain a burlap-covered root ball. Minimum diameter basket size to conform to the same minimum diameter of the tree root ball for the respective minimum tree caliper sizes.
- .7 Fertilizer: slow release formulation of low nitrogen and high phosphorus e.g. 10-50-12. Apply quantities at rates stated by product manufacturer.

2.2 PLANT MATERIALS

- .1 Nomenclature of specified trees and shrubs 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.
- .2 Plants are to be characteristically developed for their species and structurally sound, well branched, healthy and vigorous and densely foliated when in leaf. The plant 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.
- .3 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.
- .4 All part of the trees, especially the lower branches, are to be moist and show live, green cambium tissue when cut.

- .5 Trees are to have only one, sturdy, reasonably straight and vertical trunk, and a well balanced crown with fully developed leader.
- .6 Plants 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 tree trunks, broken branches, or angled leaders. Plants having the above defects will not be accepted by the Contract Administrator.
- .7 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.
- .8 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.
- .9 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.
- .10 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.
- .11 Tree spade dug trees are to be dug with mechanized digging equipment with hydraulic space. 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.
- .12 Use of collected or native trees and shrubs is not permitted.

2.3 QUANTITY AND SIZE

- .1 Trees and shrubs are to be planted at the quantities and calipers listed on the Plant List. Any variations to species, size or caliper of specified plants will require a request for approval from the Contract Administrator.
- .2 Any changes in planting locations will be determined on-site by the Contract Administrator.
- .3 Plants are to conform to the measurements specified in the Plant List, except those larger than specified may be used if approved by the Contract Administrator at no extra cost to the client.
- .4 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 15cm 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 plants 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 shady areas and water well.

Part 3 Execution

3.1 WORKMANSHIP

- .1 Location of plants to be staked out or painted on Site by the Contractor. Locations shall be approved by the Contract Administrator prior to installation.
- .2 Apply anti-desiccant in accordance with material manufacturer's instructions with prior approval of the Contract Administrator, on an as needed basis only.
- .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 Contract Administrator 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 Contract Administrator. 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 Excavate planting pits as indicated by stakes or paint marks.

- .2 Protect bottom of excavations against freezing.
- .3 Remove water that enters excavations prior to planting. Ensure source of water is not ground water or from broken City water main pipe.

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 of 100 – 150 mm. Cover bottom of each excavation with minimum of 150 mm topsoil mixture, incorporate with subgrade material.
- .5 Plant trees and shrubs vertically. Orient trees to give best appearance in relation to structure, roads and sidewalks.
- .6 Place trees to depth equal to depth they were original 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 soil, complete backfilling.
- .9 Stake trees and install wire tree protection as shown on Drawings and as directed by Contract Administrator.

3.5 FERTILIZING

- .1 When planting is completed, give surface of planting saucer dressing of fertilizer meeting the requirements of Specification. Mix fertilizer thoroughly with top layer of planting soil and water in well.

3.6 PRUNING

- .1 The Contractor shall provide a Manitoba Certified Arborist for each Work crew or Work Site.
- .2 Prune trees and shrubs 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 of application of industry approved tree wound dressing.

3.7 WATERING

- .1 Trees and shrubs 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 and shrubs noting: 1) location, and 2) date of watering. This record shall be sent bi-weekly to the Contract Administrator.
- .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