Sign-off Sheet

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All Specifications are provided to convey the City's ideal general arrangement and requirements. These documents are not suitable for integration into a specific implementation without review and modification and are only intended for use by a competent designer exercising professional judgment. The designer shall modify and supplement as necessary to provide a complete, properly functioning design that conforms in all respects to the City's functional requirements.

When employing any aspect of these specifications, the responsible professional designer shall remove any authentication of the original author(s), note any provenance as appropriate, and apply their own authentication as required. Stantec and the Client want to convey that this document does not constitute a project-specific design. No part of these documents alleviate the responsibility of the professionals retained to design and construct specific projects from taking full responsibility and authenticating their designs as required in accordance with AEP, APEGA, AWWA, Alberta OH&S, and any other statutory or safety requirements.

List of Specifications include;

Document	Title	Document	Title	Document	Title
02100	Trail Site Preparation Specification	02461	Playground Installation Specification	02491	Tree Planting Specification
02110	Site Clearing Specification	02481	Shrub Planting Specification	02495	Soil Cell Installation Specification
02202	Trail Excavation Specification	02484	Topsoil and Soil Preparation Specification	02510	Trail Asphalt Paving Specification
02210	Site Grading Specification	02485	Seeding Specification	02516	Asphalt and Shale Trail Overlay Specification
02222	Trail Granular Sub-Base Specification	02486	Sodding Specification	02528	Concrete Curbs Specification
Document	**Title**	**Document**	**Title**	**Document**	**Title**

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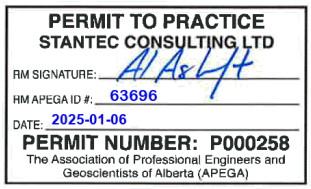
02441	Irrigation Installation Specification	02487	Coarse Grass Seeding Specification	02530	Park Furniture Specification
02457	Bollard & Chain Specification				

Prepared by:

2025 01 06

Jeff Vangen, P.Eng.

Permit:



Al Ashcroft, P.Eng.

1.0 SITE PREPARATION

1.1 REFERENCE STANDARDS AND RELATED SECTIONS

.1 Tree Preservation Bylaw 4218
.2 Site Clearing – Section 02110
.3 Trail Excavation – Section 02202
.4 Trail Granular Sub-base – Section 02222
.5 Trail Asphalt Paving – Section 02510
.6 Tree Protection – Section 02499
.7 ANSI A300 Pruning Standard

1.2 GENERAL

.1 Protect trees, shrubs, lawns, planted areas, and other features remaining as part of final landscaping. All trees presently growing on the site, which are to remain, shall be protected to avoid any damage to them during construction operations. The Contractor shall not excavate or use heavy equipment in proximity to the tree and shall stay a minimum of 5 metres (16.5 feet) away from the trunk, or outside the drip line whichever is the larger value.

.2 The Contractor will be charged a penalty for any damage to existing trees as prescribed in the Offences and Penalties section of Tree Preservation Bylaw 4218, or as prescribed in subsequent Bylaw amendments.

.3 Protect buildings, sidewalks, curbs and paved areas against damage.

.5 Protect benchmarks and reference lines from damage. Re-establish at the Contractors own expense if disturbed or destroyed.

.6 Supply and install adequate barriers, fences, warning and construction signs to prevent injury to the public. Maintain such barriers in good condition at all times.

.7 Prior to commencement of any ground disturbance, utility locates should be completed as well as a 3rd Party sweep of the area for any unidentified utilities. Notify Consultant and Utility Departments 48 hours before excavating utility line locates and maintain copies of all locate forms onsite at all times.

.8 Protect utility lines exposed by excavation from damage, as instructed by the respective Utility owner. Final excavation in the area of any utility lines to be done in accordance with the Utility Owner's requirements.

2.0 TRAIL CLEARING

2.1 CENTERLINE

The City shall flag the centreline, or as otherwise agreed to, of the trail prior to the commencement of construction, upon two (2) working days' notice from the Contractor. After initial flagging, the Contractor shall be responsible to ensure flagging remains in place for as long as required for trail construction.

2.2 SITE CLEARING AND GRUBBING

.1 All pruning shall follow the ANSI A300 pruning standards.

.2 Clear the trail and general work area of all trees, limbs, brush, and woody plants to a width of one (1) metre on both sides of the finished trail width, and a height of three (3) metres (10 feet). Trees at the trail edge shall have all limbs facing the trail cut flush with a pole saw. Stripping and scaring of standing trees shall not be permitted. All deadfall across the trail shall be cut back to 600mm (24 in) outside the clearing width.

.3 Leaning trees that could fall on, or reach the trail shall be felled away from the trails. The Contractor shall identify any tree's of concern to the Consultant who shall flag all such trees to the City Arborist. Once Approved, tree removal shall be completed as directed by the City Arborist and the Consultant.

.4 Do not pull or rip out roots of trees that are to remain. If excavation through roots is required, excavate by hand and cut roots with sharp axe.

.5 Do not remove trees marked to remain.

.6 Remove cut waste material from site.

.7 Grub out stumps and roots from cleared area and remove from site. Stumps must be removed to a minimum depth of 600mm (24 in) below proposed finished grades.

.8 Do not bury cuttings, stumps, roots or burnt waste material.

2.3 BURNING

.1 Burning of materials shall not be permitted.

2.4 REMOVALS

.1 Removal and disposal of material as noted on the drawings or in the Summary of Work.

3.0 TREE AND PLANT PROTECTION

3.1 GENERAL

.1 Protect tops, trunks and roots of existing plants on site which are intended to remain.

.2 Do not use heavy equipment within branch spread.

.3 Remove interfering branches and roots without injury to trunks, only when specifically directed by the Consultant.

.4 Contact the City Arborist if working within five (5) metres from the centre of a Public Tree.

.5 All tree pruning shall be completed by the City Arborist or by a qualified Contractor as-directed by the City Arborist.

.6 When existing grade around plants is lower than new finish grade, perform regrading by hand.

4.0 SITE REHABILITATION

.1 The Contractor shall take every precaution not to damage, injure or mark all existing surfaces, structures, utilities or landscaping on the City owned property or adjacent private properties.

.2 Any damage that may be caused by the Contractor, his employees or equipment or subcontractors shall be restored to pre-construction condition at the Contractor's expense and to the satisfaction of the Consultant.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS AND RELATED SECTIONS

.1 Tree Preservation Bylaw 4218

1.2 SITE CLEARING

.1 All trees presently growing on the site which are to remain shall be protected to avoid any damage to them during construction operations. The Contractor shall not excavate or use heavy equipment in proximity to the tree and shall stay a minimum of five (5) metres away from the trunk, or outside the drip line, whichever is the larger value.

.2 The Contractor will be charged a penalty for any damage to existing trees as prescribed in the Offences and Penalties section of Tree Preservation Bylaw 4218, or subsequent versions there-of.

.3 Dead trees shall be cut and stumps removed to a minimum depth of 600mm (24 in) below proposed finished grades.

.4 The burying of any materials on the site shall not be permitted.

.5 Burning of debris on the site shall not be permitted.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS AND RELATED SECTIONS

.1 ASTM D698 "Moisture Density Relationship of Soils" Standard Compaction Tests.
.2 Tree Preservation Bylaw 4218
.3 Trail Granular Sub-base – Section 02222
.4 Topsoil and Soil Preparation. - Section 02484
.5 Trail Asphalt Paving – Section 02510

1.2 PRODUCTS

.1 Common Material: All inorganic mineral deposits, other than Rock, and includes partially cemented materials that can be ripped and excavated by a hydraulic excavator.

.2 Rock: All firmly cemented or solid mineral material that cannot, without drilling and blasting, be removed by a hydraulic excavator equipped with a straight cutting edge bucket with a minimum of four (4) equally spaced high penetration teeth, and 0.5 cubic metres in capacity.

.3 Common Fill: Sub-soil free from roots, rocks larger than 50mm (2 in) and building debris. Excavation material is suitable if it conforms to the above and is approved by the City of Medicine Hat.

.4 Pit Run Gravel Fill: Crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.5 On-Site Topsoil: Native salvaged materials approved for use by the Consultant.

.6 Imported Topsoil: Refer to Specification 02484 – Topsoil and Soil Preparation.

2.0 EXECUTION

2.1 GENERAL

.1 Prior to commencement of any ground disturbance, utility locates should be completed as well as a 3rd Party sweep of the area for any unidentified utilities. Notify Consultant and Utility Departments 48 hours before

excavating utility line locates and maintain copies of all locate forms onsite at all times.

.2 Protect utility lines exposed by excavation from damage, as instructed by the respective Utility owner. Final excavation in the area of any utility lines to be done in accordance with the Utility owners requirements.

.3 Contractor to notify the Consultant should any conflicts be observed with any of the planned Work. Contractor shall provide this notice 48hrs in advance of Work progressing to this point of Conflict to allow for adequate time for review.

.4 Protect trees, shrubs, lawns, planted areas, and other features remaining as part of final landscaping. All trees presently growing on the site, which are to remain, shall be protected to avoid any damage to them during construction operations. The Contractor shall not excavate or use heavy equipment in proximity to the tree and shall stay a minimum of 5 metres (16.5 feet) away from the trunk, or outside the drip line whichever is the larger value.

.5 Protect benchmarks and reference lines from damage. Re-establish at the Contractors own expense if disturbed or destroyed.

.6 Supply and install adequate barriers, fences, warning and construction signs to prevent injury to the public. Maintain such barriers in good condition at all times.

.7 The Contractor will be charged a penalty for any damage to existing trees as prescribed in the Offences and Penalties section of Tree Preservation Bylaw 4218, or as prescribed in subsequent Bylaw amendments.

.8 Protect utility lines exposed by excavation from damage, as instructed by the respective Utility owner. Final excavation in the area of any utility lines to be done in accordance with the Utility owners requirements.

2.2 EXCAVATION (TOPSOIL)

.1 Remove all weed and vegetation growth from areas to be stripped.

.2 Excavate and dispose of sod.

.3 Excavate topsoil within areas specified.

.3 Do not permit topsoil to be mixed with sub-soil.

.4 Do not strip topsoil under wet conditions.

.5 Do not disturb soil within branch spread of trees or shrubs that are to remain.

.6 Stockpile topsoil on site is designated areas or haul offsite where required.

2.3 COMMON EXCAVATION

.1 Excavate, to elevations and dimensions specified, all common material encountered.

.2 Conform excavation work to grades established by the elevations and to grades specified on drawings.

.3 Excavate to proper elevation all unsuitable material encountered from construction area and stockpile on site with approval from the Consultant.

.4 Cut clean rough subgrade to within 50mm (2 in) of elevation and grade specified.

.5 Make changes in grade natural. Blend slopes into level areas.

.6 Excavated material shall be used within the site for backfilling and embankment operations.

.7 If the Consultant deems that the equipment used for excavation is inadequate in size or oversized for work area, replace with suitable equipment as directed.

.8 Where unforeseen rock is encountered, any excavation work for payment shall be authorized by the Consultant, prior to the start of excavation.

2.4 DEWATERING

.1 Keep excavations dry at all stages of operation. Provide necessary equipment including pumps, piping and temporary drains and trenches.

.2 Ensure water discharge does not contain silt held in suspension.

.3 Direct surface drainage away from excavated areas. Do not allow spillage over embankments.

2.5 SUBGRADE PREPARATION

.1 Subgrade preparation includes the preparation of excavated areas to receive fill material, sub-base or base gravel construction or foundation, and does not include landscaped areas.

.2 Scarify subgrade to depth of 150 mm (6 in).

.3 Grade material to specified levels, profiles and cross sections eliminating uneven areas and low spots and make ready to receive further surface treatment. Make changes in grade natural. Blend slopes into level areas.

.4 Machine grade subgrade to within 150 mm (2 in) of elevation and grade specified.

.5 Compact subgrade to 95% Standard Proctor Maximum Dry Density (SPMDD) +/-2% Optimum Moisture Content (OMC).

.6 Subgrade shall be approved by the Consultant prior to placing of further construction courses.

2.6 PLACEMENT OF FILL

.1 Depths specified are measurement of fill after compaction.

.2 Carry out backfilling and embankment operations systematically and as early as possible to allow maximum time for natural settlement and compaction.

.3 Use unfrozen material over frost-free ground conditions.

.4 Place common fill in continuous horizontal layers not exceeding 150mm (6 inches) compacted thickness.

.5 Place gravel fill in continuous horizontal layers not exceeding 250mm (10 inches) loose depth.

.6 Apply water to fill material uniformly and in sufficient quantities or aerate fill material, to obtain optimum moisture content for compaction.

.7 Compact common fill to 95% SPMDD +/-2% OMC.

.8 Compact gravel fill to 100% SPMDD +/-2% OMC.

.9 Compact fill material without disturbing or damaging buried services.

.10 Do not damage waterproofing, drainage tiles or pipes.

2.7 WATER

.1 The Contractor is responsible for supplying, loading, hauling and distributing water for compaction purposes.

2.8 BACKFILLING EQUIPMENT

.1 Mechanical backfilling equipment may be used except where by so doing damage to trees, buildings, sidewalks, curbs, piping, or other existing structures or man-made obstacles above or below ground cannot be avoided. Such work shall be hand excavated and backfilled where such obstacles prevent the use of mechanical equipment.

2.9 CAUTION IN EXCAVATION

.1 Caution shall be exercised with respect to structures, piping or other man-made obstacles that may exist within the working area and due consideration given to the protection and support of such properties and structures.

2.10 TESTING

.1 Soil samples will be taken by the designated testing firm, from several material sources to establish Standard Proctor Densities. Densities will be determined during construction operations as frequently as required to ensure quality control of the work.

.2 In the event that tests reveal improper compaction during filling, the defective area shall be removed and recompacted at the Contractor's expense. Retesting shall be at the Contractor's expense.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS AND RELATED SECTIONS

.1 ASTM D698 “Moisture Density Relationship to Soils” – Standard Compaction Tests

1.2 ROUGH GRADING

.1 Subgrade preparations shall include trimming of any irregularities in the subgrade. All roots, stones larger than 25 mm (1 in) in diameter, vegetation and other foreign matter, which is wholly or partly exposed, shall be removed from the surface of the subgrade.

.2 In case of bedrock, Contractor shall be responsible for placing a minimum of 750 mm (30 in) of fill, free of rocks, boulders, concrete or any other debris.

.3 The subgrade shall be established parallel to the finished grades unless shown otherwise, and shall be shaped in such a manner so as to permit draining of water in event of heavy rain.

.4 Unless shown otherwise, areas shall be given uniform slopes between points for which finished grades are indicated on the drawings, or between such points and existing grades. At top and toe of slopes and banks, grades shall be smoothly rounded.

.5 Scarify subgrade to 75mm. Where area is severely compacted, scarify to 200 mm. Any subgrade that has been disturbed shall be compacted to 95% Standard Proctor Maximum Dry Density (SPMDD) within +/-2% Optimum Moisture Content (OMC), unless specified otherwise by the Consultant.

1.2 EXCAVATION

.1 All excavation required below sub-grade shall, in all cases, be the Contractor's responsibility.

.2 All required excavation work for paving, retaining walls, steps, curbs, etc., shall be as required by the approved drawings and specifications.

.3 All excavated materials shall be removed from the site unless they are approved for use as fill materials on the site where filling is required.

.4 The excavation for planting beds which are to be completely filled with planting topsoil, shall be to the depths specified hereafter, unless specified otherwise.

.5 Excavations and trenches shall be approved by the Consultant before backfilling. The area excavated shall be backfilled immediately after receiving approval.

1.3 FILLING

.1 Unless otherwise specified, the Contractor shall, where required, supply and spread sufficient fill materials to raise existing grades to the final grades as designated by the Consultant.

.2 Such fill materials shall be free of any debris subject to rot or corrosion, and shall be approved by the Consultant before placing.

.3 Where necessary, prior to placing fill the existing grade shall be scarified to a minimum depth of 75 mm (3 in) to provide a good bond.

.4 Where necessary, fill materials shall be placed in compacted thickness not exceeding 300 mm (12 in) in depth. Each layer shall be compacted to 95% SPMDD within +/-2% OMC before placing subsequent layers.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS AND RELATED SECTIONS

1. ASTM D698 "Moisture Density Relationship to Soils" - Standard Compaction Tests.
2. Section 05020 – Granular Base / Sub-Base Preparation.

1.2 SAMPLES

.1 At least two (2) weeks prior to commencing work, inform the Consultant of the proposed source of aggregates and provide access for sampling.

.2 Submit samples or provide testing results as required of materials to testing laboratory appointed by the Consultant if requested.

.3 Pre-pay shipping charges.

.4 Cooperate with testing firm in obtaining samples.

.5 Supply and store on site one 0.84 m^3 (1 yard ^{3}) of aggregates to be used.

1.3 PROTECTION

.1 Restrict traffic over the completed or partially completed work after inclement weather or at any time when there is tendency for subgrade material to work into the base material.

2.0 PRODUCTS

2.1 MATERIALS

.1 Sub-base Gravel: Crushed stone or gravel consisting of hard, durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious material, graded according to Municipal Works Construction Specifications Section 05020; 50 mm (2 in) to meet the following:

Sieve Size	%Passing
50,000	100
25,000	66 - 90
16,000	54 - 81
10,000	45 - 73
5,000	35 - 63
1,250	22 - 45
630	17 - 38
315	13 - 30
160	9 - 20
80	4 – 10

.2 Granular Base: Crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials. graded according to Municipal Works Construction Specifications Section 05020; 20 mm (approximately 3/4 inches) to meet the following:

Sieve Size	%Passing
20,000	100
16,000	84 - 94
10,000	63 - 86
5,000	40 - 67
1,250	20 - 43
630	14 - 34
315	9 - 26
160	5 - 18
80	2 – 10

3.0 EXECUTION

3.1 SUB-BASE GRAVEL COURSE CONSTRUCTION

.1 Excavate soft areas of subgrade, replace with sub-base gravel.

.2 Compact to density not less than 100% Standard Proctor Maximum Dry Density (SPMDD) in accordance with ASTM D698 (Method C or D). Granular materials shall be moisture conditioned, by drying or by adding water, to obtain an in-place moisture content between the optimum moisture content and two percent below the specified optimum moisture content (+/-2% to optimum).

.3 Shape and compact alternately to obtain a smooth, even and uniformly compacted base.

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

.5 Place sub-base gravel in continuous horizontal layers not exceeding 150 mm (6 in) lift.

.6 Apply water to sub-base gravel course uniformly and in sufficient quantities to obtain optimum moisture content for compaction.

.7 Grade sub-base gravel course to within 1 cm (3/8 inches) of design grade by blading and compacting. Tolerance is 1 cm in 3 m (0.4 inch in 10 feet).

3.2 BASE GRAVEL COURSE CONSTRUCTION

.1 Compact to density not less than 100% SPMDD in accordance with ASTM D698 (Method C or D). Granular materials shall be moisture conditioned, by drying or by adding water, to obtain an in-place moisture content between the optimum moisture content and two percent below the specified optimum moisture content (+/-2% to optimum).

.2 Ensure that coarse aggregates and fine aggregates are well mixed.

.3 Place base gravel in continuous horizontal layers not exceeding 150 mm (6 in) lift.

.4 Apply water to base gravel uniformly and in sufficient quantities to obtain optimum moisture content for compaction.

.5 Grade base gravel course to within 1 cm (3/8 inches) of design grade by blading and compacting. Tolerance is 1 cm in 3 m (0.4 inch in 10 feet).

.6 Do not conceal manhole covers, valve covers, catch basin rims, or other features.

3.3 COMPACTION EQUIPMENT

.1 Use pneumatic tire roller and vibratory steel drum or pad roller for gravel compaction.

.2 Exercise caution when compacting adjacent retaining walls and other structures - use suitable equipment.

END OF SECTION

1. GENERAL

1.1 REFERENCE STANDARDS AND RELATED SECTIONS

.1 Canadian Standards Association
.2 ASTM D698 “Moisture Density Relationship to Soils” – Standard Compaction Tests
.3 ASTM F2164
.4 ASTM F2620
.5 ASTM F3183
.6 Topsoil and Soil Preparation – Section 02484
.7 Seeding – Section 02485
.8 Sodding – Section 02486

1.2 Materials

.1 Materials shall be new and without flaws or defects of any type. Submission of shop drawings of any material shall be submitted and approved prior to material order.

.2 For substitutions, supply material with descriptive literature and samples, at least ten (10) working days before commencement of work. Any substitutions must meet or exceed specifications and performance standards of the proposed system, without any additional cost to the owner.

.3 All major components used in the system must have all the manufacturer's identification, i.e. make, model and serial number clearly shown on the equipment. Electrical or mechanical equipment used in the system which is subject to Federal, Provincial or Municipal standards must be installed to comply with the standard and where required, clearly be identified as approved by the **Canadian Standards Association.**

1.3 Piping and Fittings

.1 The piping and fittings at the point of connection at the water service riser to the exit points of the vault shall be powder coated steel both upstream and downstream. Refer to Parks & Recreation Standard Drawing EU-207 & EU-218 for details. Fittings shall all be powder coated steel. Water service vault shall be a minimum of 3 metres (10 feet) away from City service point.

.2 Irrigation mainline piping shall be:

.1 C.S.A. high density polyethylene pipe DR 11 (PE4710). No Low Density or PVC Pipe shall be considered.

.2 100 mm (4 in) shall be the smallest size allowed, unless otherwise approved.

.3 2in (50 mm) mainline will only be acceptable for parks where a 50 mm (2 in) irrigation service has been approved by Parks & Recreation.

.3 All lateral lines on the downstream side of the electric zone valves shall be C.S.A. high density polyethylene pipe DR 11 (PE4710) with a minimum 50 mm (2 in) diameter.

.4 The use of any size or type of pipe that is different from that specified must be approved by the Consultant.

1.4 Controllers, Cabinets and Concrete Bases

.1 General

.1 All computerized automatic controllers used shall be C.S.A. Certified as a Class II power limiting circuit capable of handling the zones as noted on the drawings and have the capacity to add modules for future expansion of the computerized controller.

.2 The Contractor shall confirm the size of the irrigation cabinet with the Consultant prior to the start of work. Adjustments in size shall be made depending on the number of controllers housed in the cabinet.

.3 Interior controller mount shall consist of a 19 mm (¾ in) G1S fir plywood backplate and installed in a 14 gauge powder coated controller cabinet lockable with a padlock. Refer to Parks & Recreation Standard Drawing PK2011 & PK2014 for details.

.4 Exterior controller mount shall consist of a 19mm (3/4 in) thick G1S fir plywood back plate and installed in a powder coated metal weatherproof, lockable controller cabinet and mounted on a powder coated metal pedestal. Refer to Parks & Recreation Standard Drawing PK2011 & PK2014 for details.

.2 Large Controller Cabinet

.1 The irrigation cabinet shall be constructed of 14 gauge metal, powder coated and dark green in colour. A colour is to be submitted for approval prior to ordering Refer to Parks & Recreation Standard Drawing PK2014 for details.

.2 The large controller cabinet shall be fitted with a single door mounted on pin hinges tack mounted to the cabinet. Closure brackets, hinge attachments and plywood mounts are to be welded from the inside wherever possible to eliminate openings and protrusions. The exterior of the cabinet should be smooth and rounded with no

protrusions or sharp edges evident. Any point of entry into the cabinet shall be sealed with a waterproof sealer.

.3 The controller pedestal shall consist of a 900 mm (36 in) long metal pedestal with a 90 degree welded elbows gradually extending out to the front 300 mm (12 in) at the bottom of the conduit past the concrete pile and consisting of metal conduit welded to it for the following:

.1 Two 100 mm (4 in) metal conduit for the irrigation zone valve/hydrometer wire(s).

.2 One 38 mm (1.5 in) metal conduit for the communication cable.

.3 One 38 mm (1.5 in) metal conduit for the grounding rod wire.

.4 One 50 mm (2 in) metal conduit for the electric power supply.

.4 The length of the metal conduit for irrigation zone valve/hydrometer wires, communication cable and grounding rod is 900 mm (36 in) while the length of the metal conduit for the electrical power supply is 1,400 mm (56 in).

.5 The pedestal shall have a metal base plate welded to pedestal. The base plate shall have 9mm (3/8 in) holes drilled in all four (4) corners from the edge for attaching the controller cabinet. Refer to Parks & Recreation Standard Drawing PK2015 for details.

.6 The concrete pad complete with broom finish surface and chamfered edge shall be installed along with a concrete pile. Concrete pad shall be reinforced with rebar, mesh or fibrecrete to enhance the structural integrity of the concrete pad.

.3 Small Controller Cabinet

.1 The cabinets for all small controller cabinets shall be a 14 gauge metal powder coated dark green in colour. Colour swatch to be submitted for approval along with shop drawing prior to ordering. Refer to Parks & Recreation Standard Drawing PK2011 for details.

.2 The controller mount shall consist of a 19 mm (3/4 in) thick G1S fir plywood back plate.

.3 The small controller cabinet shall be fitted with a single door mounted on pin hinges tack mounted to the cabinet. The doors are to be fitted with hardware to facilitate locking the cabinet with a padlock. Closure brackets, hinge attachments and plywood mounts are to be welded from the inside wherever possible to eliminate openings and

protrusions. The exterior of the cabinet should be smooth and rounded with no protrusions or sharp edges evident. Any point of entry into the cabinet shall be sealed with a waterproof sealer.

.4 The pedestal shall have a metal base plate welded to pedestal. The base plate shall have holes drilled in all 4 corners for attaching the controller cabinet. Refer to Parks & Recreation Standard Drawing PK2012 for details.

.5 The concrete pad complete with broom finish surface and chamfered edge shall be installed shall be installed and reinforced with rebar, mesh or fibrecrete to enhance the structural integrity of the concrete pad.

1.5 Antenna, Base and Mast

.1 The mast shall consist of a vertical post, painted dark green with a bolt circle on mounting base.

.2 The mast height shall be determined by the Designer and shall consist of 50 mm (2 in) (outside diameter) rigid pipe. Refer to Parks & Recreation Standard Drawing PK2024 for details.

.3 The City shall supply, install and aim the antenna.

.4 The Contractor shall supply and install a pull rope and conduit.

1.6 Sprinkler Heads

.1 Spacing of the sprinkler heads shall not exceed the manufacturer's maximum spacing and must provide head to head coverage.

.2 The specified irrigation heads shall be under warranty by the manufacturer against defects in material and workmanship for a period of five (5) years from the date of installation. The contractor shall submit a certificate for head warranty at time of Substantial Completion inspection.

1.7 Wire Requirements

.1 Wiring to and from controllers and valves shall conform to the Canadian Electric Code and any other regulatory conditions which govern this type of installation.

.2 Control wire used shall meet the technical requirements of the Controller specified in the design drawings.

.3 Wire shall be furnished in minimum 762 metres (2,500 feet) reels and splicing shall be minimized, with such splices in splice boxes and made waterproof with the use of the following:

.4 3M DBR/y splice kits to be used when splicing and shall be placed vertically. All splices to occur in either a valve box or splice box.

.4 The two pairs of wires for the hydrometer shall be differentiated from the zone wires. If there is more than one hydrometer installed at one location, the wires must be bundled separately and identified separately, although if the site conditions allow, they may be run in the same trench. Each hydrometer requires its own dedicated common wire. The color-coding sequence is as follows:

For the Pulse	2 Blue wires
For the Valve Control	1 Yellow wire and 1 White (Common) wire
For the Hydrometer Spare	1 Black wire

.5 All two wire systems to include a grounding grid installed to the manufactures installation guidelines. All wire to be a minimum 6-gauge bare copper. All grounding grids to be tested by a certified tester to ensure they achieve a resistance of 10 ohms or less at the controller and 25 ohms or less at the zone valves, unless otherwise directed in writing, prior to Substantial Completion. Results to be provided to the Consultant seven (7) days of Substantial Completion. Grounding rods shall be Paige Grounding Systems Copper-clad 3metres (10 feet) Part #182007 and Grounding plates shall be Paige Grounding Systems Copper Grounding Plate Part #182199IC or approved alternatives.

1.8 Double Check Valve Assembly and Water Meter

.1 Double check valve assemblies must be installed prior to connecting the mainline to the water service. DCVA shall be tested immediately after installation. No mainline connections shall be made until satisfactory test results has been obtained. The double check valve used shall be CSA approved and clearly labelled. The installation must meet all Federal, Provincial and Municipal requirements. Shop drawing submission is required prior to ordering of part.

.2 All double check valves shall be selected from the Approved Irrigation Product List or an approved alternate.

.3 All test cocks are to remain, once the double-check valve assembly has been tested and approved. Each test cock is to be plugged by a brass plug. The assembly shall be tested by a qualified person prior to the servicing being turned on. The report shall be provided to the Consultant within three (3) days.

.4 Hydrometers shall be electrically operated, compatible with the irrigation control system, and shall be selected from Approved Irrigation Product List control/control valves, complete with a drain plug on the body to drain the meter housing. Flow shall be measured in cubic metres with a pulse rate of 0.1. Dual Check Valve Assembly (DCVA) and Hydrometer are to be installed prior to water service being turned on and tested.

1.9 Isolation Valves

.1 All gate valves for drainage and flow control shall be bronze body with replaceable seals and have a removable handle with a minimum pressure rating of 10-kg/cm² (150 psi.). All gate valves shall be full ported.

.2 All gate valves shall have standard pipe flanged ends or adapters provided for proper installation in the lines in which they are located. All valves to be of same size as the lines in which they are used.

.3 Valves 100mm (4 in) in diameter and larger shall be iron body bronze or brass mounted gate valves conforming to standard specifications and meeting local standards.

.4 All bolts shall be Grade 8.

1.10 Fittings & Unions

.1 All fittings for high density polyethylene pipe shall be either butt or electro fused except as detailed elsewhere in this specification or on the Parks & Recreation Standard Drawings.

.2 All pipe and fittings upstream of the first main shut off valve inside the water service vault shall be PVC, HDPE DR11 and shall be mechanically restrained. Refer to Parks & Recreation Standard Drawing PK2000, PK2001 & PK2002 for details.

.3 Swing joints shall consist of three PVC Schedule 40 90-degree threaded street elbows and a PVC Schedule 80 12in (300mm) nipple. They shall have a minimum diameter of 25mm (1 in) for sprinkler heads with a flow rate of up to 6 gpm, 25 mm (1 in) for sprinkler heads with a flow of up to 12 gpm, or as indicated on the drawings for sprinkler heads with flow rates exceeding 12 gpm.

.4 All HDPE fittings shall be DR 11 Butt Fusion or Electro Fusion **ONLY**. No other means of connection are acceptable. Use of mechanical saddles is not permitted. Electro Fusion saddles for change of direction and head installation is acceptable.

.5 Electrofusion completion log shall be required on all PKRC irrigation projects that involve the use of fusion techniques. Fusion of fittings and electro fusion shall be completed by a Certified Fusion Technician who shall be required to provide a copy of valid certification from a qualified and certified organization.

.6 Bend Testing Requirements: Bend testing shall be required for quality check of the quality of the fusions. Bend strap tests along the mainline of two joints to test the proper operation of fusion machine and heat plate as per ASTM bend strap test procedures. A minimum of two (2) bend tests per twenty (20) zones shall be completed. Provide proof to Consultant on site or with a video record. Refer to the most current edition of the ASTM Bend Test Procedures.

1.11 Electric Zone Valves

.1 Electric zone control shall be C.S.A. Certified as Class II power limiting circuit low voltage (i.e. 24-volt) operated only. Refer to Parks & Recreation Standard Drawing PK2018 & PK2019 for details.

.2 Each zone valve shall have a dedicated, single zone decoder.

.3 Zone control valves shall be electrically operated and self-cleaning and shall conform to the approved Irrigation Product List.

1.12 Irrigation Enclosure Boxes

.1 Where manufactured irrigation enclosure boxes are used, they shall be of heavy weight polyolefin and shall be capable of withstanding the weight of a heavy tractor on their surface and shall have a locking capability. See Approved Irrigation Product List.

.2 Zone valves shall be housed in Jumbo sized irrigation enclosure box, refer to Approved Irrigation Product List. The size of the irrigation box shall be such that there is a minimum of 150 mm (6 in) of vertical and horizontal clearance between the box and any point of the valve. Extensions will be required and are to be of the same manufacturer as the initial box.

.3 Gravel bed in boxes or vault shall consist of 100 mm (4 in) depth of clean, 25 mm(1 in) washed rock with area larger than box opening

1.13 Pipe Connection Systems

.1 All HDPE piping shall be connected by Butt Fusion or Electro Fusion only. NO other methods of connections are acceptable. Fusion shall be completed by a Certified Fusion Technician who shall be required to provide a copy of valid Fusion Certificate from qualified and certified organizations.

.2 All steel pipes shall be connected by flanged, welded and Victaulic rigid couplers style 489 as shown on the standard drawings.

1.14 Miscellaneous Systems Components

.1 All miscellaneous systems components such as air relief valves, concrete vaults, meter boxes, shall be of the type and size as indicated on the drawings or details.

.2 Install according to approved manufacturer's directions or at the direction of the Consultant.

1.15 Restraining Systems

.1 Local conditions shall determine the type and extent of restraining systems to be used. Approval from the Consultant on the best method (whether concrete, rebar or a combination of the former) shall be required before proceeding.

.2 Restraining system for the water service shall use mechanical restraints, Refer to Parks & Recreation Standard Drawing EU-207 & EU-218 for details.

1.16 Booster Pump Enclosure

.1 Where a water service requires a booster pump, the pump and all the other irrigation water service components shall be installed above grade in a 12 gauge metal enclosure.

.2 The size of the enclosure shall be such that there is 450 mm (18 in) clearance around the perimeter of the components. Refer to Parks & Recreation Standard Drawings PK2002, PK2003, PK2004, PK2005, PK2006 & PK2007.

.3 The booster pump shall be as specified on the drawings and shall be from the Approved Irrigation Product List or approved alternate.

.4 The enclosure box shall be constructed of 10 gauge metal. It shall be securely bolted to the concrete pad. Metal spacers shall be used to provide sufficient space between the enclosure and concrete pad for ventilation underneath the enclosure.

.5 Install a metal screen around the bottom of the enclosure for rodent control. Set the enclosure level and square on the concrete pad.

.6 The door(s) of the enclosure box shall be constructed of the same material as the enclosure box. The door(s) are to be rolling doors and shall be weatherproof. The door(s) shall be lockable and have handles for ease of opening.

.7 The enclosure box and door(s) shall be powder coated with ASA161 Green Urethane Paint 2 Coats, inside and outside the enclosure box.

.8 The size of the concrete base for the booster pump will be constructed such that there will be a 100 mm (4 in) overhang on all sides of the cabinet. The base shall be installed 50 mm (2 in) above grade.

.9 The concrete base shall be constructed with 4 (four) 200 mm (8 in) cardboard tubes (Sono tubes or equivalent) filled with concrete, 600 mm (24 in) in depth.

.10 Concrete mix shall be supplied by a reputable concrete supplier and a batch ticket is to be provided to the Consultant prior to installation. Mixing onsite will not be allowed.

.11 Concrete mix shall be in accordance with the following:

Minimum 28 Day Strength	25 MPa*
Designated Aggregate Size	Maximum 25 mm
Slump	25-75 mm
Air Entrainment……....	5 - 7%
Cement	Type 10 Normal Portland Cement
Calcium Chloride	ASTM D98, 2% maximum with Consultants approval

1.17 Water Service Vault

.1 The wooden vault shall be constructed of pressure treated lumber and constructed in continuous lengths with no piecing of any sides of the vault. Refer to Parks & Recreation Standard Drawing PK2008 & PK2009.

.2 Contractor to provide shop drawing for review prior to ordering materials.

.3 The vault shall be a minimum of 500 mm (20 in) in height. The corners should be alternately overlapped for stability. The end cuts of the lumber shall be coated with a wood preservative material.

.4 Each layer of wood should be screwed together at regular intervals with 8 mm (5/16 in) x 150 mm (6 in) lag bolts.

.5 The checker plated hinged lids shall be constructed of 3 mm (1/8 in) split 1.22m (48 in) intervals and have a bent offset/overlap where a split occurs. The lids shall be constructed such that they open in sequence with the lid over the main shut off valve is the first lid to be opened. A 50 mm x 50 mm (2 in x 2 in) angle iron metal support shall be welded into the vault under the split in the lid(s) for support.

.6 All piping and conduit openings shall be cut around the pipe or conduit with 50 mm (2 in) of clearance between the pipe or conduit and the vault. The pipe or conduit shall be centred in the opening. Any patching of the openings shall be done with 19 mm (3/4 inches) pressure treated plywood, which is to be screwed with wood screws, not nails to the interior of the vault.

1.18 Irrigation Service Connection

.1 For large diameter irrigation service connections greater than 50 mm (2 in) refer to Environmental Utilities Standard Water Drawings EU-218.

https://www.medicinehat.ca/government/departments/environmental-utilities/construction-standards-and-specifications

.2 For standard park irrigation service connections of 50 mm (2 in), refer to Environmental Utilities Standard Water Drawings EU-207.

https://www.medicinehat.ca/government/departments/environmental-utilities/construction-standards-and-specifications

1.19 Conduit

.1 In ground shall be a minimum of double the size of the pipe being sleeved, see table below. Wire conduit shall be a minimum of 50 mm (2 in) diameter and wires shall have a separate conduit from irrigation piping.

Nominal Irrigation Pipe Size	Nominal Conduit Pipe Size
Control Wire	2in (100mm)
1.5in (38mm)	4in (100mm)
2in (50mm)	4in (100mm)
3in (75 mm)	6in (150mm)
4in (100 mm)	8in (200mm)
6in (150 mm)	12in (300mm)

.2 Roadway shall be PVC C900 or HDPE DR11 and shall be a minimum of double the size of the pipe being sleeved. There shall be two conduits placed for all roadway crossings, one for the pipe and one for the wire.

.3 All irrigation piping or wire running under any other hard surfaces shall be sleeved with SDR 35 Series PVC or HDPE DR11.

1.20 Backfill Material

.1 Native backfill material is to be used for irrigation pipe excavation. Backfill within 150 mm (6 in) of pipe shall be clean sand or fill, free of organic matter, stones and sharp objects capable of damaging pipe.

.2 The use of provisional import fill as backfill material can be used only where approved by the Consultant prior to the placement of the imported material.

.3 Clumps of sod are not acceptable as backfill material.

2. LAYOUT

2.1 Job Conditions

.1 Proceed with irrigation installation only during suitable weather conditions.

.2 Protect the system from being contaminated during construction by enclosing all open ends on all lines.

.3 Contractors are expected to leave the site in a safe and clean environment, free of hazards daily.

2.2 Layout

.1 The Contractor shall complete line locates to verify the location of all underground utilities and use standard precautions when working near utilities. Any damage to the underground facilities shall be repaired at the Contractor’s expense.

.2 Stake out entire system, including locations of sprinkler heads and/or quick coupler valves. Heads shall be spaced according to the manufactures recommended spacing and following the general layout provided within the drawing package. The existing site shape and dimensions will differ from the plans so the Contractor must verify actual spacing onsite.

.3 Heads shall be installed at 300 mm (12 in) off the property line and 300 mm (12 in) from hard surfaces, where possible. Variations from this may be accepted based on site conditions and with the approval of the Consultant on a case-by-case basis.

.4 Verify, on-site, the location of all conduit under asphalt, shale and concrete and adjust to suit.

.5 Have layout inspected and approved by the Consultant before commencement of work.

.6 Due to variations in the park from existing site features such as, but not limited to, resident fences, shallow utilities and landscaping elements it may be necessary to adjust the spacing of the sprinklers or add sprinklers in the field. These changes shall be identified by the Contractor and approved by the Consultant prior to installation. Contractor shall receive payment for additional heads but all other work accommodating existing site features is incidental to the project.

3. SERVICING

3.1 Electrical

.1 Contractor to complete the Electric Utility Department's "Electric Service Request Form" for a Commercial Service).
Electric Service Request Form Hyperlink

Forward same to the Electric Utility Department at either 2172 Brier Park Place NW or email: eleccomm@medicinehat.ca.

.2 Once Electric Service Request Form is submitted, a Designer will be assigned and can be your point of contact for determining available voltage and confirm service point location.

.3 A service point will normally consist of either a conduit stub, service box, pad mounted transformer or power pole.

.4 Contractor to obtain electrical permit and cost of electric permit to be paid for by the Contractor.

.5 The Parks & Recreation Department shall be responsible for any charges by the Electric Utility Department for the final connection at the service box.

.6 The Contractor is responsible for:

.1 All trenching, backfilling and compaction to 95% Standard Proctor Maximum Dry Density (SPMDD). Minimum depth of service cable trench to be one (1) metre (36 in) below final grade.

.2 All trenches wider than 600 mm (24 in) shall be mechanically compacted with a J-Tamper, or by other mechanical means approved by the Consultant.

.2 Supply, installation and connecting of main service equipment.

.3 Supply and installation of electrical service cable from main disconnect in panel to Electric Utility service point.

.4 Supply and installation of 16 mm (5/8 in) x 3m (10 ft) galvanized or copper clad ground rods or a suitable ground plate at main panel location. This applies to both unmetered and metered services.

.5 Connection of main service cables at service panel

.7 Service conduit, when required, to be 50 mm (2 in) rigid PVC, DB-2 or FRE buried at a depth of one (1) 1 metre (36 in) below final grade.

.8 For 100 amp services and less (metered and unmetered), the service conductors are to be 3 - No. 10 copper x-link colour coded or colour taped as follows:

Black	Line for 120 or 240 volt service
Red	Line for 240 volt service
White	For neutral 120 volt service
Green	Ground for both 120 and 240 volt service

If service size is 31 - 60 amps Use No. 6 copper x-link conductors.

If service size is 61 - 100 amps Use No. 3 copper x-link conductors.

NMW-10 bundled cable can be used instead of single conductors.

.9 Contractor to allow 1 m (36 in) length per service conductor for connection at cable stub, submersible service box or pad mount transformer for use by the Electric Utility Department to connect service.

.10 Contractor to provide secondary cable, conduit and straps for pole risers. Cable and conduit lengths will be determined in field after contact with the Electric Utility Department.

.11 At conduit stub locations:

.1 Stub location will be indicated with a treated .61m x 1.22m (2ft x 4ft) above ground and or an electronic cable marker supplied and installed below ground by the Electric Utility Department. Contractor will contact the Electric Utility Department to locate below ground cable marker if .61m x 1.22m (2ft x 4ft) is not visible.

.2 Contractor must supply and install adapter (if required) for connecting service conduit to the Electric Utility Department's conduit stub.

.3 Contractor will dig down and connect his 50 mm (2 in) conduit to the Electric Utility conduit stub.

.4 Contractor will pull service cables from main disconnect in controller to service point from which conduit stub originates. Contractor to notify the Electric Utility Department forty-eight (48) hours before cable is pulled to arrange for opening of underground service box or pad mount transformer into which service cables will be installed.

.5 Contractor will provide additional pulling points, if required, to install the service cables from the main disconnect to the Electric Utility Department's service box or pad mount transformer.

.6 The Electric Utility Department will connect service cables at service box or pad mount transformer.

.12 At underground service box, pad mount transformer and power pole locations:

.1 Contractor will contact the Electric Utility Department (telephone 403- 529-8270) forty-eight (48) hours prior to installing service cables and conduit at the above locations.

.2 **Contractor will not dig into a service box or pad mount transformer unless under the supervision of the Electric Utility Department.**

.13 For an unmetered service, the Contractor is responsible for all work which will include but not be limited to:

.1 Supply and install 1-15 amp single pole breaker (main disconnect) to operate at 120 volts single phase.

.2 Supply and install service cables and conduit as required from main disconnect to the Electric Utility Department's service point.

.3 Supply and install grounding.

.14 For a metered service, the Contractor is responsible for all work which will include but not be limited to the following:

.1 Supply and install 100 amp 2-pole main service disconnect to operate at 120 / 240 volts or 120 / 208 volts single phase 3-wire.

.2 Supply and install 4-jaw (for 120 / 240 volt service) or 5-jaw (for 120 / 208 volt service) Jumbo meter base. Meter base to be located on load side of main disconnect unless special permission given by the Electric Utility Department to install on line side of main disconnect.

.3 Supply and install subpanel as required.

.4 Supply and install booster pump starter.

.5 Supply and install grounding.

4.0 EXECUTION

4.1 General

.1 All Irrigation Contractors shall have one valid Certified Irrigation Contractor supervising the project. Copies of the Certification shall be provided to the Consultant prior to commencing work.

4.2 Demolition and Salvage

.1 Salvage may include a zone valves, isolation valves, boxes, irrigation heads of any other additional site infrastructure as directed by Parks and Recreation.

.2 Salvage infrastructure shall be removed to ensure they are fully functional for future usage.

4.3 Trenching

.1 Contractor to minimize excavation widths where possible. Excavate trenches to 450 mm (18 in) depth from finished grade to the top of the pipe to ensure adequate coverage, regardless of pipe size. Width of trench shall be a minimum of two times but no more than three times the diameter of the pipe. When trenching, the sod should be separated from native materials and disposed of as incidental to the work.

.2 All trenching shall have a level base to minimize trapped water. In the event of over excavation, the trench shall be backfilled to the proper elevation and compacted to 95% SPMDD +/- 2% optimum moisture prior to installing pipe. Moisture conditioning and mechanical compaction may be required.

.3 In the following spring, the Contractor shall repair any settlement of the trenches by bringing them to grade with topsoil and sodding.

.4 Conduit shall be open cut or directional drilled and placed as required to enclose piping under asphalt, shale or concrete, followed by backfill. Depths of conduit shall be at the same level with irrigation pipe to avoid water collection spots at a minimum of 450 mm (18 in) under amenity areas. Under roadways the top of conduit shall be placed at a consistent grade, below the road subgrade and shallow utilities to a minimum depth of 450 mm (18 in) under roadways.

.5 Extend conduit a minimum of one (1) metre (36 in) beyond edge of hard surface or amenity area. Enclose ends to prevent debris intrusion.

4.4 Installation

.1 Controllers, Cabinets and Concrete Bases

.1 Controllers mounted indoors shall be securely mounted inside the cabinet on a fir plywood back board,

Securely mounted to the wall and easily accessible for maintenance with a minimum of 10in (250 mm) of horizontal and vertical clearance between the walls of the irrigation cabinet and the controller. Refer to Parks & Recreation Standard Drawing PK 2011 & PK2014.

.2 Controllers mounted outdoors shall be installed in the cabinet on a plywood back board and bolted to a powder coated metal pedestal complete with base plate.

.3 No doubling up of zones on the controller station shall be allowed.

.4 Each controller shall be installed at a location approved by the Consultant.

.5 The metal pedestal shall be smooth and rounded where it attaches to the base plate. Refer to Parks & Recreation Standard Drawing PK2012 & PK2015.

.2 110 Volt Electric Wiring

.1 All 110 volt wiring shall be installed in accordance with local electrical codes.

.2 110 volt wiring shall be colour coded to differentiate from 24 volt wire.

.3 The power supply shall be connected through a ground fault receptacle.

.3 Wire Requirements

.1 The control wire from the controllers to the zone valves and hydrometer valves shall be placed in the trench alongside the water line with the wires having slack to allow for curves in the water line.

.2 A minimum of 900 mm (36 in) of slack wire must be left at each control valve and at every change in direction and at each junction to allow for ease of maintenance. Lay wire with sufficient slack to accommodate backfill operation.

.3 For 2 wire decoder systems, 2 – 14 gauge wires (of 2 different colours) must be used in accordance with the manufactures specifications.

.4 All splices shall be housed in a standard irrigation enclosure box or incorporated into the zone valve box. The top/open connection end

of the splice is to be positioned facing upward. Sufficient wire slack (1.0m) must be allowed for in order to be able to extract the splices from the valve box for examination.

.5 The wire in the cabinet shall be:

.1 Neatly secured with plastic tie wraps at 100 mm (4 in) intervals,

.2 Be secured with screws that do not penetrate the exterior of the cabinet,

.3 Be secured at every third tie wrap to the cabinet

.4 Follow the perimeter of the boards and cabinet, allowing a minimum of 300 mm (12 in) of slack.

.6 Wiring within the controller cabinet shall be neatly bundled, securely mounted to cabinet. A terminal strip shall be supplied and installed for the field wire to terminate in the cabinet, interconnect wiring from terminal strip to the Controller.

.4 Double Check Valve Assembly and Water Meter

.1 All back-flow prevention assemblies must be installed in accordance with the Federal, Provincial and Municipal requirements. The Contractor is responsible for obtaining all appropriate installation permits and shall provide documentation to Parks and Recreation confirming cross-connection inspections and associated permit requirements have been met.

.2 Double check assemblies and water meters shall be installed prior to the connection with the irrigation system. The double check valve shall be tested by a qualified professional and results submitted to the Environmental Utilities Department and Consultant prior to delivery of water to the system.

.3 The double check assembly shall be supported by concrete blocks.

.4 Valves sizes and locations shall be indicated on the drawing.

.5 Hydrometers shall be installed at the water service as indicated on the drawings

.6 Hydrometers and water meters to be installed as shown on Parks & Recreation Standard Drawing PK2000, PK2001, & PK2002. Victaulic couplers can be used as an alternate to flanges and all pipe is to be powder coated prior to grooving.

.7 Hydrometers and water meters shall be supported by concrete blocks.

.5 Antenna Base and Mast

.1 The mast and the controller box shall be installed in the same concrete base, wherever practical.

.2 The concrete base for the mast portion shall be installed with the mounting apparatus enclosed in the concrete. The concrete pad shall have a minimum overhang of 100 mm (4 in) and be installed plumb with the finish grade.

.3 The wiring from the controller shall follow the most logical path and minimize the distance between the controller and the antenna. The Contractor shall supply a pull wire for ease of installation of the antenna cable. The City shall supply and install antenna and antenna wire. A 25 mm (1 in) PVC conduit shall be installed at a 450 mm (18 in) depth from the inside of the mast to the inside of the controller box.

.4 The mast shall be securely fastened to the concrete base.

.5 The mast height should be a minimum of 3 meters (10 feet). Contractor to refer to Issued for construction drawings for mast height.

.6 The mast shall be painted with 2 Coats of ASA161 Green Urethane Paint Contractor to verify paint is rust-prohibitive and weather-resistant.

.7 For masts installed on a building, the masts shall be anchored, equal distance apart, by a minimum of three (3) anchoring devices suitable for the building material. The mast shall be bolted to a 300 mm (12 in) square steel plate that is bolted to the roof. Any devices attached to the roof shall be sealed to prevent leaks and according to standard building practice. Contractor is to submit a shop drawing for review prior to confirming order.

.8 The dome antennas for the controllers shall be installed on the controller boxes and shall have silicone around the base to provide weatherproof protection.

.9 Refer to Parks & Recreation Standard Drawing PK2024 for details.

.6 Communication Tie In

1 The Contractor shall complete all the necessary communication tie-ins to ensure a fully functioning system.

.7 Isolation Valves

1 All gate valves shall be installed centred within the box for ease of accessibility, with no obstructions and enough room to operate the valve.

2 A gate valve shall be installed on the pressurized side of each electric zone valve.

3 Gate valves shall be the same size as the electric zone valve in that line.

4 Galvanized steel or brass union and nipples shall be installed between the zone isolation valve (gate valve) and the electric zone valve.

.8 Irrigation Heads and Piping

.1 Make all joints and connections tight in accordance with manufacturer's recommendations and Parks & Recreation Standard Drawing PK 2021 & PK2022. Teflon tape shall be used on all threaded joints of the swing joint assembly. Protect system from being contaminated during construction by enclosing all open ends on all lines.

.2 All sprinklers are to be adjusted and set flush with final grade using the three street elbow swing joints as detailed. Ensure the horizontal pipe is no more than 45 degrees out of level when setting sprinklers.

.3 Sprinkler heads shall be set plumb with the turf. Ensure that heads are adjusted at the proper height and angle to ensure adequate coverage.

.4 Irrigation heads are to be installed no closer than 300 mm (12 in) from all property lines or buildings.

.5 Leave a minimum of 1.5m (60 in) from a T-intersection before changing pipe sizes or direction. Cross intersections are not allowed.

6 After turf is established and the ground has settled, the Contractor shall, within ten (10) working days of notification, adjust the heads to the finished grade.

.9 Irrigation Enclosure Boxes

.1 Top level of gravel in the boxes or vaults shall be kept at the lowest point of irrigation system and shall be 100 mm (4 in) thick.

.2 A maximum of three (3) valve box extensions shall be use per valve. Sufficiently sized holes must be cut in the boxes to ensure that the irrigation piping does not come into contact with the box.

.3 Wherever possible, three (3) or more electric zone valves at the same location shall be enclosed in a vault in order to reduce the total number of enclosures at any one park location.

The irrigation designer shall show on the drawings, which valves shall be placed in vaults.

.4 Vault shop drawings are to be submitted to Consultant for approval prior to installation. Refer to Parks & Recreation Standard Drawing PK2019.

.10 Tracer Wiring

.1 A 14 gauge tracer wire (orange wire colour) shall be installed in the trench from each zone valve to all sprinkler heads to the end of each lateral line. The wire shall be extended to all heads that are more than 300 mm (12 in) off the lateral line. Care should be taken to ensure the wire closely follows the piping.

.2 The tracer wire is not to be left bare and should be terminated into 3M DBR/y with the end in the zone valve box left unattached with a minimum of 900 mm (36 in) of slack measured from top of valve box.

.11 Booster Pump

.1 The piping shall allow for two pumps within, one duty and one backup, the enclosure and alignment of the irrigation components shall be installed such that the size of the enclosure box is minimized while ensuring a minimum of 450 mm (18 in) clearance around the perimeter of the components, inside the enclosure box.

.2 The booster pump shall be bolted to a concrete pad, with the concrete pad overhanging enclosure box by a minimum of 4in

(100 mm) on all sides. Refer to Parks & Recreation Standard Drawings PK2002, PK2004, PK2006, & PK2007.

.3 The enclosure box shall be bolted to the concrete base such that the entire enclosure box can be removed. The enclosure box should also be locked onto the frame to prevent the accidental movement of the enclosure box.

.4 All electrical breakers for the booster pump shall be located in the controller cabinet.

.5 Powder coated metal pipe stands to be installed supporting the piping at maximum intervals of 0.6 m (24 in).

.12 Water Service Vault

.1 All water service components including the hydrometer, water meter, the double check valve and the blow out quick coupler shall be installed below grade in the vault.

.2 The size of the vault shall be as site hardware configuration dictates to ensure that there is 450 mm (18 in) clearance around all components. Prior to fabrication, a shop drawing shall be provided to the Consultant for review.

.3 The bottom of the vault shall have 150 mm (6 in) of 25 mm (1 in) washed gravel with the top of the gravel a minimum of 100 mm (4 in) below the lowest point of the irrigation components. Irrigation components shall be supported by bricks every 600 mm (24 in).

.4 The vault shall be level with the finished grade.

.5 The lids shall not open onto roadways or other obstructions. There shall be a minimum 2 m (6.6 feet) clearance between the open lid and any obstructions. The first lid shall open over the main shut off.

.13 Conduit

.1 Run all necessary wiring through conduit as required. Conduit must be double the size of the group of wires. Any group of wires that is larger than 50 mm (2 in) shall be run through two, 50 mm (2 in) conduit. If located outdoors, ensure that storage chamber is waterproof and lockable.

.2 Should control wires deviate from the irrigation main alignment, they shall be installed in a conduit.

4.5 Testing

Issuance and acceptance of Contractor's construction schedule is needed prior to agreement of inspection and testing.

.1 The Contractor shall have an approved set of drawings and specifications available prior to calling the Consultant for an inspection. As-built drawings are needed prior to acceptance of a Substantial Completion inspection.

.2 Flushing of Irrigation System - The Contractor shall, in the presence of the Consultant, flush all the irrigation piping and then fill it with water.

The Consultant must be made aware of the proposed flushing schedule a minimum of two (2) business days in advance of any flushing activities. Flushing activities must take place between Monday to Friday and during typical City hours of operation. If the Consultant has not been properly informed of the flushing schedule, the Contractor must repeat all flushing activities. The Contractor must flush all ends of the mainline, lateral, and swing-joint a minimum of 3 water turnovers per line, prior to the installation of the sprinkler head. If silt, soil, or other debris enters the pipe during the flushing period, the process must be repeated to the satisfaction of the Consultant. The Contractor must dispose of the flushing water in an environmentally responsible manner while not creating damage or hardship to adjacent properties.

.3 The piping is to be flushed and then filled with water, ensuring that any entrapped air has been completely expelled. The Contractor shall flush the system in the presence of the Consultant.

.4 Once the lines have been filled with water, the Contractor is to complete a pressure test of the mainlines in the presence of the Consultant.

.5 Testing of the controllers shall be done by the Contractor to ensure the system is operating properly. The final commissioning of the system shall be done in the presence of the Consultant after adjustments are made and the Contractor has confirmed its operating properly.

.6 All sprinkler heads, valve enclosures and other system component enclosures shall be adjusted to the proper elevation relative to the final turf grade by the Contractor.

.7 A sign-off sheet will be required verifying the test was completed.

.8 Backflow Prevention Assembly Installation, Certification, and Testing.

.1 The Backflow Prevention device must be tested by a Certified Backflow Prevention Tester to ensure that it is working properly. The person testing the backflow preventer must be a registered Cross Connection Control (CCC) and Backflow Prevention Tester and registered with the City of Medicine Hat, Environmental Utilities Department. The testing of the backflow preventer shall be the responsibility of the Contractor. Prior to the approval to issue water into the irrigation system, the backflow prevention device must be installed. Once water is available to the BFP,The DCVA must be tested to ensure it is functioning properly.

.2 The Certified Tester shall test the device and complete the City of Medicine Hat Cross Connection Control Testing and Inspection Report. The CCC Testing and Inspection Report must confirm that the backflow prevention device has successfully passed the test.

.3 The report is completed in triplicate and all copies are to be forwarded digitally to the Consultant for signature, and then will be forwarded as follows:

.1 Environmental Utilities Department

.2 Certified Tester

.3 Owner of the property or department

.4 Once the device is tested, the certified tester is responsible for attaching a Backflow Prevention Assembly Tag to the device and indicating the results of the test on the tag.

.9 Irrigation Installation and Pressure Test

.1 The Consultant shall be given at minimum two (2) business days' notice when an open trench and/or pressure test inspection is required. The trench inspection and pressure test must take place between Monday to Friday and during typical City hours of operation.

.2 The following procedures shall be followed when pressure testing an irrigation system:

.1 All irrigation systems to be tested from downstream of the DCVA.

.2 The Contractor shall **NOT** operate the main service valve. Before pressure test is to take place, the Contractor shall contact the Environmental Utilities Department (EUD) to confirm that the main service valve is in the off position. The Contractor shall request to the EUD that the main service valve be operated to the open position. The Consultant should be notified of this activity.

.3 Items, which must be in place and complete for the open trench and/or pressure test inspection include:

.1 Confirm trench depth and alignment: depth verification may be required for a pipe installed by means of ploughing. If this is the case, the Inspector can uncover sections of the pipe with his own capacity while a Contractor's representative is present. If depth deficiencies arise, the Inspector can require the Contractor to uncover multiple additional locations to prove proper depth at the Contractor's expense.

.2 A hydro-static pressure test of the mainline will be conducted in accordance with ASTM F2164 in the presence of the Consultant to ensure compliance. The pressure test will be conducted utilizing a minimum of 1-hour duration at a minimum pressure of 100psi. If at any time the pressure drops greater than 5psi, the test will be started over. Additionally, if any repairs to the system are required, the test will be started over.

.3 At the discretion of the Consultant a pressure gauge shall be placed on any point in the system and a reading shall be taken to confirm expected pressure loss in the system. Contractor shall submit calibration record of pressure gauge. Prior to sprinkler head installation, the Contractor shall supply all the connections and requirements to conduct the test.

.4 The Contractor shall receive in writing from the Consultant, approval of the open trench inspection and pressure test.

.10 Irrigation Wiring Inspection

.1 The Consultant shall be given one (1) working day notice when an irrigation wiring inspection is required. The wiring

inspection must take place between Monday to Friday and during typical City hours of operation.

.2 Items, which must be in place and complete for the irrigation wiring inspection include:

.1 irrigation wire properly positioned beside the pipe in the trench

.2 tracer wire properly installed in the trench and terminated into 3M DBR/y

.3 any wire splices must be visible for inspection prior to backfill

.4 wire splices must utilize a 3M DBR/y splice kit

.5 wire connections at the controller

.6 for open trench installations, all wiring should be bound with electrical tape at intervals not exceeding 10m

.7 The Contractor shall receive in writing from the Consultant, approval of the wiring inspection before proceeding with backfill.

.11 Irrigation System Inspection (after installation is complete)

.1 Items, which must be in place and complete for the irrigation system include:

.1 backfilling and compaction

.2 irrigation head adjustment

.3 valve boxes in place, granular base installed, and clear of debris

.4 water pressure on and flowing freely through the system

.5 all heads activated and operating as per manufacturer's recommendations and the irrigation design

.6 cabinet and controller installed

.2 The Contractor shall receive in writing from the Consultant, approval of the irrigation system before proceeding with final landscape development.

.12 Substantial Completion Inspection

.1 Items, which must be in place and complete for the Total Completion Inspection include:

.1 Activation of each individual zone.

.2 Adjustment of any irrigation heads that are improperly adjusted. No spraying onto fence or other vertical structures will be accepted.

.3 The Contractor shall receive in writing from the Consultant, approval of the total completion and acceptance of the irrigation project.

4.6 Backfilling

.1 After Open Trench inspection and written approval by the Consultant, backfill with approved fill.

.2 Place backfill in 150 mm (6 in) lifts, placing and compacting all lifts until 150 mm (6 in) below finished grade. Moisture conditioning and mechanical compaction may be require to achieve 95% SPMDD +/- 2% optimum moisture. Place topsoil, seed or sod as required.

.3 The Contractor shall level off any trenches that have slumped; open trench should be sodded, and ploughed trenches should be seeded unless specified otherwise within this document.

4.7 Site Restoration

.1 Remove all debris and excess excavated material left over from installation and dispose of off-site as required.

.2 All disturbance to the site and staging area, shall be returned to the original condition by the Contractor prior to leaving the site after the work is completed.

.3 All plow lines to be levelled off to prevent tripping hazards. All excess dirt along the plow alignment to be raked our and levelled off.

.4 Contractor shall repair damaged areas from construction activities as directed by Consultant with either:

- topsoil, fertilizer and new sod. All damages shall be repaired prior to final acceptance.

- topsoil, fertilizer and new drill seeding and hydro mulch cover. All damages shall be repaired prior to final acceptance.
- topsoil, fertilizer and hydro-seed cover. All damages shall be repaired prior to final acceptance

.5 Restoration work is to be completed as incidental to the Contract.

END OF SECTION

1.0 GENERAL

.1 Protect trees, shrubs, lawns, planted areas, and other features remaining as part of final landscaping. All trees presently growing on the site, which are to remain, shall be protected to avoid any damage to them during construction operations. The Contractor shall not excavate or use heavy equipment in proximity to the tree and shall stay a minimum of 5 metres (16.5 feet) away from the trunk, or outside the drip line whichever is the larger value.

.2 The Contractor will be charged a penalty for any damage to existing trees as prescribed in the Offences and Penalties section of Tree Preservation Bylaw 4218, or as prescribed in subsequent Bylaw amendments.

.3 Protect buildings, sidewalks, curbs and paved areas against damage.

.4 Protect benchmarks and reference lines from damage. Re-establish at the Contractors own expense if disturbed or destroyed.

.5 Supply and install adequate barriers, fences, warning and construction signs to prevent injury to the public. Maintain such barriers in good condition at all times.

.6 Prior to commencement of any ground disturbance, utility locates should be completed as well as a 3rd Party sweep of the area for any unidentified utilities. Notify Consultant and Utility Departments 48 hours before excavating utility line locates and maintain copies of all locate forms onsite at all times.

.7 Protect utility lines exposed by excavation from damage, as instructed by the respective Utility owner. Final excavation in the area of any utility lines to be done in accordance with the Utility owners requirements.

2.0 MATERIALS

.1 Bollards -150 mm (6 in) diameter rough sawn Spruce-Pine-Fir (S.P.F.) pressure treated (or equivalent) flat top posts, 1500 mm (60 in) in length.

.2 Chain – 7 mm (1/4 in) link zinc, grade 30 meeting NACM Standards.

.3 Swing Gates – All pipe to be schedule 40 galvanized, all steel plates to be grade 300W and HSS Sections to be 350W with all washers, nuts & bolts to be ASTM A307.

3.0 INSTALLATION

.1 Bollards

.1 The Consultant will mark the alignment for the installation of the bollards. The Contractor shall contact the Consultant, to request the marking of the alignment, 48 hours (2 days) prior to calling for locates.

.2 The bollards shall be installed on the City side of the property line.

.3 In locations where bollard and chain is to be installed, the bollards shall be installed 2.4 metres (8 feet on-centre).

.4 In locations where only bollards are to be installed (no chain), the bollards shall be installed 1.5 metres (5 feet on-centre).

.5 Bollards shall be installed level and in alignment with the property line. Install bollards in the ground with 750 mm (29.5 in) exposed above the ground. All holes shall be compacted to ensure bollards are installed tight. The Contractor is responsible for redrilling any holes.

.6 Install 3 metres (10 feet) chain gate where directed by the Consultant. The City shall supply the padlock.

.7 Drill a hole in the bollard 35 mm (1-3/8 in) in diameter, 100 mm (4 in) from the top of the bollard.

.8 Install the chain through the holes in each bollard.

.9 Using 150 mm (6 in) galvanized nails, anchor the chain in each post.

.10 Chain between posts shall have approximately 100 mm to 150 mm (4 to 6 in) of sway.

.11 Install removable steel bollard 600 mm (24 in) above ground. Bollard base pipe set in concrete. Concrete base to be flush with asphalt surface.

.2 Swing Gates

.1 The Consultant will mark the location for the installation of the swing gates. The Contractor shall contact the Consultant to request the

marking of the alignment 48 hours (2 days) prior to calling for locates.

.2 The bollard shall be installed in line with adjacent bollards or light posts.

.3 The helical pile shall be at least 150 mm from the hard surface and there shall be 1000 mm clearance behind.

4.0 SITE CLEAN UP

.1 The Contractor shall take every precaution not to damage, injure or mark existing surfaces, structures or landscaping on the City owned property or adjacent private properties.

.2 Any damage that may be caused by the Contractor, his employees or equipment or subcontractors, shall be restored to pre-construction condition at the Contractor's expense and to the satisfaction of the Consultant.

.3 All areas disturbed because of construction shall be reseeded as per the seeding specifications.

5.0 INSPECTION

.1 Upon completion of bollard installation, the contractor shall arrange for inspection.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS AND RELATED SECTIONS

.1 Children's Playspaces and Equipment - CAN/CSA-Z614-14 (R2019)

.2 ASTM F1292 Impact Attenuation of Surface Systems Around Playground Equipment

.3 ASTM F20754 – Engineered Wood Fiber for Us as a Playground Safety Surface Under and Around Playground Equipment

1.2 General

.1 A site shall be designated on the landscape plans for the placement of the playground equipment.

.2 The playground equipment shall be constructed and installed in compliance with current industry and City of Medicine Hat standards and practices.

.3 All playground structures shall adhere to CAN/CSA - Z614 - 14.

2.0 MATERIALS

2.1 General

.1 All materials shall be new and in accordance with the specifications unless changes are approved in writing by the Consultant.

2.2 Materials

.1 Engineered Wood Fiber

.1 All shredded wood fibre to consist of randomly sized pieces from recycled wood materials from woodmills and truss plants. Fibers not to exceed 50 mm (2 in) in length and contain no more then 15% Fines to aid in compaction.

.2 Concrete mix shall be in accordance with the following:

Minimum 28 Day Strength .....25 MPa*
Designated Aggregate Size……..…….maximum 25 mm (1 in)

Slump……25-75 mm (1-3 in)
Air Entrainment .....5 - 7 %
Cement .....Type 10 Normal Portland Cement
Calcium Chloride .....ASTM D98, 2% maximum, with Consultants approval

3.0 EXECUTION

3.1 General

.1 The site shall be staked by the Contractor prior to excavation. The Contractor shall notify the Consultant once the site has been staked. The Contractor is responsible for verifying all measurements as per the drawings.

3.2 Utility Locates

.1 The Contractor shall be responsible for all utility locates. Contact the utility companies 48 hours prior to start of work for locates.

3.3 Excavation of Site

.1 Excavate area to proper elevations as indicated in the drawings.

.2 Subgrade should have a minimum of a 1% grade.

.3 Excavate to accommodate any drainage system based on the elevations and grades shown in the design drawings.

3.4 Disposal of Material

.1 Disposal of any waste materials to be at Current City of Medicine Hat landfill sites. Determine the suitability of disposal area and all special treatment, schedules or costs that apply to the use of the site and include all costs in the contract price.

.2 Private dumpsite arranged for by the Contractor, in which case disposal to be in strict accordance with City regulations. This does not relieve the Contractor of the responsibility of hauling to City landfill site should the private site become unavailable for any reason.

3.5 Concrete Border Installation

.1 The safety zone described as the distance between the play equipment and the border shall meet or exceed the Canadian Standards Guidelines CAN/CSA - Z614-14.

.2 The borders shall be level with the finished grade.

.3 Refer to Parks & Recreation Standard Drawing PK1002 for details.

3.6 Playground Equipment Installation

.1 Supply and install playground equipment as per specified drawings. The equipment shall be installed according to manufacturer's specifications.

.2 The playground equipment must be installed by a certified playground installer.

.3 The drawings included in this specification package is a minimum guideline for the installation of concrete footings. The depth or amount of concrete may increase or decrease dependent on the load limits of the particular piece of equipment being installed.

.4 All concrete footings shall be installed a minimum of 300 mm (12 in) below grade.

.5 The Contractor shall have the completed work inspected by the manufacturer in conjunction with the Consultant.

.6 The Manufacturer shall complete the Playground Equipment Compliance Inspection Report (Annual Comprehensive Report) as prepared by the Canadian Playground Safety Institute, immediately after the playground equipment is installed. This report shall be submitted to the Parks and Recreation Department.

3.8 Site Rehabilitation

.1 Any damage that may be caused by the Contractor, his employees or equipment or subcontractors shall be restored to pre-construction condition at the Contractor's expense and to the satisfaction of the Consultant.

.2 Any area damaged or disturbed as part of the construction shall be sodded according to the City's General Landscape Specifications.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS AND RELATED SECTIONS

.1 Tree Preservation Bylaw 4218
.2 Site Clearing – Section 02110
.3 Topsoil and Soil Preparation – Section 2484

1.2 INSPECTION

.1 The City of Medicine Hat may, at its sole discretion, inspect all plant material at the source of supply prior to shipping to site.

.2 Approval of plant materials at source of supply will not impair the right of the City of Medicine Hat to inspect plants upon arrival at the site or during the course of construction reject plants which have been damaged or which, in any way, do not conform to the specifications.

.3 Inspection of material will be conducted within thirty (30) days after substantial completion of the work.

.4 Final inspection of all plantings will be made prior to the end of the specified guarantee period.

.5 At the time of inspection, all plants shall be alive and in a healthy, satisfactory growing condition.

1.3 REPLACEMENTS

.1 All plant materials found dead or diseased, or not in a healthy, satisfactory growing condition, or which in any other way, do not meet the requirements of the specifications, shall be replaced by the Contractor at his own expense.

.2 All plant material that has been damaged as a result of carelessness on the part of the Contractor shall be replaced by the Contractor at his own expense.

.3 All required replacements shall be by plants of the same size and species as specified on the Plant List and shall be supplied and planted in accordance with the approved drawings and specifications.

2.0 PLANT MATERIALS

.1 All plant materials shall meet the horticultural standards of the Canadian Nursery Trades Association with respect to grading and quality.

.2 They shall be nursery grown in Alberta, under proper cultural practices as recommended by the Canadian Nursery Trades Association.

.3 Nomenclature of specified plants shall conform to the International Code of Nomenclature for Cultivated Plants and shall be in accordance with the approved scientific names given in the latest edition of Standardized Plant Names. The names of varieties not named therein are generally in conformity with the names accepted in the nursery trade.

.4 Any plants dug from native stands, wood lots, orchards or neglected nurseries and which have not received proper cultural maintenance as advocated by the Canadian Nursery Trade Association, shall be designated as 'collected plants'.

.5 The use of 'collected plants' will not be permitted unless approved in writing by the Consultant.

.6 Plants shall be true to type and structurally sound, well-branched, healthy and vigorous and free of disease, insect infestations, rodent damage, sun scald, frost cracks and other abrasions or scars to the bark. They shall be densely foliated when in leaf and have a healthy, well developed root system.

.7 Any plant material not in accordance with specifications will be a deficiency and will be rejected by the Consultant.

.8 The Contractor shall be required to indicate the source of plant material and supply the Consultant with a list of where the plant material was grown and/or purchased. The Consultant may reject any plant material from a specific source if there is a concern related to the spread of any pests.

2.2 SUBSTITUTION

.1 All plants shall be supplied as specified on the plant list. Substitutions will not be allowed unless approved in writing by the Consultant.

.2 Notice, in writing, must be supplied in a timely manner to the Consultant when applying for substitutions.

.3 Proof that plant species and sizes specified are unobtainable prior to making substitutions must be supplied in a timely manner.

.4 Substitution of plants larger than specified may be permitted with no increase in contract price.

2.3 PLANTING MEDIA

.1 Materials

.1 Peat moss - decomposed plant material, fairly elastic and homogeneous, free of decomposed colloidal residue, wood, sulphur and iron, with a pH value ranging from 6.5 to 7.5.

.2 Sand - Clean, sharp sand passing 2 mm (.08 in) sieve, free of impurities, chemical or organic matter.

.2 Soil mix shall be one (1) part fertile topsoil, two (2) parts existing soil, one (1) part horticultural peat moss and one (1) part sharp sand.

2.4 DIGGING OF PLANTS

.1 All plants shall be dug and delivered to the site as specified on the plant list. Immediately after digging, the root system shall be kept moist to prevent drying out until planted.

.2 Container grown plants must have been grown in containers for a minimum of three months and have established a root system which will hold the soil when removed from container.

.3 Before removing plants from containers for planting, the plants shall be well watered to reduce injury.

.4 All plant material in containers shall be checked to ensure that there are no encircling or girdling roots. If encircling roots are present, use a sharp knife to make two vertical cuts opposite each other on the sides of the root ball through the encircling roots.

.5 Planting hole size shall be 300 mm (12 in) larger than the root ball size except at the bottom. The root ball diameter shall coincide with the Canadian Nursery Trades Association specifications for nursery stock.

2.5 HANDLING OF PLANTS

.1 Plants with broken or abraded trunks or branches are not acceptable.

.2 Plant material are not to be lifted by the trunks.

.3 All plants should be unloaded and checked immediately upon arrival and should be watered if necessary.

.4 All plant material which cannot be planted immediately upon arrival shall be well protected with soil or similar material to prevent drying out or if necessary stored in a dry, weatherproof place in such a manner that their health will not be impaired. Plants shall not remain unplanted for longer than three (3) days after arrival on site.

3.0 EXECUTION

3.1 PLANTING

.1 Plant only during periods that are normal for such work as determined by local weather conditions, to ensure success with the plant material.

.2 The Contractor shall contact the Utility Department or Companies forty-eight (48) hours prior to start of work and coordinate the locates for all underground obstructions such as electric, gas, water, communication and irrigation lines.

.3 Construct planting beds utilizing 600 mm (24 in) of topsoil.

.4 All existing weeds or vegetation is to be cleared or removed from the prepared bed. A minimum layer of 10 sheets (thick) of newsprint is to be laid down in the bed. Newsprint is to be placed up to 50 mm (2 in) from the base of each plant. Newsprint edges are to be overlapped to not permit gaps for weeds to penetrate through. Newsprint is to extend to the entire edge of the bed. Newsprint is to be moistened to allow it to settle and to assist with it conforming to the contours of the ground. Mulch is to then be added on top of the newsprint at a minimum depth of 100 mm (4 inches), and newspaper is to not be visible after installation.

.5 After the Contractor has completed the utility locates, the Contractor shall stake the location for the shrubs and then notify the Consultant who will then inspect the locations for the shrubs. There shall be a minimum of 3 metres (10 feet) away from any irrigation system components.

.6 All shrubs shall have at least 150 mm (6 inches) of growing plating media surrounding the sides of the root ball. Excess excavated material shall be removed from the site. Measure minimum depth of plant pit from downward side of slope when planting on incline.

.7 Plants shall be set exactly in the centre of the pits and at the same relation to grade as originally grown.

.8 Plant material shall be faced to give the best appearance or relationship to adjacent structures, walkways, or park features.

.9 Planting medium shall be firmly tamped in place in such a manner that the plant retains its vertical position. Particular care shall be taken to ensure that no air pockets remain under or around the roots. The planting medium shall be thoroughly watered immediately after tamping. All non-porous containers shall be removed.

.10 Damaged or broken roots should be cut back with a sharp knife to living parts remaining.

.11 For shrub beds in both manicured turf and non-irrigated coarse grass areas: There shall be a minimum of 100 mm (4 in) of mulch placed in the beds or pits, up to a maximum of 150 mm (6 in). When available, the Parks and Recreation Department will supply mulch. The mulch shall not be placed immediately adjacent to the trunk, with a minimum of 50 mm (2 in) away from the trunk of the shrub and the mulch shall not bury any branches or crowns.

.12 The mulch is to be thoroughly watered after the placement of the plant material.

.13 When constructing the beds, they shall be raised and not level with the adjacent turf. There shall be a clean 45-degree angled edge, 150 mm (6 in) deep, around the perimeter of the bed.

3.2 WATERING

.1 Watering shall be carried out when required and with sufficient quantities to prevent plants and underlying growing medium from drying out.

3.3 RESTORATION

.1 Any damage that may be caused by the Contractor, his employees, his equipment or subcontractors shall be restored to pre-construction condition at the Contractor's expense and to the satisfaction of the Consultant.

.2 Restoration shall meet or exceed the pre-existing site condition.

.3 Disposal of all excess material shall be off site in an approved disposal site.

.4 Contractor shall broom clean pavement, concrete, and sidewalks. Grass shall be raked to ensure it is free of planting materials and/or loam.

.5 Leave site in a neat condition.

END OF SECTION

1.0 GENERAL

1.1 TOPSOIL

.1 No placing of topsoil shall take place until the subgrade trimming has been approved by the Consultant.

.2 minimum depth of 150 mm (6 in) of topsoil shall be placed on all sites. Where subgrade materials are porous and subject to high percolation rates, an additional amount of loam may be required. Additional loam to be confirmed by Parks and Recreation during design and confirmed once site subsoils have been exposed.

.3 Topsoil: fertile natural loam, capable of sustaining healthy growth. Topsoil to be loose and friable, free of subsoil, clay lumps, stones in excess of 20 mm, live plants, roots or any other deleterious material greater than 20 mm diameter, free of litter, foreign matter and toxic materials harmful to plant growth. Topsoil containing construction debris, sod clumps, quackgrass or other noxious weeds is not acceptable. Topsoil to meet the following requirements:

1. Minimum 3% organic matter.

2. Acidity/alkalinity shall range from 5.9 pH to 7.0 pH.

3. Electrical Conductivity (E.C.) - level of soluble salts shall not exceed 1.5 dS/m.

4. Texture: “Loam Topsoil” in accordance with Canadian System of Soil Classification. Topsoil to fall within an allowance of ±2% of the values stated in the table below:

Soil	Sand (%)	Silt (%)	Clay (%)	Class
Topsoil	35	35	30	Loam

.4 Organic Topsoil Amendments:

.1 Peat Moss

.1 shall be decomposed plants, fairly elastic and homogeneous, free of decomposed colloidal residue, wood, sulphur and iron. Minimum of 80% organic matter by mass, pH value between 4.5 and 6.0. Furnished in an air-dry state, packed in standard bags or bales showing name of manufacture.

.2 Compost

.1 Shall be commercially prepared and shall meet the CCME Guidelines for Compost Quality (2005). Compost applications shall be managed to avoid overloading soils with heavy metals.
.2 Be substantially free from coliform, pathogens, and chemical or organic contaminants that may be detrimental to plant, animal or human health.
.3 Meet the foreign matter and sharp foreign matter requirements (CCME 2005)
.4 Not exceed a 40:1 total C:N ratio. Compost with a total C:N ratio of 25:1 to 30:1 is recommended.
.5 Well-rotted wood residuals when found to be a component of compost are acceptable provided the total C:N ratio for the topsoil type (mixture) shall be a maximum of 25:1 to 30:1.
.6 Manure compost must meet the CCME (2005) guidelines before use as an amendment.

.5 The Contractor shall notify the Consultant as to the source of the organic material. A sample will be taken within one (1) working day. A laboratory test will be conducted to ensure that the organic material meets the requirements for pathogens and heavy metal content. No placement of the organic material shall take place until the laboratory results of the test are received and evaluated.

.6 The Contractor shall notify the Consultant when the organic material has been incorporated into the topsoil. A soil sample will be taken within one (1) working day. No further development shall take place until the laboratory results of the soil test are received, evaluated and the topsoil meets the criteria for a minimum of 3% organic matter as noted above.

.7 When the seeding does not take place within one week of the preparation of the soil bed, the soil bed shall be rescarified to a minimum depth of 150 mm (6 inches) prior to seeding taking place. The soil bed shall be loose and friable.

1.2 INSPECTION

.1 Have all subgrade preparation complete, finished grades established and results of soil test meet the topsoil criteria.

.2 Give one (1) working day notice to the Consultant when work is available for inspection.

.3 Receive in writing from the Consultant, approval of the subgrade before proceeding with the placement of topsoil.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS AND RELATED STANDARDS

.1 Pulp And Paper Technical Association Of Canada, Technical Section Standard A.2.
.2 Topsoil and Soil Preparation – Section 02484

1.2 SEEDING PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Deliver grass seed, fertilizer, mulch, and other materials in standard containers clearly marked with contents, weight, analysis and name of supplier or manufacturer.

.2 In case of grass seed show quantities of different types of seed mixture as well as the original seed lot number tag complete with supplier's name.

1.3 JOB CONDITIONS

.1 Proceed with seeding operations only during favourable weather conditions in accordance with good horticultural practice.

1.4 INSPECTION

.1 Make all materials available for inspection, upon arrival on the site, or at source of supply when requested.

.2 Give one (1) working day notice to the Consultant when materials are available for inspection.

.3 Obtain the written approval of the Consultant of the finished topsoil preparation before proceeding with seeding.

.4 Where a hydro-seeding method is used, notify the Consultant one (1) working day before loading seeder and allow for an inspection by the Consultant at location of loading operation. Also provide all identification labels from materials placed in hydro-seeder. Failure to notify the Consultant before loading occurs could result in rejection of the seeding operation. The Consultant reserves the right to waive loading inspection at his discretion.

.5 Installation of seed prior to inspection by the Consultant shall be the Contractor's responsibility. The Consultant reserves the right to reject seed, after it has been installed, if seed does not conform to specifications.

.6 Remove all rejected materials from site immediately.

1.5 MATERIALS

.1 Grass Seed - Certified Canada No. 1 seed, having a minimum purity of 97% and germination of 75%, meeting the requirements of the Seeds Act and mixed as specified below:

For all manicured turf areas, a grass mixture of:

30% Kentucky Bluegrass – turf type
44% Creeping Red Fescue
6% Shadow III Chewings Fescue
5% Soilguard Hard Fescue
15% Dominator Perennial Ryegrass

Bag tags from each bag of seed should be collected and provided to the Consultant following seed application.

.2 Seed of the various species shall be furnished in a mixture in standard containers on each of which the following information shall be clearly shown:

.1 Supplier's name and address
.2 Lot Number of each individual grass species/cultivars
.3 Net Weight of each container
.4 Names and percentages of individual seed species/cultivars

.3 Hydro Seeding

.1 Mulch: Approved wood fibre mulch manufactured from whole wood chips and containing no growth or germination inhibiting factors. The following specifications shall apply:

Percent moisture content	10.0%;
Percent organic matter	99.2%;
Percent ash content	8.0%;
Ph	4.8

Water holding 1,000 gms/100 gms of fibre;

Percent of moisture content is determined in accordance with the Pulp And Paper Technical Association Of Canada, Technical Section

Standard A.2.

.2 Tackifier: Acceptable colloidal polysacharide tackifier, adhering to mulch ring manufacturing, non-toxic and without growth or germination inhibiting factors.

1.6 PREPARATION

.1 Provide a finished topsoil surface that is smooth and firm with a fine loose texture. Thoroughly loosen soil, just prior to seeding to a minimum depth of 25 mm (1 in).

.2 Ensure that finished grade meets flush and smooth with adjacent grades and surface structures such as curbs, manholes, sidewalks, etc.

.3 Incorporate organic matter, arrange for testing and obtain final approval that topsoil meets organic requirements before proceeding with seeding.

.4 Apply 11-54-0 fertilizer at the following rate: 2.44 kg per 100 sq. metre (5 lbs. Per 1000 sq feet). Equivalent fertilizer may be applied provided the Contractor consults with the Consultant prior to application.

1.7 INSTALLATION

.1 General Seeding Information

.1 Preferably do all seeding during the period from May 15 until September 30, or as weather permits, when wind speeds are minimal and site conditions are approved by Consultant.

.2 Two means of applying seed are acceptable to the Owner:
.1 mechanical or "Brillion" seeding and
.2 hydro-seeding

.3 Manicured Turf Seed Mix shall be applied at a rate not less than 2.93 kg per 100 m2 (6 lbs per 1,000 ft2 or) 300 kg/Ha)

.4 Hand broadcasting of seed shall not be acceptable under any conditions except for isolated repair work as directed by the Consultant or Parks and Recreation.

.5 Upon completion of all seeding work, arrange for inspection by the Consultant. Give timely notice for such inspection.

.6 Protect all newly seeded areas as required.

.7 Remedy all damages, washouts and eroded areas resulting from weather, improper protection or other causes.

.2 Hydroseeding and Associated Mulch

.1 General Hydroseeding Information:

.1 Proceed with hydro-seeding only after final grade has been approved by the Consultant.

.2 No hydro-seeding shall be performed when wind speeds exceed 10 km/h, over frozen soil, or on ground covered in snow, ice or standing water. Hydro-seed only when conditions are favourable for successful seed germination.

.2 One-Step Hydraulic Seeding and Mulching:

.1 Thoroughly mix grass seed, fertilizer, fibre mulch and water to obtain following slurry mixture and application rates per hectare:

- Fertilizer - 12-51-0at 300 kg/ha.
- Fibre Mulch – minimum 2250 kg/ha.
- Clean Water – minimum 32,000 litres and to fibre mulch manufacturer’s recommendations.

.2 Add tackifier directly into slurry mixture and thoroughly mix at rate recommended by manufacturer. Apply tackifier as required according to manufacturer’s instructions.

.3 Using appropriate hydraulic hydro-mulching equipment, apply slurry mixture uniformly at optimum angle of application.

.4 Use proper nozzles for application and provide hose extensions to propel mulch slurry to inaccessible areas.

.5 Re-apply slurry mixture where application is not uniform.

.6 Agitate slurry mix constantly during spraying to keep it homogeneous and avoid blockage to pipes.

.3 Alternative - Two-Step Hydraulic Seeding and Mulching:

.1 Mix grass seed and fertilizer with sufficient water and apply with hydraulic seeder to obtain same rate of application as one-step method of hydro-seeding.

.2 Apply fibre much immediately following seeding. Mix fibre mulch in water for minimum application of 2250 kg/ha as directed.

.3 Add and mix tackifier into slurry of water and fibre mulch and apply as required according to manufacturer's instructions.

.4 Using hydraulic hydro-mulching equipment, apply fibre mulch slurry mixture to form a uniform and strong moisture retaining mat.

.5 Avoid spraying structures, signs, fences, utilities and plant material. Clean and remove mulch sprayed where not intended.

.6 Area seeded shall not exceed area which can be mulched on same day

.3 Mechanical Seeding

.1 Obtain Consultant's approval of seedbed finish grades, final tilth, surface flatness and fertilizer application before seeding.

.2 No seeding shall be done on frozen soil or when conditions are not favourable for successful seed germination.

.3 Sow during calm weather and when soil moisture content is adequate for germination.

.4 Drill Seeding: apply seed using a mechanical dry spread "Brillion Seeder" that places seed at specified depth and rate and rolls in a single operation.

.5 Sow seed in two directions, 50% of seed in one direction and remaining 50% of seed at right angles to first seeding pattern, using same method of seeding.

.6 Cover broadcasted seed by raking and chain harrowing.

.7 Roll seeded grass with roller not exceeding 50 kg where uneven soil conditions warrant.

.8 Water entire area with fine spray after each area has been sown. Apply water where application of water is practical and will not interfere with other work.

.9 Apply enough water to ensure penetration of at least 50 mm, avoid washing out seeds.

.4 Where approved by the Consultant or as directed by Parks and Recreation, Broadcast Seeding may be approved for small specific locations and areas inaccessible to brillion seeding.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS AND RELATED SECTIONS

.1 Tree Preservation Bylaw 4218
.2 Topsoil and Soil Preparation – Section 02484

1.2 SODDING PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Cut sod by approved methods in accordance with recommendations of the "Canadian Standards for Nursery Stock - (Nursery Sod)", published by the Canadian Nursery Landscape Association
Certified No. 1 cultivated turf sod; with strong fibrous root system, thick and healthy growth and delivered twenty-four (24) hours from the time of cutting. Sod showing signs of deterioration due to age or lack of moisture will be rejected. Sod must be free of stones, burns, dry or bare spots, tears and delivered moist, cut in strips of uniform width and thickness and of the following mix or approved equal:

- 70-90% Kentucky Bluegrass
- 0-10% Creeping Red Fescue
- 0-30% Perennial Ryegrass

All mesh must be removed prior to installation of sod.

.2 Roll or fold sod prior to lifting, in such a manner as to prevent tearing or breaking.

.3 Protect sod during transportation with tarpaulin to prevent sun scalding and drying out and to ensure its arrival at the site in a healthy condition.
.4 Sod must be installed on the day of arrival at site. If delays in installation occur due to weather, protect sod on site from sun, keep sod moist and store in a cool place until installation. Sod that is dried out and not in a healthy growing condition will be rejected by consultant.
.5 Provide fertilizer in standard manufacturer's containers, clearly marked with the name of the manufacturer, weight and analysis. 16-20-0 fertilizer shall be applied at the rate of 3.9 kg per 100 sq. metres, (8 lbs per 1000 feet^2).

1.2 JOB CONDITIONS

Proceed with sodding operations only during favourable weather conditions and in accordance with good horticultural practice.

1.3 INSPECTION

.1 Make all materials available for inspection, upon arrival on the site, or at source of supply when requested.

.2 Submit name of sod supplier.

.3 Give one (1) working day notice, when materials are available for inspection.

.4 Ensure written approval of finished topsoil surface is obtained from the Consultant before proceeding with sodding.

.5 The Consultant reserves the right to reject sod, after it has been installed, if sod does not conform to the specifications and/or drawings.

.6 Remove all rejected materials immediately from the site.

.7 Give one (1) working day notice to the Consultant when all sodding work has been completed. All sod work is to be inspected upon completion.

1.4 MATERIALS

.1 Grass Sod: Certified No. 1 grade cultivated turf grass sod, grown and sold in accordance with “Canadian Standards for Nursery Stock - (Nursery Sod)”, published by the Canadian Nursery Landscape Association.. At the time of sale, it must have a strong, fibrous root system and be free of stones and burned or bare spots.

.2 Wooden Pegs: 25 mm x 25 mm x 225 mm (1 in x 1 in x 9 in) minimum length pegs. Ensure pegs are long enough to securely anchor sod.

1.5 PREPARATION

.1 Apply fertilizer at the following rates: 16 - 20 - 0 at 3.9 kg per 100 sq. metres, (8 lbs. Per 1000 feet²). Equivalent fertilizer may be applied provided the Contractor consults with the Consultant prior to application.

.2 Spread the fertilizer at the specified rate prior to laying sod.

1.6 INSTALLATION

.1 Lay sod with tight butt joints. Do not leave any open joints or overlap adjacent pieces of sod. Ensure that adjacent rows are laid in a staggered

sequence.

.2 Ensure finished sod surface is flush with adjoining grass areas, pavement or top surface of curbs.

.3 On slopes steeper than 4H:1V, lay sod across the face of the slope and peg each row at intervals of not more than 600 mm (24 inches). Drive pegs flush with surface of sod.

.4 Lay sod to a width of 3 m (10 feet) in swales and place perpendicular to direction of swale, unless otherwise noted on drawings.

.5 Immediately after installation of sod, water area with sufficient amounts to saturate sod and underlying topsoil to a minimum depth of 100 mm (4 in).

.6 Upon completion of all sodding work, arrange for inspection by the Consultant. Give timely notice for such inspection.

.7 Protect all newly sodded areas as required.

.8 Repair all damages, washouts and eroded areas resulting from weather, improper protection or other causes.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS AND RELATED SECTIONS

1. Pulp And Paper Technical Association of Canada, Technical Section Standard A.2.
2. City of Medicine Hat – Weed Control Bylaw (No. 2758)
3. Topsoil and Soil Preparation – Section 02484

1.2 SEEDING PRODUCT DELIVERY, STORAGE AND HANDLING

.1 Deliver grass seed, fertilizer, mulch and other materials in supplier or manufacturer containers that are clearly marked with contents, weight and composition analysis.

.2 In case of grass seed show quantities of different types of seed mixture as well as the original seed lot number tag complete with supplier's name.

1.3 JOB CONDITIONS

Proceed with seeding operations only during favourable weather conditions and in accordance with good horticultural practice.

1.4 INSPECTION

.1 Make all materials available for inspection, upon arrival on the site, or at source of supply when requested.

.2 Give one (1) working day notice to the Consultant when materials are available for inspection.

.3 Arrange for an inspection by of the Consultant of the finished topsoil preparation before proceeding with seeding.

.4 Where a hydro-seeding method is used, notify the Consultant one (1) working day before loading seeder and allow for an inspection by the Consultant at location of loading operation. Also provide all identification labels from materials placed in hydro-seeder. Failure to notify the Consultant before loading occurs could result in rejection of the seeding operation. The Consultant reserves the right to waive loading inspection at his discretion.

.5 Installation of seed prior to inspection by the Consultant shall be the

Contractor's responsibility. The Consultant reserves the right to reject seed, after it has been installed, if seed does not conform to specifications.

.6 Remove all rejected materials from site immediately.

1.5 MATERIALS

.1 Grass Seed - Certified Canada No. 1 seed, having a minimum purity of 97% and germination of 75%, meeting the requirements of the Seeds Act and mixed as specified below:

.1 **MIX A – Natural Area:** A coarse grass seed for restoration of natural areas where an irrigation system is not available, a grass mixture of:

15% Wheatgrass – Elbee Northern Wheatgrass
15% Wheatgrass – Western Wheatgrass
15% Warm Season Grass – Blue Grama
10% Dryland Grass – Prairie Junegrass
10% Bluegrass – Sandberg Bluegrass
10% Fescue – Idaho Fescue
5% Dryland Grass – Sand Dropseed
5% Dryland Grass – Green Needlegrass
5% Dryland Grass – Indian Ricegrass
10% Cover Crops – Hazlet Fall Rye – certified variety

Application rates can be found in Section 2.2 .

.2 Seed of the various species shall be furnished in a mixture in standard containers on each of which the following information shall be clearly shown:

- Supplier's name and address
- Lot Number
- Net Weight
- Names and percentages of individual seed species/cultivars.

.3 Hydro Seeding

.1 Mulch: Approved wood fibre mulch manufactured from whole wood chips and containing no growth or germination inhibiting factors. The following specifications shall apply:

Percent moisture content	10.0%;
Percent organic matter	99.2%;
Percent ash content	8.0%;
Ph	4.8
Water holding 1,000 gms/100 gms of fibre;	

Percent of moisture content is determined in accordance with the Pulp And Paper Technical Association Of Canada, Technical Section Standard A.2.

.2 Tackifier: Acceptable colloidal polysacharide tackifier, adhering to mulch ring manufacturing, non-toxic and without growth or germination inhibiting factors.

.4 Topsoil: fertile natural loam, capable of sustaining healthy growth. Topsoil to be loose and friable, free of subsoil, clay lumps, stones in excess of 20 mm, live plants, roots or any other deleterious material greater than 20 mm diameter, free of litter, foreign matter and toxic materials harmful to plant growth. Topsoil containing construction debris, sod clumps, quackgrass or other noxious weeds is not acceptable.

Soil	Sand (%)	Silt (%)	Clay (%)	Class
Topsoil	35	35	30	Loam

In natural areas, Contractors are directed to re-use native topsoil when and where possible.

2.0 EXECUTION

2.1 PREPARATION

.1 A minimum depth of 150 mm (6 in) of topsoil shall be placed on all sites where the topsoil has been stripped. Provide a finished topsoil surface that is smooth and firm with a fine loose texture.

.2 Scarify subgrade to 75 mm. Where area is severely compacted, scarify to 200 mm.

.3 Surface of topsoil free of rocks over 25 mm in diameter, weeds and debris.

.4 Ensure that finished grade meets flush and smooth with adjacent grades and surface structures such as curbs, manholes, sidewalks, etc.

2.2 INSTALLATION

.1 Preferably do all seeding as weather permits, when wind speeds are minimal and site conditions are approved by the Consultant. Seeding to take place no later than October 30 of the current year unless a later seeding date is approved by the Consultant. Dormant seeding is preferred.

.2 The following means of applying seed is acceptable to the Owner:

.1 mechanical or "Brillion" seeding; and,
.2 hydro-seeding

.3 Coarse Grass Seed Mix shall be applied at the following minimum rates;

Mechanical or Brillion	17 kg/Ha
Hydroseed	135 kg/Ha
Broadcast (where approved)	45 kg/Ha

.4 Refer to Specification 2485 for detailed Installation Processes.

Hand broadcasting of seed shall not be acceptable under any conditions except for isolated repair work as directed by the Consultant or Parks and Recreation

.5 Restore to pre-construction condition all hard surfacing, landscaping or facilities that has been damaged or disturbed in any way during the execution of the project, to the satisfaction of the Consultant.

.6 Upon completion of all seeding work, arrange for inspection by the Consultant. Give timely notice for such inspection.

.7 Protect all newly seeded areas as required.

.8 Control Noxious Weeds as per municipal and provincial requirements for a period of 2 years.

2.3 INSPECTION

Upon completion of the seeding and site cleanup, the contractor shall contact the Consultant and arrange for an inspection.

END OF SECTION

1.0 GENERAL

1.1 INSPECTION

.1 The Consultant may, at its discretion, inspect all deciduous and coniferous trees at the source of supply prior to shipping to site.

.2 Approval of plant materials at source of supply will not impair the right of the Consultant to inspect plants upon arrival at the site or during the course of construction reject plants which have been damaged or which, in any way, do not conform to the specifications.

.3 The Contractor shall stake the location of the trees, then notify the Consultant who will then inspect the locations of the trees. There shall be a minimum distance of 5 metres (16 feet) from any irrigation system components.

.4 Inspection of material will be conducted within thirty (30) days after substantial completion of the work.

.5 Final inspection of all plantings will be made prior to the end of the specified guarantee period.

.6 At the time of inspection, all plants shall be alive and in a healthy, satisfactory growing condition.

2.0 PLANTING MATERIALS

2.1 PLANT MATERIALS

.1 All plant materials shall meet the horticultural standards of the Canadian Nursery Trades Association with respect to grading and quality.

.2 They shall be nursery grown in Alberta, under proper cultural practices as recommended by the Canadian Nursery Trades Association.

.3 Nomenclature of specified plants shall conform to the International Code of Nomenclature for Cultivated Plants and shall be in accordance with the approved scientific names given in the latest edition of Standardized Plant Names. The names of varieties not named therein are generally in conformity with the names accepted in the nursery trade.

.4 Any plants dug from native stands, wood lots, orchards or neglected nurseries and which have not received proper cultural maintenance as

advocated by the Canadian Nursery Trade Association, shall be designated as 'collected plants'.

.5 The use of 'collected plants' will not be permitted unless approved in writing, in advance, by the Consultant.

.6 Plants shall be true to type and structurally sound, well-branched, healthy and vigorous and free of disease, insect infestations, rodent damage, sun scald, frost cracks and other abrasions or scars to the bark. They shall be densely foliated when in leaf and have a healthy, well developed root system. Pruning wounds shall show vigorous bark on all edges and all parts shall be moist and show live, green cambium tissue when cut. Trees shall have straight stems unless that would be uncharacteristic and shall be well and characteristically branched for the species or variety.

.7 All plant materials shall conform to the measurements specified in the Plant List except that the plants larger than specified may be used if approved by the Consultant.

.8 All plants shall be measured when the branches are in their normal position. Heights and spread dimensions specified refer to the main body of the plant and not from branch tip to root base or from branch tip to branch tip. Where trees are measured by calliper, it will be in accordance with the Canadian Nursery Trades Association specifications for Nursery stock.

.9 The types of species of trees shall be as indicated on the approved drawings. Trees shall conform to the quality, and measurements shall be in accordance with the 'Guide Specifications for Nursery Stock' of the Canadian Nursery Trades Association and following specifications.

.10 Trees are to be supplied by a grower or nursery in a similar climatic zone unless approved by the Consultant.

.11 Any plant material not in accordance with specifications will be a deficiency and will be rejected by the Consultant.

.12 The Contractor shall be required to indicate the source of plant material and supply the Consultant with a list of where the plant material was grown and/or purchased. The Consultant may reject any plant material that is not an Alberta source.

2.2 SUBSTITUTION

.1 All plants shall be supplied as specified on the plant list. Substitutions will not be allowed unless approved in writing by the Consultant.

.2 Notice, in writing, must be supplied in a timely manner to the Consultant when applying for substitutions.

.3 Proof that plant species and sizes specified are unobtainable prior to making substitutions must be supplied in a timely manner.

.4 Substitution of plants larger than specified may be permitted with no increase in contract price.

2.3 PLANTING MEDIA

.1 Materials

.1 Peat moss - decomposed plant material, fairly elastic and homogeneous, free of decomposed colloidal residue, wood, sulphur and iron, with a pH value ranging from 6.5 to 7.5.

.2 Sand - Clean, sharp sand passing 2 mm (.08 in) sieve, free of impurities, chemical or organic matter.

.2 Soil mix shall be one (1) part fertile topsoil, two (2) parts existing soil, one (1) part horticultural peat moss and one (1) part sharp sand.

2.4 DIGGING OF PLANTS

.1 All plants shall be dug and delivered to the site as specified on the plant list. Immediately after digging, the root system shall be kept moist to prevent drying out until planted.

.2 Plants specified 'Bare Root' shall be dug and moved while dormant, with the major portion of the fibrous root system provided. The root system shall extend a minimum of 380 mm (15.0 in) diameter per 25 mm (1.0 in) of tree caliper. Immediately after digging, wrap the roots in wet burlap and keep burlap wet during transport and storage.

.3 All plants specified 'Ball & Burlap' shall be dug and moved while dormant, with the major portion of the fibrous root system provided.

.4 All root balls less than 45 cm (17.65 in) in diameter shall be burlapped. Balls from 45 cm to 75 cm (17.65 in to 29.55 in) in diameter shall be double burlapped, or burlapped and wire basketed.

.5 The sizes of root balls for trees shall be as specified in the Canadian Nursery Trades Association specifications for nursery stock.

.6 All plants specified may be moved with a mechanical tree spade providing adequate roots are kept as specified.

.7 Container grown plants must have been grown in containers for a minimum of three months, and have established a root system which will hold the soil when removed from container.

.8 Before removing plants from containers for planting, the plants shall be well watered to reduce injury.

.9 All plant material in containers shall be checked to ensure that there are no encircling or girdling roots. If encircling roots are present, use a sharp knife to make two vertical cuts opposite each other on the sides of the root ball through the encircling roots.

.10 Tree hole size shall be 150 mm (6 in) larger than the root ball size except at the bottom. The root ball diameter shall coincide with the Canadian Nursery Trades Association specifications for nursery stock.

2.5 HANDLING OF PLANTS

.1 Protect plants during shipment with windscreen or other suitable covering. Carefully tie in all branches before transporting. Take all precautions to prevent excessive drying from sun and wind and breakage from wind and equipment during transport. All points of contact between plant and equipment shall be protected with pads.

.2 Trees that are moved by the Basket Method or Balled and Burlap Method must be covered with a tarp if transported on an open vehicle.

.3 Plants with broken or abraded trunks or branches are not acceptable.

.4 Root balls, trunks, branches and leaves shall be protected from drying, frost or damage and be kept moist until planted.

.5 Container stock should be handled as much as possible by the pot or basket only, in order to reduce breakage.

.6 Trees are not to be lifted by the trunks.

.7 All plants should be unloaded and checked immediately upon arrival and should be watered if necessary. Trees with cracked or broken root balls will not be accepted.

.8 All plant material which cannot be planted immediately upon arrival shall be well protected with soil or similar material to prevent drying out or if necessary stored in a dry, weatherproof place in such a manner that their effectiveness will not be impaired. Plants shall not remain unplanted for longer than three (3) days after arrival on site.

.9 Plant material shall not be moved under the following conditions;.

1 Do not transport trees in open trucks when the temperature is in excess of 25 degrees celsius, or at speeds in exceed of 60 km/h

2 During extreme windy conditions.

.10 Bareroot material must be moved while dormant

.11 Transportation and handling of trees during weather conditions that exceed the above parameters must be approved by the Consultant.

2.6 MULCH

.1 Random sized wood chips, twigs and leaves collected from a wood chipper being fed tree limbs, branches and brush.

.2 Contractor to supply, haul and place mulch. Mulch may be supplied by the Parks and Recreation Department, subject to availability of supply.

3.0 EXECUTION

3.1 PLANTING

.1 The base of the tree trunk where the roots flare should be partially visible when planting to allow for potential future settling.

.2 Plant trees, only during periods that are normal for such work as determined by local weather conditions, to ensure success with the plant material.

.3 All trees shall have at least 150 mm (6.0 in) of growing medium surrounding the sides of the root ball. Excess excavated material shall be removed from the site. Measure minimum depth of plant pit from downward side of slope when planting on incline.

.4 Where necessary, holes dug by a mechanical tree spade shall be scarified to ensure that they do not have glazed sides.

.5 The Contractor shall contact the Utility Companies or City Departments 48 hours prior to the start of work, and coordinate the locates for all underground obstructions such as electric, gas, water, communication and irrigation lines.

.6 After the Contractor has completed the utility locates, the Contractor shall stake the location for the trees and then notify the Consultant who will then inspect the locations for the trees. There shall be a minimum of 5 metres (16 feet) away from any irrigation system components.

.7 Plants shall be set exactly in the centre of the pits and at the same relation to grade as originally grown.

.8 Plant material shall be faced to give the best appearance or relationship to adjacent structures, walkways or park features.

.9 At the time of planting, cut away the strappings and remove the top 1/3 of the wire and burlap.

.10 Planting medium shall be firmly tamped in place in such a manner that the plant retains its vertical position.

.11 Damaged or broken roots should be cut back with a sharp knife to living parts remaining.

.12 Bare-root plants are to be placed on a cone-shaped mound of soil at the bottom of the hole, roots must not be doubled over, crowded or crossed. Spread roots out gently and evenly in the planting pit.

.13 In exceptional cases where a tree spade cannot be used to dig holes, the following shall apply:

.1 holes shall be dug by hand or backhoe

.2 the soil from such holes shall be removed by the Contractor, at his expense, to an approved disposal site

.14 Each plant other than those in planting beds shall have an earth saucer at its base which shall have a dish as large as the excavated area. The saucer shall be constructed so as to retain water around the roots of the plant. The retaining ring around the saucer shall be 100 mm (4.0 in) and constructed to retain water.

.15 There shall be 100 mm (4 in) of mulch placed in the tree pit, with a 1 m diameter circle around the base of the tree. The mulch shall be level with the adjacent turf. The mulch shall not be placed immediately adjacent to

the tree trunk and shall be placed a minimum of 50 mm (2 in) away from the trunk of the tree.

.16 Tree wraps consisting of plastic tree guards, requiring no staples or fasteners, available 760 mm (30 in) lengths shall be installed around each tree trunk.

Wraps shall be installed 400 mm (16 in) in height around the trunk.

.17 Water bags (minimum 20L) shall be installed according to Manufacturer's specifications around all new trees in non-irrigated areas. Water bag manufacturer to be approved before installation by the Consultant.

3.2 WATERING

.1 Watering In – Trees shall be place upright in the tree hole supported by 150 mm (6 in) of planting media between the ball and each side of the tree hole. Planting media shall be watered in to remove all air spaces. Tree holes shall then be filled to grade with planting media and watered in. The 100 mm (4 in) retaining ring of planting media constructed around the perimeter of the tree hole must be kept intact to ensure adequate retention of water. Ensure the tree ball is at the same height that it was growing at in the nursery.

.2 Watering shall be carried out when required and with sufficient quantities to prevent plants and underlying growing medium from drying out.

3.3 STAKING AND TYING

.1 Trees shall be braced upright in position by 4 metal stakes.

.2 The Contractor shall provide stakes for support of trees and shall be metal stakes 50 mm x 50 mm x 2.5 m (2 in x 2 in x 8 ft-2in)) long. Tree stakes shall be installed 750 mm (30 in) away from the tree trunk and the ties shall be installed in the top one third of the tree. Ties shall be placed around the trunk to provide adequate support and to prevent damage.

.3 New black rubber hose, two ply, reinforced and 3 mm (.125 in) in diameter, or wire encased in rubber, shall be used to encase wires where they circle the trunk or branches to protect the tree.

.4 Animal Protection Fencing shall be installed from the landscape ground level to 1.2m in height. Refer to drawing PR1004 for more information.

3.4 RESTORATION

.1 Any damage that may be caused by the Contractor, his employees, his equipment or subcontractors shall be restored to pre-construction condition at the Contractor's expense and to the satisfaction of the Consultant.

.2 Disposal of all excess material, off site in an approved disposal site.

.3 Broom cleaning of pavement, concrete and sidewalks. Raking grass to ensure it is free of planting materials and/or loam.

.4 Leave site in a neat condition.

END OF SECTION

1.0 GENERAL

This specification describes the requirements for the installation of soil cells for new tree planting area(s) within the contract limits of new construction.

This specification includes requirements for the supply and installation of soil cell systems for planting and paving, including soil cell assemblies and related accessories; geotextile, geogrid, granular sub-base material, backfill, root barrier, growing medium, mulch and granular base for paving.

1.1 REFERENCE STANDARDS AND RELATED SECTIONS

.1 Tree preservation Bylaw 4218
.2 Site clearing – Section 02210
.3 Tree Planting – Section 02491

1.2 LAYOUT AND INSPECTION

.1 The Contractor shall stake the layout and limits of excavation, and required horizontal and vertical control points sufficient to install the Silva Cells in the correct locations. There shall be a minimum distance of 3 metres (10 feet) from any irrigation system components. Where not possible, Contractor to review with City Arborist and Consultant to confirm limits of work.

.2 Contractor is to request Inspection of from the Consultant

.1 Following the installation of the cells & prior to filling in with the Growing Medium.
.2 Following installation of the cell top and backfilling of all topsoil.
.3 Following the placement of granular material & prior to installation of the hard surfaces.

2.0 MATERIALS

2.1 GENERAL

.1 All materials shall be inspected by the Contractor for damage in transit. All Material damaged shall be removed from the site immediately. Any excess bulk materials shall be removed at the completion of construction.

.2 Refer to CoMH Tree Planting Specification – Section 02491 for details on plant materials, planting media, and mulch.

.3 Refer to CoMH Topsoil and Soil Preparation Specifications – Section 02484 for details on granular sub-base material and preparation and top soiling.

2.2 SOIL CELLS

.1 Soil Cell systems shall be:
- a. Strata Vault 30 series as manufactured by City Green Urban Landscape Solutions
- b. Silvacell as manufactured by Deeproot Canada Corp.
- c. City Approved Alternative

2.3 TREE GRATE

.1 Tree grates shall have a minimum dimension of 1500mm x 1500mm. Tree grates and supporting structures shall be sized to cover the tree opening without encroachment into the minimum tree opening.

.2 Tree grate opening shall be a minimum of 0.28m^2, square or round and suitable for the tree species planted.

.3 Trees must be centered within the tree grate openings.

.4 Tree grates shall be installed to be flush with the surrounding pavement and shall not be fastened to frames.

2.5 SUBSTITUTION

.1 All material shall be supplied as specified in the contract documents. Substitutions will not be allowed unless approved in writing by the Project Manager.

.2 Notice, in writing, must be supplied in a timely manner to the Project Manager when applying for substitutions.

.3 Proof that the material specified is unobtainable prior to making substitutions must be supplied in a timely manner.

.4 Substitution of material superior to specified may be permitted with no increase in the contract price.

3.0 EXECUTION

3.1 GENERAL

.1 Soil cells and related products shall be installed by a trained installer.

.2 Locate underground utilities before proceeding with excavation. Clearance and cover measurements for underground infrastructure (utilities, services pipes)and conduits are to be observed by the installer.

.3 Review the manufacturer's installation procedures and coordinate installation with other work affected, such as grading, excavation, utilities, construction access, erosion control, etc.

.4 Each soil cell or stack of soil cells shall be structurally independent such that a single stack, or group of stacks, may be removed to facilitate future utility connections or repairs. If connections are required, the connections must have the ability to break during access for maintenance or repair activities.

.5 Cold weather installation or assembly of modules should not be undertaken when temperatures are below 4° C.

.6 Tree Pit Layout: Layout tree pit locations and dimensions using string lines, survey pegs, and marking paint. Obtain the Consultant's approval of the layout before proceeding with excavation.

.7 Tree Pit Depths: Confirm excavation depths concerning finished hard surface elevations. Allow for a granular base course layer and, where applicable, a drainage layer.

.8 If a root barrier is required, the root barrier shall prevent root penetration. The root barrier shall be made of an impermeable and ribbed geotextile. The root barrier is to be installed to the full depth of the soil cells. Root barrier must be continuous or interlocking.

.9 Assembled modules may be walked on, but vehicular traffic is prohibited until properly backfilled and covered per the Manufacturer's recommendations. Protect personnel and the installation against damage with highly visible construction tape, fencing, or other means until construction is complete.

3.2 EXCAVATION BELOW GRADE

.1 Excavation required for the installation of all Structures shall be made to the depths and widths indicated on the Drawings (a minimum of 300 mm beyond all sides of the structural soil cell components for proper backfill). The Contractor shall ensure that the bottom of the excavation is firm and dry and, in all respects, acceptable to the Consultant.

.2 All objectionable material encountered within the limits indicated shall be removed and disposed of by the Contractor.

.3 On excavation faces, all loose or protruding rocks shall be secured or otherwise removed to finished grade. All cut slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings or as directed by the Consultant or authorized representative.

3.3 SUB-GRADE AND SUBBASE PREPARATION AND GRADING

.1 Sub-grade shall be unfrozen, level, and free of lumps or debris with no standing water, mud, or muck. Do not use frozen materials or materials mixed or coated with ice or frost.

.2 Sub-grade shall be compacted to 95% Proctor Density minimum, or as specified by the Consultant. Dependent on the geotechnical report, the Consultant or authorized representative may require that a reinforcement geogrid fabric be placed within the base layer. If required, the geogrid fabric shall be placed on top of 50 mm of aggregate and covered with 50mm of aggregate. Overlap geogrid a minimum 300 mm, or as recommended by manufacturer.

.3 If the Contractor fails to maintain the sub-grade properly, the Contractor shall remove and dispose of the unsuitable material. If the bottom of any portion of the excavation is removed below the limits shown on the Drawings, it shall be restored to the elevation shown in the Drawings with an approved granular. Compacted native earthen fill is not acceptable.

.4 If in the opinion of the Consultant or authorized representative, the sub-grade, at or below the normal grade of the excavation as indicated on the Drawings, is unsuitable for construction; it shall be removed to such depth and width as the Consultant may direct and be replaced with suitable granular material as directed by the Consultant or authorized representative.

3.4 INSTALLATION OF SOIL CELL

.1 Install soil cell modules in strict accordance with the manufacturer's written instructions and installation diagrams. Prior to placement, check each soil module for damage. Reject cracked, chipped, and otherwise damaged modules. Ensure that panels in contact with the granular base course are firmly seated, with no rocking. Ensure that panels are mechanically interconnected both horizontally and, in multiple layers, vertically.

.2 Utilize a string to outline the footprint of the structural soil cell system. Prior to the installation of soil module panels, confirm tree pit dimensions and mark the location of trees.

.3 Upon completion of the placement, wrap the sides of the system with root and moisture barrier, or geogrid/fabric to prevent material migration into the soil module system. Avoid damage to the root and moisture or geogrid/fabric barrier during placement. If damage occurs, repair that portion per manufacturer specifications.

3.5 SOIL FILLING AND BACKFILLING

.1 Obtain Consultant's approval prior to filling the structural soil cell modules with filler soil. Install filler soil after soil modules are fully assembled and piping systems and barriers are in place. Keep outer trench free of filler soil.

.2 Soil can be compacted in lifts of 200mm to 300mm during placement and compacted by walking over layers or utilizing a hand-held roller designed specifically for this use. Note: the top panel is also an aeration deck allowing soil to be filled to top of upright panels.

.3 Place backfill materials around the perimeter in lifts with a maximum thickness of 300mm. No fill shall be placed over top of modules until the side backfill has been completed. Each lift shall be compacted at the specified moisture content to a minimum of 95% of the Standard Proctor Density until no further densification is observed.

.4 When using mulch, add a final layer of growing medium as required to bring the growing medium level to not more than 25mm below the bottom of the soil cell when installed.

3.6 INSTALLATION OF GEOGRID

.1 Install the geogrid with integrated non-woven geotextile on top of the structural soil cell system allowing it to extend 300mm vertically down the sides of the modules, and 300mm horizontally away from the decking. Overlap geogrid with integrated non-woven geotextile a minimum of 200mm.

3.7 TREE PIT OPENINGS

.1 Confirm the exact location of tree pit openings. Cut the geogrid layer and fold it back to expose the opening. Position perimeter formwork.

3.8 RESTORATION

.1 Any damage that may be caused by the Contractor, there employees, equipment, or subcontractors shall be restored to pre-construction condition at the Contractor's expense and to the satisfaction of the Consultant.

.2 Disposal of all excess material, off-site in an approved disposal site.

.3 Broom cleaning of pavement, concrete, and sidewalks. Raking grass to ensure it is free of planting materials and/or loam.

.4 Leave the site in a neat condition.

3.9 SITE CLEAN UP

.1 Perform cleanup during the installation of work and upon completion of the work. Maintain the site free of soil and sediment, free of trash and debris. Remove from site all excess soil materials, debris, and equipment. Repair any damage to adjacent materials and surfaces resulting from installation of this work.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS AND RELATED SECTIONS

.1 The Asphalt Institute Manual Series No. 2, 3, 4, 8 and 13.
.2 Prime, Tack, and Fog Coats – Section 05110
.3 Hot Mix Asphalt Concrete Trails - Section 05150
.4 Asphalt Milling – Section 05160
.5 Trail Excavation – Section 02202
.6 Trail Granular Sub-base – Section 02222
.7 Trail Asphalt Paving – Section 02510
.8 Tree Protection – Section 02499

1.2 PROTECTION

.1 Protect structures and buildings against damage caused by paving operations.

2.0 PRODUCTS

2.1 MATERIALS

.1 Primer

.1 The emulsified asphalt must be a Slow Setting (SS) type SS-1 diluted at a maximum of 1 part potable water added to 1 part SS-1 up to September 30.
.2 After September 30 the Contractor may use an undiluted Medium Setting (MS) type MS-1 or a Rapid Setting (RS) type RS-1.

.2 Tack Coat

.1 The emulsified asphalt must be a Slow Setting (SS) type SS-1 diluted at a maximum of 1 part potable water added to 1 part SS-1 up to September 30.
.2 After September 30 the Contractor may use an undiluted Medium Setting (MS) type MS-1 or a Rapid Setting (RS) type RS-1.

.3 Asphalt Pavement: City of Medicine Hat Type S2

.4 Asphalt Cement: 150/200 (A) premium grade

.5 Mix Physical Property Requirements:

Marshall Stability (Kn)	8 min.
Marshall Flow (mm)	2.0 – 4.0
Air Voids (%)	3.3 – 3.8
Voids in Mineral Aggregate (%)	14.0 min.
Voids Filled with Asphalt (%)	70 – 80
Film Thickness (µm)	7.5 min.
Tensile Strength Ratio (%)	75 min.

2.2 ASPHALT PAVEMENT MIXTURE

.1 Asphalt Paving: Hot plant mix consisting of crushed gravel aggregate, and asphalt cement binder as specified in this section and according to Municipal Works Construction Specification – Hot Mix Asphalt Concrete Trails Section 05150.

.2 Submit to the Consultant a design mix formula for approval three (3) days prior to actual paving work in field.

.3 Do not change proportions of the design mix. The design mix shall not be changed during the work without submission of a new design mix formula.

.4 Submit a Design Mix based on the following criteria: 16 mm (1/2 inches) mix with 50 blows per specimen.

3.0 EXECUTION

3.1 BASE

.1 Examine prepared base before paving. Report defects in base to the Consultant. Do not commence work if base is unsatisfactory.

.2 Construct gravel base according to specifications herein.

.3 Contractor must provide and operate a loaded single axle test vehicle loaded to 8,165 kg on the rear axel to proof roll the sub-grade, sub-base gravel, or granular base for rutting, weaving, and soft spots.

.4 Excavate soft areas of subgrade, replace with sub-base gravel as required.

3.2 PRIMER

.1 Before application of the emulsified asphalt all loose, dirty or objectionable material must be removed from the surface by power brooming or by other methods acceptable to the Consultant.

.2 Do not apply emulsified asphalt when rain is forecast within 2 hours, the weather is foggy, excessively windy or when the air temperature is less than 5°C, unless otherwise permitted in writing by the Consultant.

.3 Apply primer at rate of 0.90 litres per square metre to 2.20 litres per square metre with asphalt pressure distributor.

.4 Allow primer to set for at least 6hrs until its cured.

3.3 TACK COATS

.1 Before application of the emulsified asphalt all loose, dirty or objectionable material must be removed from the surface by power brooming or by other methods acceptable to the Consultant.

.2 Do not apply emulsified asphalt when rain is forecast within 2 hours, the weather is foggy, excessively windy or when the air temperature is less than 5°C, unless otherwise permitted in writing by the Consultant.

.3 Apply tack coat at rate of 0.2 litres per square metre to 0.60 litres per square metre with pressure distributor.

.4 Ensure tack coat is thin and applied lightly.

3.4 ASPHALT CONCRETE PLACEMENT

.1 Notify the Consultant seventy-two (72) hours prior to paving.

.2 Apply asphalt when temperature is above 8 degrees Celsius, monitor weather forecasts to determine optimum paving schedule. Paving in adverse weather conditions or in temperatures below 8 degrees Celsius requires Consultant approval.

.3 Apply asphalt in one full lift to achieve a total laid thickness of 75 mm (3 in) to the specified elevations and grades. Areas where the asphalt thickness

is less than 65 mm are subject to 'Remove and Replace' conditions at the Contractor's cost.

.4 Top elevation of the finished asphalt surface shall be 50 mm (2 in) higher than adjacent grades.

.5 Compact to 97% of Marshall Design Density.

.6 No payment will be made for asphalt areas with a compaction less than 93% of Marshall Design Density. Remove and replace any asphalt with a Marshall Design Density of less than 93% at no expense to the Consultant.

.7 Trueness of surface: 5 mm (3/16 inches) maximum depression per 3.0 m (10 feet)

.8 Finish roll with a rubber-tired roller.

3.5 MANHOLES, VALVES, ETC.

.1 During paving operations, ensure positive surface drainage to catch basins and catch basin manholes.

.2 Ensure that surface run off will not drain into sanitary sewer manholes.

.3 Do not pave over manholes or water valves.

3.6 TRAFFIC

.1 Keep vehicular traffic off newly paved areas until pavement surface temperature has cooled below 30 degrees Celsius. No stationary loads shall be permitted on the pavement until twenty-four (24) hours after placement.

.2 Provide access to buildings at all times. Arrange paving schedule so as not to interfere with normal use of premises.

3.7 JOINTS

.1 All connections to existing trails are to be milled to a depth of 40 mm.

.2 All cold joints are to be cut back in a step joint, 0.5 metres (20 in) long, milled at a minimum of double the maximum aggregate size (typical S2 asphalt standard is 20mm aggregate – 40mm milled step).

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS AND SPECIFICATIONS

.1 The Asphalt Institute Manual Series No. 2, 3, 4, 8 and 13.

.2 Municipal Works Construction Specifications SECTION 05140 – Hot Mix Asphalt Concrete.

2.0 PRODUCTS

2.1 MATERIALS

.1 Primer: SS-1.

.2 Tack Coat: SS-1 diluted with water.

.3 Asphalt Pavement: City of Medicine Hat Type S2.

2.2 ASPHALT PAVEMENT MIXTURE

.1 Asphalt Paving: Hot plant mix consisting of crushed gravel aggregate, and asphalt cement binder as specified.

.2 Submit to the Consultant a design mix formula for approval three (3) days prior to actual paving work in field.

.3 Do not change proportions of the design mix. The design mix shall not be changed during the work without submission of a new design mix formula.

.4 Submit a Design Mix based on the following criteria: 13 mm (1/2 inches) mix with 50 blows per specimen.

3.0 EXECUTION

3.1 BASE

.1 Examine prepared base before paving. Report defects in base to the Consultant. Do not commence work if the base is unsatisfactory.

.2 Strip existing shale off. Existing shale to be removed and disposed of at trail edge (300 mm (12 in) width).

.3 Provide equipment to load test base.

.4 Excavate soft areas of subgrade, replace with sub-base gravel as required.

.5 Carefully compact the existing shale trail to 100% Standard Proctor Maximum Dry Density (SPMDD), +/- 2% Optimum Moisture Content.

3.2 PRIMER

.1 Apply primer at rate of 0.90 litres per square metre to 2.20 litres per square metre with asphalt pressure distributor.

.2 Allow primer to set.

3.3 TACK COATS

.1 Apply tack coat at rate of 0.23 litres per square metre to 0.50 litres per square metre with pressure distributor.

.2 Ensure tack coat is thin and applied lightly.

3.4 ASPHALT CONCRETE PLACEMENT

.1 Notify the Consultant 3 days (72 hours) prior to paving.

.2 Apply asphalt when temperature is above 8 degrees Celsius, and monitor weather forecasts to determine the optimum paving schedule.

.3 For shale trail overlay, proceed with asphalt paving, consisting of 75 mm (3 in) of Type S2 asphalt. Blend shale and asphalt areas, as required.

.4 For asphalt trail overlay, proceed with asphalt paving, consisting of 50 mm (2 in) of S2 asphalt. Blend newly asphalted areas.

.5 Compact to 97% of Marshall Design Density.

.6 No payment will be made for asphalt areas with a compaction less than 93% of Marshall Design Density. Remove and replace any asphalt with a Marshall Design Density of less than 93% at no expense to the Consultant.

.7 Trueness of surface: 5 mm (3/16 inches) maximum depression per 3.0 m (10 feet).

.8 Compact and flatten with a rubber tired roller.

.9 The trail edge is to be machine packed wherever possible and hand packed as a minimum to ensure a true, straight, packed edge. Excess asphalt material is to be cleaned up and removed.

3.5 MANHOLES, VALVES, ETC.

.1 During paving operations, ensure positive surface drainage to catch basins and catch basin manholes.

.2 Ensure that surface run off will not drain into sanitary sewer manholes.

.3 Do not pave over manholes or water valves.

3.6 TRAFFIC

.1 Keep vehicular traffic off newly paved areas until pavement surface temperature has cooled below 30 degrees Celsius. No stationary loads shall be permitted on the pavement for 24 hours after placement.

3.7 JOINTS

.1 All cold joints are to be cut back in a step joint, half (0.5) metre long, milled at a minimum of double the maximum aggregate size (typical S2 asphalt standard is 20mm aggregate – 40mm milled step).

4.0 SITE REHABILITATION

.1 The Contractor shall take every precaution not to damage, injure or mark all existing surfaces, structures, utilities or landscaping on the City owned property or adjacent private properties.

.2 Any damage that may be caused by the Contractor, his employees or equipment or subcontractors shall be restored to pre-construction condition at the Contractor's expense and to the satisfaction of the Consultant.

.3 The Contractor shall reseed the trail edge of the shale trails that have been overlayed with a coarse grass seed as required.

END OF SECTION

1.0 GENERAL

1.1 REFERENCE STANDARDS AND RELATED SPECIFICATIONS

1. Cast-in-Place Concrete - Section 03300 – Cast-In-Place Concrete.
2. ASTM C233: Standard Test Method for Air-Entraining Admixtures for Concrete
3. ASTM Designation C33: Standard Specification for Concrete Aggregates
4. ASTM C309: Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
5. ASTM C42: Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
6. ASTM Specifications C94: Standard Specification for Ready-Mixed Concrete
7. ASTM D98: Standard Specification for Calcium Chloride.
8. CSA A23.2-1C: Sampling Plastic Concrete
9. CSA A23.2-3C: Making and Curing Concrete Compression and Flexural Test Specimens
10. CSA Specification A23.2-4C: Air Content of Plastic Concrete By The Pressure Method
11. CSA Specification A23.2-5C: Slump and Slump Flow of Concrete
12. CSA A23.2-9C: Compressive Strength of Cylindrical Concrete Specimens
13. CSA Specification 4A

1.2 CONCRETE MIX

.1 Proportion normal density concrete in accordance with CAN/CSA-A23.1-04, to give following properties for all concrete:
.2 Cement: Type HS Portland cement.
.3 Minimum compressive strength at 28 days: 25.0 MPa.
.4 Minimum cement content: 300 kg/m3 of concrete.
.5 Maximum water-cement ration: 0.45
.6 Class of exposure: A.
.7 Nominal size of coarse aggregate: 20 mm.
.8 Slump at time and point of discharge: maximum 65 mm.
.9 No water adjustment is allowed to the delivered concrete after 1 hour of the concrete batch time.
.10 Air content: 5 to 8%.

2.0 AGGREGATES FOR CONCRETE

.1 Prior to purchasing aggregates, the contractor shall have samples and ASTM Tests taken of the aggregate at the source of supply by a testing firm acceptable to the Owner. The source of supply will be approved if the samples submitted meet the requirements of these specifications. The

supply of aggregate that has been tested must also be in a stockpile of sufficient quantity to supply the complete sidewalk, curb and gutter program. Samples will be taken periodically after initial approval and as the work proceeds with a minimum number one (1) aggregate test per 275 cubic metres of placed concrete. Aggregates not meeting the requirements of these specifications will be rejected. Supply plants not properly equipped to grade coarse and fine aggregates within the limits herein specified or required, will not be approved. The cost of all aggregate tests shall be borne by the successful bidder.

3.0 TESTING AND INSPECTION

.1 The Contractor shall employ a testing consultant approved by the Consultant, to carry out mix designs and aggregate tests for materials approved.

.2 The City shall engage a testing consultant, and the costs of testing, including the cost of the moulds shall be borne by the City.

.3 The Contractor shall allow access and provide material for all tests by the City's testing consultant.

.4 Minimum number of field tests shall be as follows:

.1 Curb and Gutter - one test for each section 0-200 lineal metres of curb and gutter.

.2 Monolithic Sidewalk - one test for each section 0-150 lineal metres of sidewalk.

.3 Air Content tests - in accordance with CSA Specification A23.2-4C, minimum testing frequency same as field cast cylinders.

.4 Slump tests - in accordance with CSA Specification A23.2-5C, minimum testing frequency same as field cast cylinders.

.5 Test Cylinders - at least three test cylinders will be taken daily for each class of concrete placed.

.5 TESTING AND SAMPLING METHODS

.1 Compression Test Specimens - Standard method of Making and Curing Concrete Compression and Flexure Test Specimens (CSA A23.2-3C).

.2 Compression Tests - Standard method of Compressive Strength of Cylindrical Concrete Specimens (CSA A23.2-9C).

.3 Air Content - Standard method of Air Content of Plastic Concrete by the Pressure Method (CSA A23.2-4C).

.4 Slump - Standard method of Slump of Concrete (CSA A23.2-5C).

.5 Sampling Plastic Concrete - Standard method of Sampling Plastic Concrete (CSA A23.2-1C).

.6 FACILITIES INSPECTION

.1 Proper facilities shall be provided for the Consultant to inspect the ingredients and processes used in the manufacture and delivery of the concrete. The manufacturer shall afford the Consultant all reasonable facilities without charge, for securing samples to determine whether the concrete is being furnished in accordance with this specification.

.2 Notify the Consultant 24 hours in advance of any concrete placement.

4.0 ENFORCEMENT

.1 In the event that the concrete tested in accordance with Section 2 of these specifications fails to meet the strength requirements, the Consultant shall have the right to require any one or all of the following at no additional expense to the City of Medicine Hat.

.1 Changes in the concrete mix proportions for the remainder of the work.

.2 Coring and testing of the concrete represented by the tests which failed to meet the required strength; sampling and testing shall be according to ASTM Designation C42.

.3 Removal and replacement of the concrete failing to meet the minimum strength requirements.

.4 Extension of the warranty period beyond the specified two (2) year time limit.

.2 In the event of non-compliance with the specifications in Section 3.5, additional testing will be done at the contractor's expense regardless of the results of the retesting. The cost of the testing will be invoiced by the City to the contractor, and subsequently will be deducted from the progress payments.

.3 If the measured slump or air content falls outside the limits specified, a check test shall be made immediately on another portion of the same sample. In the event of a second failure, the Consultant may refuse to permit the use of the load of concrete presented.

5.0 MIXING AND DELIVERY

.1 MIXING

Ready mixed concrete shall be mixed and delivered in accordance with ASTM Specifications C-94 In case of doubt as to the quality of concrete provided by the proposed supplier on the basis of substandard materials, or methods of manufacture or transportation, the Consultant may, at his option, order the Contractor not to use concrete on the job from such proposed supplier and the Contractor shall arrange for an acceptable source of supply.

.2 DELIVERY TIME

When a truck mixer or agitator is used for transporting concrete, the concrete shall be delivered to the site of the work and discharge shall be completed within one and one-half hours after the introduction of the mixing water to the cement and aggregates.

6.0 MATERIALS

.1 PORTLAND CEMENT

Portland Cement shall be type 1 and shall conform to CSA Specification 4A., unless otherwise specified.

.2 CONCRETE AGGREGATES

.1 Concrete Aggregates shall conform to the "Standard Specifications for Concrete Aggregates" - ASTM Designation C33.

.3 ADMIXTURES

.1 Air Entrainment: An air entraining agent conforming to ASTM C233

shall be used in sufficient amounts to produce air entrainment between the limits of 5-7%.

.2 Calcium Chloride: Calcium Chloride conforming to ASTM D98 will be used as directed by the Consultant. To provide cold weather protection, the maximum amount permitted will be 2% by weight of cement.

.3 Initial Set Retarder: An initial set retarding (water reducing) admixture, Daratard HC or equal, shall be used in strict accordance with the manufacturer's recommendations.

.4 WATER

Water used in mixing concrete shall be clean and free from injurious amounts of oils, acids, alkalis, organic materials, or other deleterious substances.

.5 CURING COMPOUND

.1 Curing compound shall conform to ASTM Specifications C309 Type 1-D or 2, and be approved by the Consultant.

.2 The compound shall be sufficiently free from permanent colour to result in no pronounced change in colour from that of natural concrete.

.3 The compound shall, however, contain a dye of colour strength sufficient to render the film distinctly visible on the concrete for a period of at least four (4) hours after application.

.6 SEALING SOLUTION

The sealing solution shall be a mixture of 50% boiled linseed oil and 50% kerosene or varsol.

7.0 EXECUTION

.1 REMOVAL OF EXISTING CONCRETE

.1 Remove existing curbs, gutters, and sidewalks and other structures shown on the drawings as being removed.

.2 Cut existing concrete neatly, and load and haul debris to designated disposal areas. The cost of excavating, loading and hauling to place of disposal is to be included in the unit price for concrete removal.

.3 Avoid damage to adjacent concrete surfaces not scheduled for

removal. Damages will be the responsibility of the Contractor.

.4 If necessary, in the opinion of the Consultant, jack hammers shall be used to facilitate sidewalk, curb and gutter removal.

.2 EXCAVATION

.1 Excavate materials to the required grade, elevations, and cross-sections as shown on the drawings.

.2 Remove all deleterious or unstable material encountered at the sub-grade level to an approved depth and dispose of in accordance with the contract. Replace with approved fill material compacted to 100% of Standard Proctor Density to provide a uniform bearing over the area of the structure.

.3 If the sub-grade is excavated in error, below the specified grade, replace with approved fill material compacted to 100% of Standard Proctor Density, at no extra cost to the Owner.

.4 Excavated material that is unsuitable for use as fill, or surplus excavated material will be disposed of by the contractor at approved locations by the Contractor and approved by the Consultant. If the Contractor is disposing of surplus material on privately owned land, he will make proper arrangements with the owner and he will be held responsible for any damage occurring as a result of his work.

.3 FORMING

.1 Forms, either of steel or wood shall conform to the shape, lines and dimensions of the concrete as called for on the plans.

.2 Forms shall be substantial and sufficiently tight to prevent leakage of mortar; they shall be properly braced or tied together so as to maintain position and shape.

.3 Forms shall be set to line and grade and so constructed and fastened as to produce true lines. Special care shall be used to prevent bulging.

.4 The inside of the forms shall be smooth, cleaned, and coated with non-sustaining mineral oil or other approved material or thoroughly wetted (except in freezing weather).

.5 Forms shall not be disturbed until the concrete has adequately

hardened.

.4 INSPECTION

.1 Ensure that the base material has not been softened by moisture, and ensure that the base is not too dry for placing concrete.

.2 Delay placing concrete as required to dry the base if the base is too wet or add moisture as necessary to prevent absorption of water from concrete if the base is too dry.

.3 Obtain approval of the Consultant prior to placing any concrete.

.5 PLACING

.1 All concrete construction shall be vibrated by means of a vibrating screed or internally by means of a poker or pencil vibrator which shall not exceed 50mm (2 in) in diameter.

.2 All concrete sections be constructed in accordance with attached detailed drawing.

.3 Provide 3mm (.12 in) wide contraction joints at least every three (3) metres (36 in). Joints should be tooled to a depth of 30mm (1.2 in) in concrete sections.

.4 Flexible metal forms shall be used to form all curves with a radius of less than ten (10) metres (32 feet).

.5 The finish of the walk is to be brush finish and all edges including joints shall be tooled for a width of 50 mm (2 in) and rounded to a radius of 6 mm (.25 in).

.6 Concrete shall be conveyed to the place of final deposit by methods which will prevent the separation or loss of materials.

.7 Water shall be removed from the excavations before concrete is deposited unless otherwise directed by the Consultant. Any flow of water into the excavation shall be diverted through proper side drains to a sump, or be removed by other approved methods which will avoid washing and freshly deposited concrete.

.8 Provide 30mm (1.2 in) deep contraction joints directly over tree roots. Spacing of adjacent joints shall be averaged over next two joints, but shall not exceed 1.5 m (5 feet).

.9 Provide expansion joints around all structures such as poles, valve boxes, hydrants, buildings using a 13mm (.5 in) wide approved expansion joint material.

.7 FINISHING

.1 Top surface shall be smoothed with a wood float and stiff brush or broom to provide an even surface in such a manner and at such a time as to minimize the depth and quantity of brush marks.

.2 Bleed water must not be worked into the concrete surface. Delay finishing until excess bleed water has evaporated. Dry cement, or dry mixture of cement and sand shall not be used to absorb surface water.

.3 The contractor is responsible to ensure the surface of the concrete is not vandalized. Any damaged surface must be repaired, or replaced, to the satisfaction of the Consultant.

.8 CURING

.1 All concrete shall receive moist curing for a period of at least 72 hours. One of the following methods shall be used as soon as the concrete has hardened sufficiently to prevent marking:

.1 Surface covered with canvas or other satisfactory material and kept thoroughly wet.

.2 Surface sealed with polyethylene sheeting at least 6 mils thick and the concrete kept thoroughly wet.

.3 Subject to the approval of the Consultant, a liquid, membrane forming, curing compound supplied at the rate recommended by the manufacturer may be used. Curing compounds shall not be used on a surface where bond is required for additional concrete. Curing compound to be applied as follows:

.1 Apply in two coats with approved spray equipment to form complete and unbroken film on surface of concrete. Mechanically agitate compound before and during use.

.2 Apply first spray as soon as excess water has evaporated from surface.

.3 Apply second spray within 24 hrs. of first spray.

.4 Apply each spray at application rate recommended by manufacturer.

.5 Spray slab edges within one (1) hour. of removal of forms.

.6 Respray areas where membrane is damages during curing period.

.9 COLD WEATHER REQUIREMENTS

.1 Do not place concrete when air temperature is below 5 degrees Celsius (41 degrees Fahrenheit) unless the following requirements are met:

.1 Preheat water and aggregates as well as reinforcement, forms, and the ground.

.2 Concrete when deposited, shall have a temperature of not less than four (4) degrees Celsius, nor more than 27 degrees Celsius under warm weather conditions. Concrete shall be covered and maintained at a temperature of at least ten (10) degrees Celsius for not less than 72 hours after placing, or until the concrete has thoroughly hardened.

.3 Do not use calcium chloride, except with the written permission of the Consultant and then only with normal Portland cement and in quantities less than 2% by weight. Close control of calcium chloride quantities and careful mixing is required.

.10 NAMEPLATE

.1 Once in each block place the imprint of the nameplate showing the name of the Contractor and the year of construction.

.11 BACKFILL

.1 Backfilling shall be completed by the Contractor on all the concrete poured.

.2 Backfilling shall commence within ten (10) days, but no sooner than seven (7) days from the day the concrete was finished.

.3 Material placed behind sidewalks or curb and gutter shall be compacted to a minimum 90% of Standard Proctor Maximum Dry Density. Material shall be placed to the full height of concrete unless otherwise specified by the Consultant.

.4 Where landscaping by others is required following the work of this contract, leave backfill 100 mm (4 in) below finish grade to allow for topsoil.

.12 CLEANUP

.1 Remove all debris and excess materials from the site immediately after completion of the work.

.2 Perform cleanup during the installation and upon completion of the work. Maintain the site free of soil and sediment, free of trash and debris. Repair any damage to adjacent materials and surfaces resulting from installation of this work.

.3 Any damage that may be caused by the Contractor, there employees, equipment, or subcontractors shall be restored to pre-construction condition at the Contractor's expense and to the satisfaction of the Consultant.

.4 Disposal of all excess material, off-site in an approved disposal site.

.5 Broom cleaning of pavement, concrete, and sidewalks. Raking grass to ensure it is free of planting materials and/or loam.

.6 Leave the site in a neat condition.

END OF SECTION

1.0 GENERAL

1.1 UTILITY LOCATES

The Contractor is responsible to have all underground utilities located. Contact the Utility Companies a minimum of 48 hours in advance.

2.0 MATERIALS

2.1 GARBAGE CONTAINERS:

.1 Containers shall have access on the front or side, no locks on doors, shall be at least 265 L (70gal) and be painted standard green.

2.2 BENCHES AND PICNIC TABLES

.1 Permanent Benches – refer to Parks and Recreation Department's Approved Product List or an approved alternative as approved by Parks and Recreation Department.

.2 Permanent Pedestal Picnic Tables – refer to Parks and Recreation Department's Approved Product List or an approved alternative as approved by Parks and Recreation Department.

.3 Permanent Benches and Permanent Pedestal Picnic Tables installed within manicured areas shall be mounted on concrete pads and shall have a minimum clearance of one (1) metre.

.4 All benches and tables shall be vinyl coated and painted Park Green or Blue.

3.0 INSTALLATION

3.1 GARBAGE CONTAINERS

.1 Excavate area for concrete pad. Final grade to be level with existing landscape.

.2 Container to be mounted on poured or pre cast pad, as per manufacturer's recommendations.

3.2 BENCHES AND PICNIC TABLES

.1 Pedestals must be set in concrete to a minimum depth of 600 mm (24 in) below finished grade.

.2 Seating surface to be 410 - 440 mm (16 – 17.5 in) above finished grade.

.3 Top of concrete to be flush with adjacent finished grade. The contractor is to adjust the landscape to ensure drainage away from the concrete pad.

.4 Refer to Parks & Recreation Standard Drawing PK1007 for details on the bench concrete pad.

4.0 SITE CLEAN UP

.1 The Contractor shall take every precaution not to damage, injure or mark existing surfaces, structures or landscaping on the City owned property or adjacent private properties.

.2 Any damage that may be caused by the Contractor, his employees or equipment or subcontractors, shall be restored to pre-construction condition at the Contractor's expense and to the satisfaction of the Consultant.

.3 All areas disturbed as a result of construction shall be reseeded as per the seeding specifications.

5.0 INSPECTION

.1 Upon completion of installation, the contractor shall contact the Consultant and arrange for inspection.

END OF SECTION