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Division 32 - Exterior Improvements

Division 33 – Utilities

END OF TABLE

Part 1 General

1.1 SECTION INCLUDES

.1 Measurement schedule.

.2 Quantity calculations.

1.2 GENERAL REQUIREMENTS

.1 The conditions contained in this document are supplemental to, and should be read in conjunction with, the RFT any condition herein deletes, modifies, or adds to a special general condition set forth in the RFT or part thereof, the unaltered portion shall remain in effect.

1.3 MEASUREMENT SYSTEM

.1 This section specifies the measurement rules that will generally be used for payment purposes unless otherwise specified in the Contract Documents. In case of conflict between the method of measurement specified in this section and the requirements specified in Section 01280 – Measurement Schedule, the latter will govern.

.2 Work will be measured in the International System of Units (SI) in accordance with CAN/CSA–Z234.1–89 Canadian Metric Practice Guide.

.3 When used in the Contract, the following abbreviations and symbols have the meaning assigned to them.

Abbreviation/Symbol	Meaning
µm	micrometre or micron
mm	millimetre
m	metre
mm^2 or mm2	square millimetre
m^2 or m2	square metre
ha	hectare
kPa	kilopascal
MPa	megapascal
m^3 or m3	cubic metre
L	litre
L.S.	lump sum
g	gram
kg	kilogram
N	newton
kN	kilonewton
t	tonne
no.	number (quantity)
min	minute (time)
h	hour
d	day
wk	week
%	percent

>	greater than
≥	greater than or equal to
<	less than
≤	less than or equal to
$	Canadian dollars
°	degree (angle)
°C	degree Celsius
vm	vertical metre
rpm	revolutions per minute
US gpm	US gallon per minute
gal	gallon
Btu	British thermal unit
VDC	volts of direct current
VAC	volts of alternating current
Ah	amp hour

1.4 METHOD OF MEASUREMENT

.1 Unless otherwise indicated in the Contract Documents:

.1 Earthwork materials will be measured net in place after compaction, with no allowance for bulking, shrinkage, compression, foundation settlement, or waste;

.2 Products will be measured net, with no allowance for waste;

.3 Dimensions used in calculating quantities will be rounded to the nearest unit of dimension as follows:

Quantity	**Dimension**
Volume of earth	centimetre
Volume of concrete	millimetre
Length of pipe	centimetre
Area of land	decimetre

.4 The survey station grid system adopted will be at 10 linear metres spacing on curves and 20 linear metres spacing on tangent sections for measuring earthwork quantities, respectively;

.5 Contours may be based on aerial photograph interpretation and are approximate only. Actual ground elevations and location co–ordinates will be determined in the field during the course of the Work for measurement purposes; and

.6 Measurement and payment will not be made for work carried out beyond measurement and payment lines and limits specified in the Contract Documents.

.2 When boundaries between different items of Work are not specified in the Contract Documents, such boundaries will be established by the Owner.

.3 Mass:

.1 Mass will be measured by weigh scale or by estimated or theoretical mass taken from reference documents, as specified.

.2 Mass will be measured to 3 decimal places.

.4 Length:

.1 Length will be measured at the item centreline or mean chord.

.2 Items to be measured by linear dimension will be measured parallel to the base or foundation upon which such items are placed.

.3 Items to be measured by station will be measured horizontal to the base or foundation upon which such items are placed.

.4 Centre line for pipes, ducts, culverts, and similar items will be the line equidistant between inside faces of pipe walls.

.5 Area:

.1 For rectangular and regular shaped objects, area will be measured using mean length and width or radius.

.2 For irregular objects, area will be measured by the sum of squares, triangles, and circles, etc., as selected by the Owner.

.6 Volume:

.1 Unless otherwise indicated, volume will be measured using mean length, width, and height or thickness.

.2 Excavation and fill volumes will be computed using a digital terrain modelling computer software program.

.7 Time:

.1 Construction Equipment to be paid for on a time basis will be measured in hours of actual working time, and necessary travelling time, when under its own power to the nearest tenth thereof.

.2 Hauling equipment to be paid for on a time basis will be measured in hours of actual working time to the nearest tenth thereof.

.8 Number of items will be measured on a per item basis.

.9 Lump Sum items will not be measured for payment.

.10 When standard manufactured items are identified by their physical characteristics, such characteristics will be considered as nominal. Unless more stringently controlled by specified tolerances, manufacturing tolerances established by the industry involved will be accepted.

1.5 MEASUREMENT COMPUTATION

.1 Formulae and computer programs used for measurement computation will be as specified or, when not specified, as selected by the Owner.

1.6 MEASUREMENT OF WORK

.1 Unless otherwise specified, the Owner will measure the Work for the purpose of determining payment to the Contractor.

.2 The Owner will request the Contractor to attend with the Owner in making measurements.

.3 If the Contractor does not attend pursuant to Paragraph 1.4.2, measurements made or approved by the Owner will be considered to be the correct measurement for such part of the Work.

.4 The Owner will prepare survey records and drawings for payment purposes as the Work progresses. The Owner will request the Contractor to attend, within 14 days, to examine and verify such records and drawings. If the Contractor does not attend to examine and verify such records and drawings, they will be considered to be correct.

.5 If, after attending pursuant to Paragraph 1.4.2 or 1.4.4, the Contractor disagrees with such measurements or records or drawings, they will nevertheless be considered correct until the Contractor notifies the Owner of the aspects in which they are considered incorrect. On receipt of such notice, the Owner will review the measurements or records or drawings and either confirm or vary them.

1.7 QUANTITIES

.1 Unless otherwise indicated, quantities specified in the Schedule of Prices for Unit Price Work are estimated quantities and will not be considered as actual quantities of Work to be performed. Subject to the Contract terms, unit prices stated in the Schedule of Prices will be applied to actual quantities of Work performed as measured in accordance with the Contract Documents.

.2 When it is stated that the Contractor will be paid only for the quantity specified for an item of Work, such quantity will be considered as a fixed quantity and the Contractor will be paid for the quantity specified, regardless of the actual quantity performed. If a change in the Work directed by the Owner results in a change in a fixed quantity, the quantity will be adjusted in accordance with the Contract Documents and payment will be made for the adjusted quantity.

1.8 SCALES

.1 Unless otherwise indicated, provide weigh scales, certified by Industry Canada, for measurement purposes.

.2 Provide scales that are accurate to within 0.5% of correct mass throughout the range of use. Spring balances will not be permitted.

.3 Prior to use and at any time requested by the Owner, provide the services of a qualified independent person, acceptable to the Owner, for the testing and servicing of weigh scales. Perform baseline tests and record results. Service and adjust weigh scales to meet requirements of Industry Canada and the Contract Documents. Submit a final report of weigh scale tests, services, and adjustments.

.4 Scales indicating more than true mass will not be permitted to operate and material measured subsequent to the last previous correct accuracy test will be reduced by the percentage of error in excess of 0.5%.

.5 Scales indicating less than true mass will be adjusted and no additional payment will be made for materials previously scaled and recorded.

1.9 MEASUREMENT SCHEDULE

.1 Schedule: See following pages.

.2 Quantity Calculations – Scheduled Lump Sum items.

.1 When an interim payment is to be a specified percentage of a lump sum item and is calculated based on the ratio of the value of Work completed to the interim date, and the Project Price, that specified percentage will be included in the calculation of the value of the Work completed to that interim date.

.3 Breakdown of Lump Sum items

.1 Submit a breakdown of each lump sum item included in the Schedule of Prices, within 15 days after the commencement date of the Agreement.

.2 Provide sufficient details as required to identify the principal components of the work and to permit ready valuation of the work performed.

.4 Lump Sum items paid in accordance with the following schedule. The total amount of such payments shall not exceed the amount bid for this item.

.1 Payment of 25% of the Lump Sum amount after completion of Work for 5% of the bid amount.

.2 Payment of another 25% of the Lump Sum amount after completion of Work for 25% of the bid amount.

.3 Payment of another 25% of the Lump Sum amount after completion of Work for 50% of the bid amount.

.4 Payment of the remaining 25% of the Lump Sum amount after completion of all Work of the Agreement.

.5 Payment of Cash Allowance items

1.10 2.1 EXTRA WORK ALLOWANCES

.1 .1 Unforeseen Work:

.1 .1 Scope: Includes unforeseen work for which payment is not included elsewhere. Unforeseen work shall be approved by Owner.

.2 .2 Measurement: Shall be made by the Owner after assessment of the nature of the unforeseen work. Method of measurement, extent of work and the limit of work shall be agreed to prior to commencing the unforeseen work.

.3 .3 Payment: Shall be made by an approved change order describing the unforeseen work and setting out the method of payment (ie. lump sum, unit price and/or force account). Payment amount shall be taken from the Extra Work Allowance provided for in the Contract.

1.11 UNIT PRICES

.1 Refer to Schedule B, Schedule of Quantities.

.2 If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit sum/prices contracted.

.3 All unit price Work performed without notifying The Consultant to establish measurement and payment shall not be considered for payment.

.4 The prices bid for various items of work, unless specifically noted otherwise, shall include the supply of all labour, material, and product equipment necessary to construct the work in accordance with the specifications.

.5 The prices bid for supply and installation shall be full compensation for supplying, hauling, installing, cleaning, testing, and placing in service together with all other work subsidiary and incidental thereto for which separate payment is not provided elsewhere.

.6 Measurement - unit prices

.1 Measurement units are delineated in the Schedule of Quantities for conditions specified in the Contract.

.2 Measurement methods and unit prices are determined by The Municipality of Drumheller for conditions that have been changed since the creation of this Contract.

.3 Take measurements and compute quantities. The Municipality of Drumheller will verify measurements and quantities.

.7 Includes full compensation for required labour, Products, tools, equipment, plant and facilities, transportation, storage, services, and incidentals; erection, application or installation of an item of the Work; overhead and profit.

ITEM No.	ITEM NAME	SCOPE, MEASUREMENT, AND PAYMENT
1	Mobilization and Demobilization	.1 Scope: Mobilization includes: Supplying and transporting to the Site, labour, equipment, products and incidentals; providing and maintaining temporary facilities and controls, including site offices and related utilities; providing, maintaining, and restoring roads, pathways, laydown areas, and parking areas including video survey; temporary relocation and reinstatement of existing facilities; supplying, installing, maintaining and removing construction materials necessary for the Contractor's methods carried out during performance of the Agreement and which does not remain as part of the Permanent Work; and all related work and materials for which payment is not included elsewhere. Demobilization includes: Removing and transporting from the Site, labour, equipment, products, and other items not required to remain upon Completion; cleaning of the Site; and all related work and materials for which payment is not included elsewhere. Mobilization and Demobilization includes: Interim and partial mobilization and demobilization activities required to perform the Work of the Agreement. .2 Payment: Lump Sum and shall be paid for as 80% once mobilization to the Project Site is complete and the subject work has been initiated and the remainder shall be paid upon completion of all work to the satisfaction of The Municipality of Drumheller.

2	Existing and Temporary Roads, Pathways and Signs	.1 Scope: Includes designing; providing earthwork materials; constructing, and removing when required, existing and temporary roads and pathways, and detours; providing materials including signs, barricades, signals, flashers, and other safety measures; removing snow, dirt and debris from existing and temporary roads and detours; dust control; preparing submittals and obtaining approvals, including paying all levies, from the City of Calgary Transportation Department and Traffic Operations Division and Calgary Parks Department; includes video surveys; and all related work and materials for which payment is not included elsewhere. Materials incorporated in these works will not be paid for under any other item. .2 Payment: Lump Sum paid in accordance with the schedule outlines in Article 1.4.4 above.
3	Temporary Construction Panel Fencing	.1 Scope: Includes supplying, storing, handling, installing, maintaining, and removing temporary construction panel fencing; and all related work and materials for which payment is not included elsewhere. .2 Measurement: Shall be the installed length of temporary construction panel fencing measured along the fence at the ground surface. .3 Payment: Unit Price per metre in accordance with the following schedule: .1 Payment of 75% of the extended amount after installing the fence. .2 Payment of the balance of the extended amount after removing the fence.
4	Surveying	.1 Scope: Layout, grading, and as-built purposes .2 Payment: Lump Sum paid in accordance with the schedule outlines in Article 1.4.4 above.
5	Paving Preparation	.1 Scope: <u>Clearing and Grubbing</u>: Includes cutting, removing, grubbing, mulching, loading, hauling, and disposing of logs, trees, brush, stumps, roots, and other deleterious material at an off Site waste disposal facility; salvaging and protecting roots of cleared plants designated by the Consultant to be replanted; protecting and treating trees and shrubs that are to remain; levelling, grading, and finishing of cleared areas; and all related work and materials for which payment is not included elsewhere.

		Topsoil Stripping: Includes stripping, sorting, loading, hauling, dumping, and stockpiling of Topsoil in specified areas; and all related work and materials for which payment is not included elsewhere. Excavation: Includes excavating designated areas; shaping and trimming to finished excavation surfaces; temporary stockpiling and rehandling, if required; loading, hauling, and dumping excess in an appropriate off-Site waste disposal facility following approval by The City; and all related work and materials for which payment is not included elsewhere. .2 Measurement: Shall be the area of Paving Preparation measured by survey. .3 Payment: Unit Price per square metre
6	Sidewalk Removal	.1 Scope: Includes saw cutting, demolishing, excavating, removing, temporary stockpiling, if required, rehandling, loading, hauling, and disposal of asphalt and gravel pavements and gravel subgrade materials off-site; and all related work for which payment is not included elsewhere. .2 Measurement: The area to be demolished shall be paint-marked prior to demolition and measured with the Consultant prior to starting the work. Shall be the surface area in square metres of the asphalt or gravel pathway removed as agreed with the Consultant. .3 Payment: Unit Price per square metre.
7	Tree/Shrub Removal	.1 Scope: Includes cutting, removing, grubbed, mulching, loading, hauling and disposal at an off-site waste disposal facility; levelling, grading and finishing of area; and all related work and materials for which payment is not included elsewhere. .2 Payment: Unit Price per Each
8	Soil Type A	.1 Scope: Includes preparing submittals and obtaining approvals, quality control testing, supplying, paying royalties, excavating, sorting, loading, hauling, temporary stockpiling, if required, mixing native Topsoil and supplied compost to the satisfaction of The City; preparing receiving surfaces; dumping, spreading, grading, rolling, cultivating, and raking Soil Type A; removing and disposing of rocks and deleterious materials; and all related work for which payment is not included elsewhere. .2 Measurement: Shall be the in-place volume of Soil Type A as determined from the top surface area of the Soil Type A measured by survey multiplied by the thickness specified

		in the contract documents or as adjusted by the Consultant. .3 Payment: Unit Price per cubic metre
9	Asphalt Repair	.1 Scope: Includes all labour, equipment, and material necessary to complete the construction of the Municipal Standard asphalt, including excavating, preparing the subgrade and base, side forms as required, supplying, storing, placing, spreading, trimming, joining, anchoring, installing root barrier, if required; protecting, paying royalties, any quality control testing as required by the approving authority, and any other work or material necessary to complete the structure that is not provided elsewhere. .2 Measurement: Shall be the installed area of asphalt pathway as determined by survey. .3 Payment: Unit Price per square metre
10	Concrete Unit Pavers	. 1 Scope: Includes all labour, equipment, and material necessary to complete the construction of the concrete unit pavers as identified in the specs and construction drawings, including excavating, preparing the subgrade and base, side forms as required, supplying, storing, placing, spreading, trimming, joining, anchoring, installing root barrier, if required; protecting, paying royalties, any quality control testing as required by the approving authority, and any other work or material necessary to complete the structure that is not provided elsewhere. .2 Measurement: Shall be the installed area of pavers as determined by survey. .3 Payment: Unit Price per square metre
11	Concrete Paving	.1 Scope: Includes all labour, equipment, and material necessary to complete the construction of the Cast in Place Concrete Paving, including excavating, preparing the subgrade and base, supplying, storing, placing, spreading, trimming, joining, protecting, paying royalties, any quality control testing as required by the approving authority, and any other work or material necessary to complete the structure that is not provided elsewhere. .2 Measurement: Shall be the installed area of Cast in Place Concrete as determined by survey. .3 Payment: Unit Price per square metre
12	Concrete Curb	.1 Scope: Includes all labour, equipment, and material necessary to complete the construction of the Concrete Curb, including excavating, preparing the subgrade and

		base, supplying, storing, placing, spreading, trimming, joining, protecting, paying royalties, any quality control testing as required by the approving authority, and any other work or material necessary to complete the structure that is not provided elsewhere. .2 Measurement: Shall be the installed area of Concrete Curb as determined by survey. .3 Payment: Unit Price per metre
13	Waste Bin Enclosure	.1 Scope: Includes supplying, storing, loading, hauling, handling, and installing Waste Bin Enclosure; and all related work and materials for which payment is not included elsewhere. .2 Measurement: Shall be the installed length of Waste Bin Enclosure measured along the fence at the ground surface. .2 Payment: Unit Price per metre
14	Waste Receptacle	.1 Scope: Includes installation of waste receptacle at site. .2 Measurement: Shall be the in-place number of waste receptacles. .3 Payment: Unit Price per bench receptacle.
15	Benches	.1 Scope: Includes designing, fabricating, loading, hauling, protecting, temporary storing, and rehandling, if required, and installing the benches, supplying, excavating, sorting, quality control testing, and installation of all benches. .2 Measurement: Shall be the in place in-place number of benches .3 Payment: Unit Price per bench
16	Trees	.1 Scope: Includes supplying nursery-grown container trees, protecting, hauling, offloading, and temporarily storing, if required; preparing receiving surfaces; excavation of pits and planting beds, placing planting soil; temporary stockpiling and rehandling, if required; planting, protecting, and watering; removing and disposing of deleterious materials; supplying, loading, hauling, and placing Hemp Squares; supplying and installing tree protection; and all related work and materials for which payment is not included elsewhere. .2 Measurement: Shall be the in place in-place number of trees. .3 Price: Unit Price per tree.

17	Site Lighting + Pedestal	1 Scope: Includes supplying, storing, loading, hauling, handling, and installing site pole lighting and pedestals; and all related work and materials for which payment is not included elsewhere. .2 Measurement: Shall be the in-place number of pole lights and pedestals .3 Payment: Unit Price per pole light and pedestal.
18	Perennials	.1 Scope: Includes supplying nursery-grown container perennials, protecting, hauling, offloading, and temporarily storing, if required; preparing receiving surfaces; excavation of pits and planting beds, placing planting soil; temporary stockpiling and rehandling, if required; planting, protecting, and watering; removing and disposing of deleterious materials; supplying, loading, hauling, and placing additional mulch if required; and all related work and materials for which payment is not included elsewhere. .2 Measurement: Shall be the in placein-place number of perennials. .3 Price: Unit Price per perennial..1 Scope: Includes supplying nursery-grown container perennials, protecting, hauling, offloading, and temporarily storing, if required; preparing receiving surfaces; excavation of pits and planting beds, placing planting soil; temporary stockpiling and rehandling, if required; planting, protecting, and watering; removing and disposing of deleterious materials; supplying, loading, hauling and; supplying and installing plant protection; and all related work and materials for which payment is not included elsewhere. .2 Measurement: Shall be the in place number of shrubs. .3 Price: Unit Price per perennial.
19	Vegetation Establishment – Watering Perennials	.1 Scope: Includes preparing and obtaining permits, if required, and obtaining approvals; soil moisture testing and recording; loading, hauling, and watering planted trees, shrubs, perennials; installing temporary irrigation systems if determined by the Contractor and approved by The City; and all related work and materials for which payment is not included elsewhere. .2 Payment: Lump Sum per Year..1 Scope: Includes supplying nursery-grown container perennials, protecting, hauling, offloading, and temporarily storing, if required; preparing receiving surfaces; excavation of pits and planting beds, placing planting soil; temporary stockpiling and rehandling, if required; planting, protecting, and watering; removing and disposing of deleterious materials;

		supplying, loading, hauling, and placing additional mulch if required; and all related work and materials for which payment is not included elsewhere. .2 Measurement: Shall be the in place number of perennials. .3 Price: Unit Price per perennial
20	Vegetation Establishment - Establishment logs Vegetation Establishment - Watering	.1 Scope: Includes preparing and submitting Establishment logs; pruning trees, shrubs; protecting plants, replanting trees, shrubs, perennials; and all related work and materials for which payment is not included elsewhere. .2 Measurement: to be filled out whenever activities are performed and submitted monthly with the progress claims. .3 Payment: Lump Sum per Month.1 Scope: Includes preparing and obtaining permits, if required, and obtaining approvals; soil moisture testing and recording; loading, hauling, and watering planted trees, shrubs, perennials; installing temporary irrigation systems if determined by the Contractor and approved by The City; and all related work and materials for which payment is not included elsewhere. .2 Payment: Lump Sum per Year
21	Vegetation Establishment - Establishment logs	.1 Scope: Includes preparing and submitting Establishment logs; pruning trees and perennials; protecting plants, replanting trees, perennials; and all related work and materials for which payment is not included elsewhere. .2 Measurement: to be filled out whenever activities are performed and submitted monthly with the progress claims. .3 Payment: Lump Sum per Month
22	Vegetation Establishment - Weed control Vegetation Establishment - Establishment logs	.1 Scope: Includes preparing submittals and obtaining approvals; supplying, loading, hauling and applying chemical herbicides; eradicating or preventing weed growth through labour and mechanical methods as described in the Contract Documents or directed by The City; and all related work and materials for which payment is not included elsewhere. 2: Payment: Lump Sum per Month. 1 Scope: Includes preparing and submitting Establishment logs; pruning trees, perennials; protecting plants, replanting trees, and perennials; and all related work and materials for which payment is not included elsewhere. .2 Measurement: to be filled out whenever activities are performed and submitted monthly with the progress claims.

		.3 Payment: Lump Sum per Month
23	Stage base	.1 Scope: Includes supplying, loading, hauling, handling, preparing receiving surface and installing foundations for concrete stage platform and stairs and all related work and materials for which payment is not listed elsewhere. .2 Payment: m2

Part 2 Products - NOT USED

Part 3 Execution - NOT USED

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Coordination Work with other contractors under administration of Consultant.

.2 Pre-installation, inspection and scheduled progress meetings.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Municipality of Drumheller Standard General Conditions.

1.3 ADMINISTRATIVE RESPONSIBIILITIES

.1 The Consultant will be responsible for the administrative requirement for the following meetings:

.1 Pre-construction.

.2 Construction progress.

.3 Post-construction.

.2 The Contractor shall be responsibility for the administrative requirement for the following meetings:

.1 Workplace orientation.

.2 Safety.

.3 The Consultant or Contractor may request additional meetings related to installation of equipment, co-ordination of assigned contracts, co-ordination of subcontracts, warranty, dispute resolution, and environmental issues. Unless otherwise specifically requested by the Contractor, the Consultant will be responsible for administrative duties related to these meetings. The agenda for these meetings may be combined with that of the construction progress meetings.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 The administrative requirements for Contract meetings include the following:

.1 Scheduling and administering the Contract meetings throughout the progress of the Work.

.2 Preparing the agenda for the meetings.

.3 Distributing to the relevant attendees written notice of each meeting and the proposed agenda at least 3 days in advance of the meeting date.

.4 Presiding at the meetings.

.5 Recording the minutes including attendance, significant proceedings and decisions, and action required by the parties.

.6 Consultant will record minutes of meetings and circulate to attending parties and affected parties not in attendance within seven (7) days after meeting.

.1 The meeting minutes will serve as the agenda for the subsequent construction meeting.

.2 Representatives of the Contractor, Subcontractors, and Suppliers shall attend meetings as necessary and be authorized to act on behalf of the party each represents.

1.5 CONSTRUCTION ORGANIZATION AND START-UP

.1 Within fifteen (15) days after award of Contract and prior to commencement of activities on site, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities. Include time and location of meeting in the request.

.2 Attendees

- .1 Contractor's representatives: senior management, site superintendent, major Subcontractors, and others as necessary
- .2 Consultant: as determined by the Consultant.
- .3 The Municipality of Drumheller: Project Manager, Site inspector and others as necessary.

.3 Agenda to include the following:

- .1 Appointment of official representative of participants in Work and communication ladder.
- .2 Schedules: of the Work, submittals, equipment delivery, etc. Coordinate inspections and layout work with Consultant and The Municipality of Drumheller.
- .3 Mobilization to Site, including requirements and locations for temporary facilities, site signage, offices, storage sheds, utilities, fences.
- .4 Site safety and security.
- .5 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.
- .6 Owner-furnished Products.
- .7 Record documents.
- .8 Maintenance manuals, takeover procedures, acceptance, and warranties.
- .9 Monthly progress claims, administrative procedures, photographs, and holdbacks.
- .10 Inspection and testing.
- .11 Insurances and transcript of policies.

1.6 CONSTRUCTION PROGRESS MEETINGS

.1 Schedule and administer bi-weekly project meetings throughout progress of Work or as determined by the Consultant.

.2 Purpose is to monitor construction progress, to identify problems and actions required for their solution, and to expedite the Work.

.3 Attendees: Contractor, major subcontractors involved in Work, Consultant, The Municipality of Drumheller and others as necessary that are involved in the Work.

.4 Agenda may include the following:

- .1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule and revisions to the construction schedule. Corrective measures and procedures to regain projected schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Progress and schedule for the succeeding work period.

.7 Review submittal schedules: expedite as required.

.8 Adherence to quality standards.

.9 Review proposed changes that affect the construction schedule and/or completion date.

.10 Review site safety, environmental and security issues, or other contentious items of the Work.

.11 Other business.

END OF SECTION

Part 1 General

1.1 DEFINITIONS

.1 Activity: An element of Work performed during course of the Project. An activity normally has an expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): A graphic display of schedule related information. In a typical bar chart, activities or other Project elements are listed down the left side of the chart, dates are shown across the top, and activity durations are shown as horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: Original approved plan (for Project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: Number of work periods (not including holidays or other nonworking periods) required to complete an activity or other Project element. Usually expressed as workdays or workweeks.

.6 Milestone: A significant event in Project, usually completion of major deliverable.

.7 Project Schedule: The planned dates for performing activities and the planned dates for meeting milestones. A dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.8 Project Planning, Monitoring and Control System: Overall system operated by Consultant to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

.1 Ensure Schedules are practical and remain within specified Contract duration.
.2 Plan to complete Work in accordance with prescribed milestones and time frame.
.3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 SUBMITTALS

.1 Construction Schedule: Within 10 working days from the Award of Contract, submit to the Consultant a proposed construction schedule, including a phasing schedule that keeps approximately 50% of the park open to the public.

1.4 PROJECT MILESTONES

.1 To be determined by the Consultant

1.5 PROJECT SCHEDULE

.1 Construction Schedule shall show:

.1 Commencement and completion dates of Contract.
.2 Commencement and completion dates of stipulated stages.
.3 Commencement and completion dates of stipulated stages.
.4 Commencement and completion dates of Trades.
.5 Order and delivery times for materials and equipment, where possible.
.6 Dates for submission of Shop Drawings, material lists and samples.
.7 Any other information relating to the orderly progress of Contract, considered by Consultant or Consultant is pertinent.

1.6 UPDATING AND MONITORING

.1 Set up format of Construction Schedule to allow plotting of actual progress against scheduled progress.

.1 Allow sufficient space for modifications and revisions to the Schedule as Work progresses.

.2 Format shall be approved by the Consultant.

.2 Copy of Schedule shall be displayed in Site office during complete construction period and actual progress plotted weekly.

1.7 CONSTRUCTION SCHEDULE REPORTING

.1 Update Construction Schedule on bi-weekly basis reflecting activity changes and completions, as well as activities in progress.
.2 Include as part of Construction Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Shop Drawings and product data.

.2 Samples.

.3 Establishment Log Submissions.

1.2 RELATED SECTIONS

.1 Other sections requesting submittals.

1.3 ADMINISTRATIVE

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

.2 Work affected by submittal shall not proceed until review is complete.

.3 Present Shop Drawings, product data, samples, and mock-ups in metric units.

.4 Where items or information is not manufactured or produced in SI metric units, converted values within the metric measurement tolerances are acceptable.

.5 Review submittals prior to submission to Consultant. This review represents those necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents.

.6 Submittals not stamped, signed, dated, identified as to specific project, and attesting to their being reviewed will be returned without being examined and shall be considered rejected.

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

.8 Verify field measurements and affected adjacent Work are coordinated.

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

.10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant review.

.11 Keep one (1) reviewed copy of each submission on site.

1.4 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "Shop Drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.3 Allow a minimum of ten (10) days for Consultant's review of each submission.

.4 Adjustments made on Shop Drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

.5 Make changes in Shop Drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of any revisions other than those requested.

.6 Accompany submissions with transmittal letter, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.7 Submissions shall include:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to other parts of the Work.

.8 After Consultant's review, distribute copies.

.9 Submit electronic copy of Shop Drawings for each requirement requested in specification Sections and as consultant may reasonably request.

.10 Submit electronic copy of product data sheets or brochures for requirements requested in specification sections and as requested by Consultant where Shop Drawings will not be prepared due to standardized manufacture of product.

.11 Delete information not applicable to project.

.12 Supplement standard information to provide details applicable to project.

.13 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If Shop Drawings are rejected, noted copy will be returned and re-submission of corrected Shop Drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.14 Shop Drawings must be submitted for the following features:

.1 Stage Feature

.15 Foundation type and sizing, where needed, shall be sized appropriately for each feature and follow the recommendations from the Geotechnical Report.

.16 Shop Drawings prepared under supervision of and stamped by a Professional Structural Engineer experienced in design of this Work and licensed in Alberta must be submitted for the following features (including all required components for construction):

.1 Public Washroom unit and rammed earth facade

.2 Waste Bin Enclosure, including foundation

.17 Contractor is responsible for all Engineering costs.

1.5 SAMPLES

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Consultant's business address.

.3 Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

.6 Make changes in samples which Consultant may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.6 ESTABLISHMENT LOGS

.1 Provide establishment logs during the warranty period.

.2 Contractor to submit revisions to the Establishment Log prior to the warranty period for approval.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Not Used.

1.2 REFERENCES

.1 Manual of Uniform Traffic Control Devices (UTCD) for Streets and Highways [2002].

1.3 PROTECTION OF PUBLIC TRAFFIC

.1 Comply with requirements of Acts, Regulations and By Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.

.2 When working on traveled way:
- .1 Place equipment in position to present minimum of interference and hazard to traveling public.
- .2 Keep equipment units as close together as working conditions permit and preferably on same side of traveled way.
- .3 Do not leave equipment on traveled way overnight.

.3 Do not close any lanes of road without approval of the Consultant Before re routing traffic, erect suitable signs and devices in accordance with instructions contained in Part D of UTCD.

.4 Keep travelled way graded, free of pot holes and of sufficient width for required number of lanes of traffic.
- .1 Provide minimum 7m wide temporary roadway for traffic in two way sections through Work and on detours.
- .2 Provide minimum 5m wide temporary roadway for traffic in one way sections through Work and on detours.

.5 As directed by Consultant, provide paved detours or temporary roads to facilitate passage of traffic around restricted construction area:
- .1 Place and compact granular sub base and base.
- .2 Place and compact asphalt concrete pavement.
- .3 Provide and maintain road access and egress to property fronting along Work under Contract and in other areas as indicated, unless other means of road access exist that meet approval of the Consultant.

1.4 INFORMATIONAL AND WARNING DEVICES

.1 Provide and maintain signs, and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.

.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in Part D, Temporary Conditions Signs and Devices, of UTCD manual.

.3 Place signs and other devices in locations recommended in UTCD manual.

.4 Meet with Transportation Services prior to commencement of Work to prepare list of signs and other devices required for project. If situation on site changes, revise list to approval of Transportation Services.

.5 Continually maintain traffic control devices in use by:
- .1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.
- .2 Removing or covering signs which do not apply to conditions existing from day to day.

1.5 CONTROL OF PUBLIC TRAFFIC

.1 Provide competent flag persons, trained in accordance with, and properly equipped as specified in, UTCD manual in following situations:
- .1 When public traffic is required to pass working vehicles or equipment that block all or part of traveled roadway.
- .2 When it is necessary to institute one way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.
- .3 When workmen or equipment are employed on traveled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.
- .4 Where temporary protection is required while other traffic control devices are being erected or taken down.
- .5 For emergency protection when other traffic control devices are not readily available.
- .6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.
- .7 Delays to public traffic due to contractor's operators: maximum 15 minutes.

.2 Where roadway, carrying two way traffic, is restricted to one lane, for 24 hours each day, provide portable traffic signal system. Adjust, as necessary, and regularly maintain system during period of restriction. Signal system to meet requirements of Part IV of Manual of Uniform Traffic Control Devices for Streets and Highways.

1.6 OPERATIONAL REQUIREMENTS

.1 Maintain existing conditions for traffic throughout period of contract except that, when required for construction under contract and when measures have been taken as specified and approved by Departmental Representative to protect and control public traffic.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Health and safety considerations required to ensure due diligence towards health and safety on construction sites, and meets the requirements laid out in PWGSC/RPB Departmental Policy DP 073 - Occupational Health and Safety - Construction.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 41 00 - Regulatory Requirements.

1.3 REFERENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

.3 Province of Ontario

.1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1990 June 2002.

1.4 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit site-specific Health and Safety Plan: Within 5 working days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

.3 Submit 3 copies of Contractor's authorized representative's work site health and safety inspection reports to Consultant and authority having jurisdiction, monthly.

.4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Submit WHMIS MSDS - Material Safety Data Sheets

.7 Consultant will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 working days after receipt of plan. Revise plan as appropriate and resubmit plan to Consultant within 5 working days after receipt of comments from Consultant

.8 Consultant review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Consultant.

.10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.5 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to beginning of Work.

1.6 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.7 MEETINGS

.1 Schedule and administer Health and Safety meeting with Consultant to commencement of Work.

1.8 REGULATORY REQUIREMENTS

.1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements.

1.9 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:

.1 Refer to Risk Assessment and Special Provisions

1.10 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Consultant may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.11 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.12 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Health and Safety Act and Regulations for Construction Projects, R.S.O..

.2 Comply with Occupational Health and Safety Act, Industrial and Commercial Establishments Regulation, R.R.Q.

.3 Comply with Occupational Health and Safety Regulations, 1996.

.4 Comply with Occupational Health and Safety Act, General Safety Regulations, O.I.C..

.5 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.13 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise C verbally and in writing.

1.14 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have minimum 2 years' site-related working experience specific to activities associated with.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

1.15 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Consultant.

1.16 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Consultant.

.2 Provide Consultant with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Owner, Departmental Representative, or Consultant may stop Work if non-compliance of health and safety regulations is not corrected.

1.17 POWDER ACTUATED DEVICES

.1 Use powder actuated devices only after receipt of written permission from Consultant.

1.18 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES AND CODES

.1 Meet or exceed the most stringent requirements of:

.1 Contract documents

.2 Applicable Acts, regulations, standards, codes and referenced documents.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

1.3 DEFINITIONS

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.4 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Consultant. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.

.3 Address topics at level of detail commensurate with environmental issues and required construction tasks.

.4 Environmental protection plan: include:

.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.

.2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.

.3 Names and qualifications of persons responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan which identifies type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.6 Drawings showing locations of proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.

.12 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.13 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water (to be completed by others), disinfection water, hydrostatic test water, and water used in flushing of lines.

.14 Historical, archaeological, cultural and biological resources plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, and biological resources.

.15 Pesticide treatment plan: to be included and updated, as required.

1.5 FIRES

.1 Fires and burning of rubbish on site is not permitted.

1.6 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site.

.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

1.7 DRAINAGE

.1 Provide erosion and sediment control plan that identifies type and location of erosion and sediment controls to be provided. Plan: include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sedimentations control plan.

.3 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

.4 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.8 WORK ADJACENT TO WATERWAYS

.1 Do not operate construction equipment in waterways.

.2 Do not use waterway beds for borrow material.

.3 Do not dump excavated fill, waste material or debris in waterways.

.4 Design and construct temporary barriers to minimize erosion to waterways.

.5 Do not skid logs or construction materials across waterways.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Laws, notices, permits and approvals.

1.2 RELATED SECTIONS

.1 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 REGULATORY RESPONSIBILITY

.1 Conform to Regulatory Requirements and pay all fees and give all notices required by them.

.2 Obtain approvals necessary for the Work and the Agreement from the regulatory agencies having jurisdiction, except those approvals obtained by The Municipal's Design Professional as identified in this section.

.3 The Municipal's Design Professional will obtain the approvals necessary for the Project that involve agreement between The Municipal's Design Professional and the regulatory agency having jurisdiction.

1.4 CITY OBTAINED APPROVALS

.1 The Municipality of Drumheller will obtain the approvals listed below prior to construction. Do not commence work until approvals are obtained by The Municipal. Comply with conditions of approvals.

1.5 REGULATORY DOCUMENTS

.1 The following regulatory documents are required prior to commencing Work on site:

.1 Tree Protection Plan and Soil Management Plan.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

.2 Tests and mix designs.

.3 Mock-ups.

.4 Written and electronic reports.

.5 Equipment and system adjust and balance.

1.2 RELATED SECTIONS

.1 This section describes requirements applicable to all Sections within Divisions 02 to 32.

1.3 REFERENCES

.1 ISO/IEC 17025-2005 - General Requirements for the Competence of Testing and Calibration Laboratories.

.2 SCC (Standards Council of Canada).

.3 Calgary Development Guidelines and Standard Specifications: Landscape Construction (current edition).

1.4 INSPECTION BY AUTHORITY

.1 Allow Authorities Having Jurisdiction access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection whenever portions of the Work are designated for special tests, inspections, or approvals, either when described in the Agreement or when required by law in the Place of the Work.

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections, or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

1.5 REVIEW BY DESIGN PROFESSIONAL

.1 Consultant may order any part of the Work to be reviewed or inspected if Work is suspected to be not in accordance with the Agreement.

.2 If, upon review such work is found not in accordance with the Agreement, correct such Work and pay cost of additional review and correction.

1.6 TESTING

.1 The Contractor shall be responsible for securing qualified testing agencies to perform any required testing.

.2 The Municipality of Drumheller may employ an independent testing agency or employ their own forces to conduct test on the work for verification. The Municipality of Drumheller will pay for this extra testing if the Municipality of Drumheller choses to have the testing done. The contractor shall make work or materials available for testing.

.3 Testing Organizations: As determined by the Municipality of Drumheller.

.4 Provide equipment required for executing inspection and testing by appointed agencies.

.5 Employment of inspection and testing agencies does not relax responsibility to perform Work in accordance with The Agreement.

.6 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and testing to ascertain full degree of defect. Correct defect and irregularities as advised by Design Professional at no cost to Municipality of Drumheller. Pay costs for retesting and re-inspection.

1.7 ACCESS TO WORK

.1 Allow inspection and testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Cooperate to provide reasonable access and facilities for such access.

1.8 PROCEDURES

.1 Notify appropriate agency and Consultant in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.9 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Consultant as failing to conform to The Agreement. Replace or re-execute in accordance with The Agreement.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of the Consultant it is not expedient to correct defective Work or Work not performed in accordance with the Agreement, Municipality of Drumheller may deduct from Project Price the difference in value between Work performed and that called for the Agreement, amount of which shall be determined by the Consultant.

1.10 REPORTS

.1 Submit one (1) electronic copy of signed inspection and test reports to Consultant.

.2 Provide signed paper copies to manufacturer or fabricator of material being inspected or tested.

1.11 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as may be requested.

.2 The cost of tests and mix designs beyond those called for in the Agreement or beyond those required by law of Place of Work shall be appraised by the Design Professional and may be authorized as recoverable.

1.12 MOCK-UP

.1 Prepare mock-up for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.

.2 Construct in all locations acceptable to the Consultant.

.3 Prepare mock-ups for the Consultant's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of the agreement and no claim for extension by reason of such default will be allowed.

.5 If requested, the Consultant will assist in preparing a schedule fixing dates for preparation.

.6 Approved mock-up may remain as part of Work if directed by the Consultant.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Site enclosure.

.2 Guardrails and barriers.

.3 Weather enclosures.

.4 Dust tight barriers.

.5 Protection for off-site and public property.

.6 Protection of applied finishes.

.7 Protection of surrounding Work.

1.2 RELATED SECTIONS

.1 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.4 SITE ENCLOSURE

.1 Erect temporary site enclosure hoarding using 38 x 89 mm construction grade lumber framing at 600 mm on centre, and 1200 x 2400 mm size, thick exterior grade particleboard.

.2 Provide one (1) lockable truck entrance gate and at least one (1) pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys with restricted availability, in the project office.

.3 Maintain pedestrian walkways routes complete with signs and electrical lighting as required by law.

.4 Erect temporary site enclosure using new 1.2 m snow fence wired to rolled steel "T" bar fence, posts spaced at 2.4 m on centre.

.1 Provide [one (1)] lockable truck gate.

.2 Maintain site protection fencing in good repair.

1.5 GUARD RAILS AND BARRIERS

.1 Provide secure, rigid guard rails and barricades around excavations and open edges of site demolition areas.

1.6 WEATHER ENCLOSURES

.1 Design enclosures to withstand wind pressure and snow loading.

1.7 DUST TIGHT BARRIERS

.1 Provide dust tight barriers and screens or insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.

.2 Maintain and relocate protection until such work is complete.

1.8 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.9 PROTECTION OF APPLIED FINISHES

.1 Provide protection for finished and partially finished surfaces and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with Consultant locations and installation schedule three (3) days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

1.10 PROTECTION OF SURROUNDING WORK

.1 Provide protection for finished and partially finished Work from damage.

.2 Provide necessary cover and protection.

.3 Be responsible for damage incurred due to lack of or improper or inappropriate protection.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Product quality, availability, storage, handling, protection, and transportation.

.2 Product substitution procedures.

.3 Manufacturer's instructions.

.4 Quality of Work, coordination, and fastenings.

.5 Existing facilities.

1.2 RELATED SECTIONS

.1 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 TERMINOLOGY

.1 New: Produced from new materials.

.2 Re-newed: Produced or rejuvenated from an existing material to like-new condition to serve a new or existing service.

.3 Defective: A condition determined exclusively by the Consultant.

1.4 PRODUCT QUALITY

.1 Products, materials, equipment, parts, or assemblies (referred to as Products) incorporated in Work: either new or renewed, not damaged or defective, of best quality (compatible with specification requirements) for purpose intended. If requested, provide evidence as to type, source and quality of Products provided.

.2 Defective Products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility but is precaution against oversight or error. Remove and replace defective Products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should any dispute arise as to quality or fitness of Products, decision rests strictly with Consultant.

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.5 Permanent labels, trademarks and nameplates on Products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.5 AVAILABILITY

.1 Immediately upon signing Contract, review Product delivery requirements and anticipate foreseeable supply delays for any items.

.2 If delays in supply of Products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.3 In event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves right to substitute more readily available Products of similar character, at no increase in Contract Price or Contract Time.

1.6 STORAGE AND PROTECTION

.1 Store and protect Products in accordance with manufacturers' written instructions.

.2 Store with seals and labels intact and legible.

.3 Store sensitive Products in weather tight, climate controlled, enclosures in an environment favourable to Product.

.4 For exterior storage of fabricated Products, place on sloped supports above ground.

.5 Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.

.6 Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

.7 Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

.8 Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.7 TRANSPORTATION AND HANDLING

.1 Transport and handle Products in accordance with manufacturer's written instructions.

.2 Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.

.3 Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.8 PRODUCT CHANGES

.1 Change in Product/Products: Submit request for substitution or alternative to Consultant within 5 business days.

1.9 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to project schedule, pedestrians, and surrounding traffic flow.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

1.10 MANUFACTURER'S WRITTEN INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect Products to manufacturer's written instructions. Do not rely on labels or enclosures provided with Products. Obtain written instructions directly from manufacturers.

.2 Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant may establish course of action.

.3 Improper installation or erection of Products, due to failure in complying with these requirements, authorizes Consultant to require removal and re-installation at no increase in Contract Price or Contract Time.

1.11 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Consultant if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Consultant reserves right to require dismissal from site any workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Consultant, whose decision is final.

1.12 COORDINATION

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.13 CONCEALMENT

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation, inform Consultant if there is interference. Install as directed by Consultant.

1.14 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.15 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Consultant of conflicting installation. Install as directed.

1.16 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.17 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use Type 304 or 316 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.18 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of any part of the Project.

.2 Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated, without written approval of Consultant.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Submittal requirements associated with connecting to new and existing facilities.

.2 Execution requirements for all Work.

1.2 RELATED SECTIONS

.1 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 SUBMITTALS - ATTACHING TO EXISTING WORK

.1 Submit written request in advance of cutting or alteration which affects:

- .1 Structural integrity of any element of Project.
- .2 Integrity of weather-exposed or moisture-resistant elements.
- .3 Efficiency, maintenance, or safety of any operational element.
- .4 Visual qualities of sight-exposed elements.
- .5 Work of Owner or separate contractor.

.2 Include in request:

- .1 Identification of Project.
- .2 Location and description of affected Work.
- .3 Statement on necessity for cutting or alteration.
- .4 Description of proposed Work, and products to be used.
- .5 Alternatives to cutting and patching.
- .6 Effect on Work of Owner or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.4 TOLERANCES

.1 Monitor fabrication and installation tolerance control of Products to produce acceptable Work.

.2 Do not permit tolerances to accumulate beyond effective or practical limits.

.3 Comply with manufacturers' tolerances. In case of conflict between manufacturers' tolerances and Contract Documents, request clarification from Consultant before proceeding.

.4 Adjust Products to appropriate dimensions; position and confirm tolerance acceptability, before permanently securing Products in place.

1.5 EXECUTION

.1 Execute cutting, fitting, and patching to complete the Work.

.2 Perform all required excavation and fill to complete the Work.

.3 Fit several parts together, to integrate with other Work.

.4 Uncover Work to install ill-timed Work.

.5 Remove and replace defective or non-conforming Work.

.6 Remove samples of installed Work for testing, if not designated in the respective Section as remaining as part of the Work.

.7 Provide openings in non-structural elements of Work for penetrations of electrical and mechanical work. Limit opening dimensions to minimal sizes required and performed in a neat and clean fashion.

.8 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.9 Employ qualified workers to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.10 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry or concrete work without prior approval.

.11 Restore work with new products in accordance with requirements of Contract Documents.

.12 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.13 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material, for full thickness of the constructed element.

.14 Re-finish surfaces to match adjacent finishes: For continuous surfaces re-finish to nearest intersection; for an assembly, re-finish entire unit.

.15 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

END OF SECTION

1. GENERAL

1.1 INTENT

.1 Read this Section in conjunction with other Sections for requirements for "Earthwork and Granular Material Testing" specified herein.

.2 Read this Section in conjunction with requirements for testing specified in General Conditions Section 00725.

1.2 TESTING

.1 Contractor is responsible for performance testing in performance of the Work.

.2 The Owner's Representative will perform quality assurance testing and related functions.

.3 The Owner's Representative will perform quality assurance testing according to the testing standards listed in the Contract Documents as selected by the Owner.

.4 Provide samples requested by Owner's Representative for testing.

.5 Co-operate with the Owner's Representative in site sampling for testing.

2. PRODUCTS

.1 Not applicable.

3. EXECUTION

3.1 FILL MATERIAL TESTING

.1 Fill materials may be tested, before and after placement, for conformance with specified requirements and to confirm suitability for intended uses.

.2 Acceptance of fill material will be made only after the material has been dumped, spread and compacted in place. Owner may reject fill material in the borrow areas, in the stockpiles, in the transporting vehicle or in place. Cooperate with the Owner to ensure only acceptable fill material will be placed in the Work.

.3 If requested by the Owner's Representative, provide up to 1 m^3 of each type of imported granular fill material for testing purposes.

3.2 COMPACTION AND MOISTURE CONTENT TESTING

.1 Compaction and moisture content testing will be performed during fill material placement operations to ensure that specified requirements are met.

.2 The frequency of compaction and moisture content testing will be determined by the Owner.

3.3 GRAVEL TESTING

.1 The Owner's Representative may carry out testing of the gravel material while it is being processed.

END OF SECTION

1. GENERAL

1.1 SECTION INCLUDES

.1 Alteration project procedures
.2 Removal of designated construction
.3 Disposal of materials
.4 Identification of utilities
.5 Refer to items as indicated

1.2 PRICE AND PAYMENT PROCEDURES

.1 Unit Prices: Section 01 22 10 - Measurement Schedule.

1.3 INTENT

.1 Read this Section in conjunction with other Sections for the location, use and placement of "Demolition, Removal and Salvage" requirements specified herein.

1.4 DEFINITIONS

.1 For the purpose of construction in this Contract, the following definitions apply:

.1 "Salvageable" is defined as all materials having salvage value.

.2 "Non-salvageable" is defined as all material having no salvage value.

1.5 ALTERATION PROJECT PROCEDURES

.1 Materials: As specified in Product sections; match existing Products and work for patching and extending work.
.2 Employ skilled and experienced installer to perform alteration work.
.3 Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
.4 Remove, cut, and patch Work in a manner to minimize damage and to provide means of restoring Products and finishes to specified condition.
.5 Where new Work abuts or aligns with existing, provide a smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.
.6 When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and submit recommendation to the Consultant for review.
.7 Where a change of plane of 6 mm or more occurs, request instructions from the Consultant.
.8 _atch or replace portions of existing surfaces which are damaged, lifted, discoloured, or showing other imperfections
.9 Finish surfaces as specified in individual Product sections.

1.6 ADMINISTRATIVE REQUIREMENTS

.1 Indicate in the following paragraph if demolition is to be completed in stages or in a particular sequence.
.2 Scheduling:

.3 Schedule Work to precede site excavation work and coincide with new construction.
.4 Describe demolition removal procedures and schedule.
.5 The following paragraph may require attention when demolition work is to be executed at or near Owner occupied spaces.
.6 Perform noisy work:
.7 Between the hours of 9:00 am and 5:00 pm.

1.7 SUBMITTALS FOR INFORMATION

.1 The following submittals are for project closeout purposes; do not request these submittals if the information submitted will be assessed for acceptability.
.2 Record Documentation: Accurately record actual locations of capped utilities and subsurface obstructions.

1.8 REGULATORY REQUIREMENTS

.1 Conform to applicable code for demolition work, dust control, products requiring electrical disconnection or reconnection.
.2 Obtain required permits from authorities.
.3 Do not close or obstruct egress width to any building or site exit.
.4 If utilizing certain General Conditions documents, note requirements applicable to discovery of hazardous materials and associated procedures. Edit the following two paragraphs accordingly.
.5 Conform to applicable regulatory procedures when discovering hazardous or contaminated materials.

1.9 SITE CONDITIONS

.1 Conduct demolition to minimize interference with adjacent building areas and properties.
.2 Cease operations immediately if structure appears to be in danger and notify the Consultant. Do not resume operations until directed.

2. PRODUCTS

.1 Not Applicable.

3. EXECUTION

3.1 INSPECTION

.1 Inspect site and verify with the Owner's Representative items to be demolished, removed, and salvaged.

3.2 SALVAGEABLE MATERIALS

.1 All materials having a salvage value will be excavated and removed in such a manner that no damage will be done to the material. Salvaged material will be removed, cleaned and stored at a location within the work area. At the completion of the project all salvage items will be transferred to the Owner's facility for storage. There will be no separate payment for salvaging or transferring to storage of these items.

3.3 DEMOLITION AND NON-SALVAGEABLE MATERIALS

.1 Unless indicated otherwise, demolition and non-salvageable materials will be excavated, transported and disposed of at a licensed landfill. Burying of demolition and non-salvageable materials will not be allowed under any circumstances.

.2 Asbestos cement pipe and materials are to be handled, removed and disposed of according to OH&S regulations and guidelines and the "*Alberta Asbestos Abatement Manual*", latest edition by Alberta Employment and Immigration.

.3 The Contractor will bear the cost of all disposal fees.

3.4 REMOVAL OF CONCRETE MATERIALS

.1 Saw cut the concrete as required for all concrete removal work and as indicated by the Owner's Representative. All cutting to be approved by Owner's Representative prior to cutting.

.2 Re-cut concrete edges that are damaged or chipped due to the work, at no expense to the Owner.

.3 Jack hammer, excavate, load, haul and dispose of the waste concrete materials at a licensed landfill, unless otherwise authorized by the Owner's Representative.

.4 No separate payment will be made for saw cutting concrete, unless otherwise noted.

3.5 REMOVAL OF ASPHALT MATERIALS

.1 Saw cut or wheel cut the asphalt as required for all asphalt removal work and as indicated by the Owner's Representative. All cutting to be approved by Owner's Representative prior to cutting.

.2 Re-cut asphalt edges that are damaged or rounded due to the work, at no expense to the Owner.

.3 Asphalt removals other than by cold milled method will be excavated, loaded, hauled and disposed of at a licensed landfill, unless otherwise authorized by the Owner's Representative.

.4 No separate payment will be made for saw cutting or wheel cutting asphalt, unless otherwise noted.

3.6 SELECTIVE DEMOLITION

.1 Remove the following equipment and store for re-use on-site for re-use.
- .1 Grease Bin
- .2 Recycle Bin
- .3 Garbage Bin

.2 Remove the following equipment and materials for disposal as noted on the drawings. Dispose of at an approved off -site facility.

0-01 – Asphalt surface and/or excavate to 600mm ± depth
0-02 – Existing concrete planter curb
0-03 – Existing concrete curb and gutter along roadway
0-04 – Asphalt surface and/or excavate to 480mm ± depth
0-05 – Existing concrete paving and/or excavate to 450mm ± depth
0-06 – Asphalt surface and/or excavate to 150mm ± depth
0-07 – Planting and planting soil to 600mm ± depth
0-08 – Planting and planting soil to 300mm ± depth
0-09 – Existing trees to be removed
0-12 – Asphalt surface and/or excavate to extent required for repair.

.3 Protect the following materials and equipment:

.1 Existing Utility to remain.
.2 Existing Street signs to remain.
.3 Existing sidewalks and pathways to remain.
.4 Existing curbs to remain.
.5 All other site elements not designated for removal.
.6 Existing Power Poles to remain

.4 Coordinate the following removal and work with ATCO:

.1 ATCO’s removal of (1) existing light pole on site

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Acceptable Design-Build Firms

.2 Stage Feature canopy

.3 Poured-in-Place concrete stage platform

.4 Materials

1.2 RELATED SECTIONS

.1 32 14 13 Precast Unit Pavers

.2 31 22 13 Rough Grading

.3 31 22 19 Finish Grading

.4 32 13 13 Concrete Paving

1.3 DEFINITIONS

.1 **Design-Build (D-B):** Design-Build means combining the project's design and construction phases, and in some cases construction engineering and inspection, into a single Contract.

.2 **Design-Build Firm:** Design-Build Firm means any company, firm, partnership, corporation, association, joint venture, or other legal entity permitted by law to practice engineering, architecture, and construction contracting, as appropriate.

1.4 INTENT

.1 Intent of RFP subsect is to obtain a firm to design and construct work to complete the 'Stage Feature' within the Drumheller Downtown Plaza Project for a Cash Allowance contract, in accordance with these Tender Documents.

.2 Perform Work within schedule as outlined in the RFP and Form 4.

1.5 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 11, Contractor's Qualification Statement.

.2 CCDC Document 14-Design-Build Stipulated Price Contract.

.3 CCDC Document 15-Design-Builder/Consultant Contract.

.4 CCDC 21, A Guide to Construction Insurance.

.5 CCDC 22, A Guide to Construction Surety Bonds.

1.6 ADMINISTRATIVE

.1 Refer to Schedule B, Schedule of Quantities.

1.7 ACCEPTABLE DESIGN-BUILD FIRMS

.1 Prime contractor to include one of the five below firms to provide joint proposal for the design-build of the Feature Stage:

- .1 Option 1
  - .1 Firm Name: Heavy Industries
  - .2 Location: 9192 52 Street SE Calgary, AB
  - .3 Contact: Kevin Poole, kevinp@heavyexperience.com, 403 252-6603
- .2 Option 2
  - .1 Firm Name: Custom Park & Leisure Ltd.
  - .2 Location: Bay 22, 240023 Frontier Crescent, Rocky View County, AB
  - .3 Contact: Patrick McMaster, pat@custompark.com, 403 569-8180
- .3 Option 3
  - .1 Firm Name: F&D Scene Changes Ltd.
  - .2 Location: 2b, 803 24 Ave SE, Calgary AB
  - .3 Contact: info@fdscenechanges.com, (403) 233-7633
- .4 Option 4
  - .1 Firm Name: Carvel Creative Ltd.
  - .2 Location: 1607 41 Avenue SE, Calgary AB
  - .3 Contact:info@carvelcreative.com, 403 273-9550
- .5 Option 5
  - .1 Firm Name: Dinosaur Valley Studios
  - .2 Location: 232 2 Ave, East Coulee AB
  - .3 Contact: 403 822-3782

Part 2 Products

2.1 NOT USED

.1 Not Used

Part 3 Execution

3.1 DESIGN-BUILD PROCESS

.1 Design Meeting

- .1 Selected proponent to be available for Start-up meeting with Prime, Contractor, Consultant and Town Representative to discuss project intent, budget and execution.

.2 Design Collaboration

.1 Design Collaboration period between selected proponent, Landscape Architecture Consultant and Town to develop concept that meets project goals, cost and schedule. Phase should consider early work schedule, procurement and material selection.

.3 Detailed Design

.1 Selected proponent to further develop detailed design, workplan and budget to execute build.

.4 Shop Drawings

.1 Selected proponent to develop stamped-engineered shop drawings which detail the stage platform design, structural footings, overhead canopy, and electrical integration etc.

.5 Construction

.1 Selected proponent to deliver detailed work plan and construction that meets prime contractors and Town's expectations and Timeline.

.6 Maintenance + Warranty

.1 Selected proponent to provide a (1) year maintenance period and (10) year warranty on final Feature Stage.

3.2 DESIGN INCLUSIONS

.1 Proponent to consider the following considerations:

.1 Integrated Audio/Visual + lighting components into overhead structure – Review Electrical Tender Documents to see current electrical allowances.

.2 Existing + Proposed Utilities to remain

.3 Desire for 360 degree views to stage from surrounding plaza and road with the creation of shade for performers

.4 Geotechnical and structural requirements for stage design and construction.

.5 Stage design should consider the protection of all equipment in the event of rain, snow etc. and should account for use 365 days a year

3.3 STAGE COMPONENT DESCRIPTION

.1 Stage Feature canopy:

.1 Draw on the Tender Package to create a baseline for the Dinosaur-themed design.

.2 Consider functionality of providing comfortable space for performers throughout all seasons and times of day. Consider Drumheller's Climate.

.3 Provide 360 degree performing functionality from smaller plaza to the east to possible larger events to the west into the road

.4 Integrate power receptacle for performers into canopy post or cast-in-place stage platform

.5 Integrate speaker and lighting into canopy structure and posts

.2 Poured-in-Place concrete stage platform

.1 Stage platform design should create vertical separation from surrounding plaza. Consider accessibility for performers.

.2 Stage platform should incorporate required structural footings or reinforcement to support the stage posts and overhead canopy

3.4 MATERIALS

.1 Appropriate materials are to be selected throughout the design process with consideration for durability, availability, cost and suitability to achieve the design intent.

END OF SECTION

1. GENERAL

1.1 INTENT

.1 Read this Section in conjunction with other Sections for location use and placement of "PVC Pipe and Fittings" specified herein.

2. PRODUCTS

2.1 LINE CODE CLASSIFICATION

.1 Use the following code classification to determine pipe type and pressure rating from the drawings:

B3	Series 100
B4	Series 125
B5	Series 160
B6	C900 Class 150 or C905 Class 150

2.2 PIPE

.1 All pipe are to be cylindrical and straight, with ends cut square to the longtudinal axis and having a smooth finish free from imperfections such as grooves or ripples.

.2 PVC Class Pipe

.1 For pipe sizes 100 mm to 300 mm in diameter, all pipe and joints shall be to the latest revision AWWA C900-81, CSA certified as meeting latest revision CSA 3-B137.3-M86, SDR 18, pressure class 150.

.2 For pipe sizes 350 mm to 900 mm in diameter, all pipe and joints shall be to the latest revision AWWA C905-88, CSA certified as meeting latest revision CSA 3-B137.3-M86, SDR 18, pressure class 150.

.3 All PVC class pipe to be cast iron outside diameter, bell end, c/w 1 MPa elastomeric gasket push-on joint.

.3 PVC Series Pipe

.1 PVC Series pipe will be bell and gasket joint type or fusible certified for CSA Standard B137.0 and B137.3 SDR 26, Series 160, rigid Poly (Vinyl Chloride) for pressure applications.

2.3 FITTINGS

.1 Class Pipe

.1 For sizes 300 mm and smaller, PVC Fittings to the latest revision AWWA C-907, CSA certified as meeting latest revision CSA 3-B137.2-M89, SDR 18, pressure Class 150, bell ends, c/w 1 MPa elastomeric gasket push-on joint.

.2 For sizes 350 mm and larger, use cast iron fittings to the latest revision AWWA C110-87 / ANSI A21.10-1987, pressure Class 150 minimum. Long body only. Interior and exterior of fittings to be factory epoxy coated, with potable grade coating.

.3 Joints for cast iron fittings to latest revision AWWA C111-85 / ANSI A21.11-1980, pressure Class 150 minimum, “Tyton Joint” or approved equal.

.2 Series Pipe

.1 All fittings to be PVC, with gasketed joints of the same material as the pipe. Fittings to conform to CSA B137.2 or CSA B137.3.

2.4 TRACER WIRE

.1 Tracer wire will be a 12 AWG solid, PRO-TRACE HDD-CCS PE45. Conductor will be hard-drawn, 21% IACS, copper clad steel, utilizing an ANSI 1045 high carbon steel core (required to meet break load), with rated break load of 1,030 lbs (201,000 psi). Conductor will be extruded with a 45 mil, high-density polyethylene. Tracer wire will be rated for direct burial use at 30 volts and RoHS compliant.

.2 Approved Products

.1 PLAINSMAN HDD-CCS PE45 as manufactured by Plainsman Manufacturing.

3 EXECUTION

3.1 OPEN CUT INTSALLATION

.1 Installation and handling of pipe will be according to the manufacturer's recommendations and applicable AWWA Specification for the type of pipe selected or as specified herein.

.2 PVC pipe and fittings to be installed with a minimum cover of 2.5 m above the crown of the pipe. Pipe and fittings with less than 2.5 m cover will be installed with an insulating frost shield unless otherwise directed by Owner’s Representative.

.3 Install pipe to the lines, grades and elevations shown on the Contract Documents. Lay the pipes on the prepared bed, true to line and grade, with pipe invert smooth and free of sag or high points. Ensure barrel of each pipe is in contact with shaped bed throughout

the full length of pipe. Commence laying at outlet and proceed in upstream direction with bell ends of pipe facing upgrade.

.4 For ties to existing water mains requiring interruption of the water service, advise the Engineer 48 hours in advance of the proposed interruption for approval. Upon approval notify the occupants, residents and businesses at least 24 hours in advance by way of a written notice and verbal advisory. Submit a copy of the notice to the Owner's Representative for approval prior to distribution. Minimize the period of time of the interruption and schedule the interruption for a non-peak demand time. Notify the fire department of the water supply service interruption to any hydrants.

.5 Lower pipe into the trench by hand or by mechanical equipment. Lift pipe by means of slings and lower into the trench. By no means will the pipe be lifted with equipment that gouges or scars the pipe or be allowed to be pulled over the ground. Do not roll pipe into the trench. Lumps of earth and rock greater than 25 mm will not be permitted beneath the pipe and must be removed prior to pipe replacement.

.6 The assembly of the gasket joint will be performed as recommended by the pipe manufacturer and applicable AWWA Specification for the type of pipe selected. In all cases, clean the gasket, the bell or coupling interior, especially the groove area, and the spigot area with a rag, brush or paper towel to remove any dirt or foreign material before the assembling. Inspect the gasket; pipe spigot, bevel, gasket groove and sealing surface for damage or deformation. Apply lubricants as specified by the pipe manufacturer.

.7 Good alignment of the pipe is essential for easy assembly. Align the spigot to the bell and insert the spigot into the bell until it contacts the gasket uniformly. Firm and steady pressure will be applied either by hand or by bar and block assembly until the spigot easily slips through the gasket. Do not swing or stab the joint or suspend the pipe and swing it into the bell or use excavating equipment to force pipe sections together. Complete each joint before laying next length of pipe.

.8 Handle pipe in a manner to prevent damage to the pipe walls. Pipe strung along the trench will, if necessary, be supported on timber skids sufficiently protected to prevent injury. Securely close the open end of pipe at the end of each day's work to prevent the entrance of small animals, or the introduction of foreign matter of any nature, and do not be reopen the ends until work is resumed. Exercise care in joining sections of the pipe, in order to minimize any possibility of foreign matter whatsoever being inside the pipeline after the completion. Any obstructions remaining in the line after the completion thereof to be removed.

.9 Do not install pipe on frozen bedding.

.10 PVC pipe fittings will have Type 1 backfill in accordance with Section 02319 – Trench Excavating and Backfilling.

.11 Install sacrificial anodes and corrosion protective tape on all cast iron fittings.

.12 Provide thrust blocking on all pipe and fitting deflecting more than 5 degrees..

3.2 DIRECTIONAL DRILL INSTALLATION

.1 For directional drilling installation, refer to Section 02429

3.3 TOLERANCE

.1 Maintain constructed grade pipe within the specification given for water and sewer pipes from the lines, grades and elevations shown in the Contract Documents. Where departures occur, return to established grade gradually over a distance of not less than 25 meters.

3.4 RECORD SURVEYS

.1 Contractor will sufficient time for the Owner's Representative to survey points such as elbows, deflections, and other significant details for record drawings prior to backfilling the pipe.

END OF SECTION

1. GENERAL

1.1 INTENT

.1 Read this Section in conjunction with other Sections for location, use and placement of "Valves and Valve Boxes" specified herein.

2. PRODUCTS

2.1 VALVES

.1 Resilient Wedge Gate Valves:

.1 100 mm diameter valves are not permitted.

.2 Valves sized 150 to 300 mm diameter will be resilient wedge gate valves, conforming to latest revision AWWA C509, c/w fully rubber encapsulated solid wedge, non-rising stem, suitable for direct bury.

.3 Valves to open counter clockwise. (Turn left to open).

.4 Valve body to be constructed of cast iron, in accordance with ASTM A126, Class "B". All nuts, bolts, and washers will be stainless steel.

.5 Interior and exterior of valve to be epoxy coated, as per latest revision AWWA C550.

.6 Bronze valve stem to be operated by a 50 x 50 mm square operating nut. The valve stem (stuffing box) will contain a double "O" ring seal.

.7 Valve ends to be push-on "Tyton Joint" conforming to latest revision of AWWA C111 / ANSI A21.11.

.8 Approved Products:
- clow f-6112 resilient wedge gate valve
- bibby-ste-croix resilient wedge gate valve
- american avk co. Resilient wedge gate valve

.2 Resilient Wedge Tapping Gate Valves:

.1 100 mm diameter valves are not permitted.

.2 Valves sized 150 to 300 mm diameter will be resilient wedge gate valves, conforming to latest revision AWWA C509, c/w fully rubber encapsulated solid wedge, non-rising stem, suitable for direct bury.

.3 Valves to open counter clockwise. (Turn left to open

.4 Valve body to be constructed of cast iron, in accordance with ASTM A126, Class "B". All nuts, bolts, and washers will be stainless steel.

.5 Interior and exterior of valve to be epoxy coated, as per latest revision AWWA C550.

.6 Bronze valve stem to be operated by a 50 x 50 mm square operating nut. The valve stem (stuffing box) will contain a double "O" ring seal.

.7 Valve ends to be push-on "Tyton Joint" by flange, or mechanical joint by flange. Push-on and mechanical joints will conform to latest revision of AWWA C111 / ANSI A21.11. Flanged valve ends will meet the requirements of ANSI B16.1, Class 125. Bolts, nuts, washers to be stainless steel.

.8 Approved Products

- Clow F-6115 Resilient Wedge Tapping Gate Valve flange x push-on for sizes 150 and 200 mm diameter.
- Mueller A-2360 Resilient Wedge Tapping Gate Valve flange x push-on for sizes 150 and 200 mm diameter.
- Mueller H688-W-40 Resilient Wedge Tapping Gate Valve flange x mechanical joint for sizes 250 and 300 mm diameter.
- Bibby-Ste-Croix Resilient Wedge Tapping Gate Valve flange x push-on for sizes 150 to 300 mm diameter.

.3 Butterfly Valves:

.1 Valves sized 350 to 900 mm diameter will be butterfly valves conforming to latest revision AWWA C504. They will be short body design, Class 150B, c/w adjustable rubber seats, suitable for direct bury. All nuts, bolts, and washers will be stainless steel.

.2 Valves to open counter clockwise. (Turn left to open).

.3 Valve must be rated at 1034 KPa (150 psi) working pressure and must be able to pass a hydrostatic test at 2068 KPa (300 psi) with the valve partially open.

.4 Valve to be operated by 50 x 50 mm square operating nut connected to a totally enclosed gear actuator.

.5 Valve ends to conform to the following patterns:

- Mechanical Joint: will meet the requirements of the latest revision AWWA C111 / ANSI A21.11. Bolts to be stainless steel.
- Flanged End: will meet the requirements of ANSI B16.1, Class 125. Bolts to be stainless steel.

.6 Interior and exterior of valve to be epoxy coated, as per latest revision AWWA C550.

.7 Approved Products

- Dresser 450
- Jenkins Fig. 2544
- Mueller Lineseal III
- Clow M&H 4500
- Pratt Groundhog

.4 Plug Valves

.1 Valves will be Cast Iron Eccentric Plug Valves suitable for raw wastewater with pressures up to 150 PSI.

.2 The valve body and cover will be constructed of ASTM A126 Class B cast iron for working pressures up to 150 PSI.

.3 The plug will be one-piece construction and made of ASTM A126 Class B cast iron with a resilient facing per ASTM D2000-BG and ANSI/AWWA C504 requirements.

.4 Plug Valves will be quarter-turn, non-lubricated, eccentric type with resilient faced plug. Valves to open counter clockwise. (Turn left to open).

.5 All valves to be flanged with drilling to ANSI B16.1, Class 125. Bolts to be stainless steel.

.6 Valve to be operated by 50 mm x 50 mm square operating nut connected to a totally enclosed gear actuator.

.7 Interior and exterior of valve to be epoxy coated, as per latest revision AWWA C550.

.8 Approved Suppliers
- Val-Matic
- DeZurik

.5 Air and Vacuum Relief Valves

.1 Air and vacuum relief valves to be heavy duty combination air release type employing direct acting kinetic principle.

.2 Valves to expel air at high rate during filling, at low rate during operating and to admit air while line is being drained.

.3 Valves to be fabricated of cast iron body and cover, with stainless steel trim.

.4 Floats to be stainless steel with shock-proof synthetic seat suitable for 2 MPa working pressure.

.5 Valve to be complete with surge check unit.

.6 Valve inlets and outlets to be threaded.

.7 Approved Products:

- ARI
- Val-Matic
- Crispin

- Apco

2.2 CAST IRON VALVE BOXES

.1 To be completely bituminous coated sliding type, adjustable over a minimum of 450 mm. Bottom casing to be large round type with minimum inside diameter of 240 mm. All castings will clearly have the manufacturer's identification cast on them.

.2 Depth of bury to be 2.00 m (6.5') to 3.05m (10') or as shown on contract documents.

.1 Valve operating extension spindle to be 25 x 25 mm square. Spindle length will be such that the operating nut will not be more than 300 mm below the cover when set on the valve-operating nut.

.2 Bottom of spindle to fit 50 x 50 mm square valve operating nut and will be riveted to spindle.

.3 Top of spindle will have removable 50 x 50 mm square operating nut c/w stonecatcher flange.

.4 Top casing to fit over 133 mm (5.25") inside diameter bottom casing.

.5 Lid to be 11.35-kg (25-lbs.) minimum, marked "WATER".

.6 Approved Products:

- Norwood "Type A"
- Trojan Industries “Type A”
- Sovereign Castings Ltd. "Type A" modified to City of Lethbridge specification.

3. EXECUTION

3.1 VALVE INSTALLATION

.1 Set and joint all valves in accordance with the manufacturer's recommendations and applicable AWWA Specifications.

.2 Ensure that the stuffing glands are properly packed with a high-grade packing and tighten gland bolts prior to installation.

.3 Install concrete base for valves and anchors as per the drawings.

.4 Provide sacrificial anodes and corrosion protective tape on all valves.

.5 Set the valve accurately in position and place the valve box carefully over the bonnet with the valve casing perpendicular to the axis of the pipe, and adjust the top box to the grades specified.

.6 Secure the extension rod to the valve nut. Install extension rod and valve Box Riser plumb over the valve.

.7 Backfill for valves and valve boxes shall be consistent with the connecting pipe backfill.

.8 Install wooden markers as per Contract Documents.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Soil materials.

.2 Soil Amendments.

.3 Placement of soil materials.

.4 Finish grading.

.5 Stockpile Cleanup.

1.2 RELATED SECTIONS

.1 Section 01 22 00 Measurement Schedule.

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 32 93 10 - Trees, Shrubs and Ground Cover Planting.

1.3 REFERENCES

.1 Government of Alberta

.1 Design Guidelines for Erosion and Sediment Control, Appendix C – Erosion and Sedimentation Control, Best Management Practices (BMP) - #34 (a-c) www.transportation.alberta.ca

.2 AASHTO T 180-15 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 inch) Drop.

.3 American Society for Testing and Materials (ASTM)

.1 ASTM D2487 – 17 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

.2 ASTM D698-12e2 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3)).

.3 ASTM D1557-12e1 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).

.4 ASTM D2167-15 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

.5 ASTM D6938-15 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.4 SUBMITTALS FOR REVIEW

.1 Analysis of Planter Topsoil Material:

.1 Provide intended use, type of mulches to be applied, type of topsoil, and the quality of drainage list to Consultant for approval, including all below listed features:

.1 Nitrate-nitrogen (total nitrogen maximum 0.33%)

.2 Available phosphorus (ranging from 20 to 60 mg/kg)

.3 Available potassium (ranging from 300 to 1000 mg/kg)

.4 pH (ranging from 6.0 to 7.5)

.5 Salinity (EC) (Salinity reading not exceeding 1.5 dS/m)

.6 Micronutrients (boron, chlorine, copper, iron, manganese and zinc)

.7 Organic matter (not less than 4% for clay loams and not less than 2% for sandy loams, to a maximum of 10%)

.8 Texture (Loam, Sandy loam, silt loam, sand clay loam are acceptable)

.9 Free of subsoil contamination, roots, and weeds.

.10 Free of rocks greater than 75 mm in diameter. Volume of rock (75mm dia. And under) not to exceed 20%..

.2 Planting topsoil shall not be delivered to site until Consultant has approved soil type selection.

.2 Soil Amendments

.1 Supply labels from all specified Soil Amendments and those recommended from testing of Soil Material.

.2 Soil Amendment Type A:

.1 Prior to placement, prepare one (1) five-gallon bucket of Soil Amendment Type A onsite with the Consultant for inspection and approval. A scale is required for measurement of materials.

.2 Supply labels from all specified components of Soil Amendment Type A.

.3 Compost

.1 Submit to the Consultant the source and type of compost.

.3 The Municipality of Drumheller will provide testing on soil materials to be disposed off site. The Contractor shall not dispose of soil materials off-site until approval from The Municipality of Drumheller has been obtained.

1.5 QUALITY CONTROL

.1 Provide materials of each type from same approved source throughout the Work.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Place planting soil and mulch in dry weather.

.2 Do not spread soil when ground is frozen, excessively wet, or otherwise in a condition detrimental to the Work, as determined by the Consultant.

Part 2 Products

2.1 SOIL MATERIALS

.1 Planting Soil: Top Dress mixture.

.1 50mm thick of 50% topsoil and 30% compost amendments.

.2 Topsoil to meet identified values from the soil testing submittals.

.1 Soil amendments shall be added as determined by the results of the soil tests and as directed by the Consultant.

.2 30% Class A Compost that shall:

.1 Be approved by the Consultant prior to use.

.2 Commercially prepared compost shall meet the CCME Guidelines for Compost Quality.

.3 Be substantially free from coliform, pathogens, and chemical or organic contaminates that may be detrimental to plant or animal health.

.4 Contain less than 0.5% by volume of contaminants such as rocks, plastic, metal or glass.

.5 Not exceed a 25:1 to 30:1 total carbon to nitrogen ratio.

.6 Well rotted wood residuals are acceptable provided the total carbon to total nitrogen ratio above is not exceeded.

.3 5% Perlite

.4 120 g of Mycorrhizae fungi per cubic meter of mix (endo types, multiple species)

.3 Or Accepted Equivalent

2.2 SOIL AMENDMENTS

.1 Soil amendments shall be used only if recommended by the Consultant. The Consultant will recommend specific soil amendments based on soil testing results if soil does not meet specified requirements.

.2 Supply and apply soil amendments at rate determined from topsoil analysis for all native topsoil as directed by the Consultant.

.3 Soil Amendment Types:

.1 Soil Amendment Type A: Soil Amendment to be placed at the base of all potted plants per Section 32 93 10 Trees, Shrubs and Ground Cover Planting.

.1 Imported from off-site sources and mixed with the following materials (this mix will fill 11 – 5-gallon buckets, each bucket should cover 2.5 m2 and will cover approximately 28 m2 at approximately 10 mm depth):

.1 6.00 kg of organic fertilizer, 4-4-4 with: alfalfa meal, bone meal, blood meal, glacial rock dust, sulphate of potash, humate, rock phosphate, greensand, kelp meal, gypsum, (Gaia Green Products Ltd. All Purpose 4-4-4) or approved equivalent.

.2 0.12 kg of Mycorrhizae fungi (endo types, multiple species).

.3 0.80 kg of granular humate complexes (Gaia Green Products Ltd, Fossilized Carbon Complex) or approved equivalent.

.4 7 Litres of quality worm castings.

.4 Water:

.1 Clean, fresh, and free of substances or matter which could inhibit vigorous growth of plants.

Part 3 Execution

3.1 TOPSOIL PLACEMENT

.1 Verify the following prior to starting work:

- .1 Existing conditions.
- .2 Substrate base has been contoured and compacted, uneven area and low spots are eliminated, and debris, root, branches, stones in excess of 500mm in size are removed.

.2 Scarify substrate surface to depth of 200 mm where topsoil is scheduled to be placed. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

.3 Place topsoil after Consultant has accepted subgrade.

.4 Wherever practical, Topsoil shall be transferred directly to placement.

.5 Place topsoil in areas where planting, sodding, and seeding is required as shown on the drawings to thickness as scheduled. Place topsoil during dry weather.

.6 Place topsoil and grade no more than 48 hours prior to seeding or sodding.

.7 Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of subgrade.

.8 For Topsoil depths greater than 300mm, place Topsoil at no greater than 150 mm lifts and lightly compact.

.9 Placed Topsoil shall be allowed to settle or shall be lightly compacted such that it is firm against deep footprints prior to planting, seeding or sodding. Compaction shall not be more than necessary to meet this requirement. Mechanical compactors are not permitted.

.10 Topsoil shall be placed and spread manually to prevent damage to existing infrastructure.

.11 Remove roots, weeds, rocks, and foreign material while spreading.

.12 Consultant to inspect and approve placed Topsoil and finish grades prior to planting.

.13 Install Plant Material immediately after placing Topsoil.

.14 Protect Topsoil from disturbance and compaction during remainder of construction and maintenance period.

.15 Lightly compact placed topsoil.

.16 Stockpile as specified in Section 31 12 13 Site Clearing.

3.2 STOCKPILE CLEANUP

.1 Remove stockpile, leave area completely free of excess material upon completion of the project.

.2 Leave area in a clean and neat condition. Dispose of roots, debris and other deleterious materials at an off-site waste disposal facility.

.3 Vegetate stockpile area per the Contract Documents. If needed, scarify compacted areas prior to planting.

END OF SECTION

1. GENERAL

1.1 INTENT

.1 Read this Section in conjunction with other Sections for location, use, and placement of "Granular Materials" specified herein.

.2 This Section is intended to be used as a reference Section; it is not a "section of work". All materials specified in Part 2, Products, may not necessarily be required.

2. PRODUCTS

2.1 MATERIAL QUALITY

.1 Use only clean, sound, hard, durable particles, free from silt, clay, soft shale, flaky particles, topsoil, organic matter and other detrimental material.

.2 Ensure granular materials are not gap graded and have a smooth gradation curve with no excess or deficiency of any particular grain size within the required range.

.3 Where blending is required, thoroughly mix the granular materials in such a manner that a homogeneous material of the specified gradation is achieved prior to placing of the material into the work or stockpiles.

.4 "Gravel" in general means a mixture of natural gravel, crushed gravel or crushed stone, and natural or crushed sand, meeting the gradation limits specified below for each type.

.5 "Crushed Gravel" means angular shaped particles of crushed gravel or stone, washed, meeting the gradation limits specified. Ensure minimum of 50% by weight, of material retained on 5 mm sieve has at least one face resulting from fracture.

2.?? STANDARD GRANULAR MATERIALS

Fill Type	Sieve Size (mm)	% Passing By Weight
Crushed Gravel		
(Well graded gravel typically used	20	100
in pipe bedding and haunching.)	10	35 – 60
	5	5 – 25
	2.0	0 – 10
Pit Run Gravel		
	100	100
	40	70 – 90
	10	30 – 60
	2.0	15 – 40

	0.080	0 – 5
Road Gravel (Well graded crushed gravel		
	20	100
typically used for road surfaces	10	35 – 77
Or structural bedding.)	5.0	15 – 55
	1.25	0 – 30
	0.080	0 – 12

2.?? **STANDARD GRANULAR ROAD MATERIALS**

Fill Type	Sieve Size (mm)	% Passing By Weight
Granular Sub-base	80	100
	40	60 – 90
	20	40 – 70
	10	25 – 60
	5	15 – 45
	2.5	10 - 35
	0.630	5 - 23
	0.160	3 - 12
	0.080	2 - 10
Granular Base	25	100
	20	95 – 100
	10	55 – 80
	5	35 – 65
	2.5	28 – 52
	0.630	13 – 25
	0.315	9 - 26
	0.160	6 - 18
	0.080	4 - 10

2.?? **PIPE GRANULAR BEDDING MATERIALS**

Fill Type	Sieve Size (mm)	% Passing By Weight

Bedding Materials for: Yellow Jacket Ductile Iron, Epoxy Coated Steel, PVC and Concrete Water Feeder Mains; PVC and HDPE Sanitary Forcemains

Granulite (supplied by Inland Aggregates Ltd.) or approved equal.

Aggrelite (supplied by Atrium Lightweight Materials Inc.) or approved equal.

Lightweight 730 (supplied by Brimstone Logistics) or approved equal.

Sand (Fine Aggregate)	10	100
(Dry trench only)	5	95 – 100
Compact to 95% SPD	2.5	80 – 100
	1.25	50 – 85
	0.630	25 – 60
	0.315	10 – 30
	0.160	2 - 10
Class IA Manufactured Aggregate	20	100%
open graded, clean	4.75	<10%
Compact to minimum 90% SPD	2.5	<5%
	0.075	<5%

Fill Type	Sieve Size (mm)	% Passing By Weight

Bedding Materials for: PVC SDR 35, PVC SDR 28, PVC Profile and Concrete Sanitary and Storm Sewer Pipe; Water Distribution Mains and Service Pipes

(bedding materials classes conform to the embankment materials specified in ASTM D2321)

Class IA	Manufactured Aggregate: open graded, clean	-
For pipes 375 mm and smaller	20	100%
and all sizes of PVC Profile Pipe	4.75	<10%
	2.5	<5%
	0.075	<5%
For pipes larger than 375 mm	40	100%
	4.75	<10%
	2.5	<5%
	0.075	<5%
Class IB	Manufactured, Processed Aggregate: dense graded, clean	
For pipes 375 mm and smaller	20	100%
and all sizes of PVC Profile Pipe	4.75	10-50%
	2.5	<5%
	0.075	<5%
For pipes larger than 375 mm	40	100%
	4.75	10-50%

	2.5	<5%
	0.075	<5%
Class II	Coarse Grained Soils: From clean or borderline clean to with fines	-
For pipes 375 mm and smaller and all sizes of PVC Profile Pipe	20	100%
	4.75	Varies
	0.075	0-12%
For pipes larger than 375 mm	40	100%
	4.75	Varies
	0.075	0-12%

Fill Type	Sieve Size (mm)	% Passing By Weight
Class III	Coarse Grained Soils: with fines	-
For pipes 375 mm and smaller and all sizes of PVC Profile Pipe	20	100%
	4.75	Varies
	0.075	12-50%
For pipes larger than 375 mm	40	100%
	4.75	Varies
	0.075	12-50%

Foundation Stabilization Material for Unstable Soil – (Do not use on service pipe or PVC pipe less than 400 mm diameter)

40mm Drain Rock or Class IA (for wet trench conditions)	40	100%
	4.75	<10%
	2.5	<5%
	0.075	<5%

2.?? RIPRAP CLASS 1M

.1 Unless otherwise designated in the Contract Documents, Class 1M riprap is to be used for the placement of hand-laid rock placed around culvert inlets and outlets, and along slopes, embankments, and ditches.

Class 1M	Equivalent Diameter (mm)	Percentage (by weight) of Riprap Greater than Equivalent Diameter
Note: The minimum	300 mm	0%

dimension of any single rock shall not be less than one third of its maximum dimension.	200 mm 175 mm 125 mm	20% - 50% 50% - 80% 100%

2.?? ASPHALT AGGREGATE

.1 For asphalt aggregates refer to Section 02744.

3. EXECUTION

3.1 GENERAL

.1 Drain, clean and maintain foundation and subgrades free from debris, snow, ice, water, topsoil or any loose objectionable material. Do not proceed with granular material placement, until the Owner's Representative has inspected and approved the foundations and subgrade areas.

.2 Place granular materials to the lines, grades and elevations specified in the Contract Documents.

.3 Suspend all granular material placement at any time when satisfactory work cannot be conducted due to rain, floods, snow or other unsatisfactory conditions.

.4 Select temporary stockpile sites that minimize potential for contamination with underlying soils.

.5 Stockpile material in a manner that minimizes segregation.

.6 Replace stockpiled material that becomes contaminated, damaged, or lost at no cost to the Owner.

.7 Refer to other Sections for location, use, and placement of Granular Materials specified herein.

3.2 PLACEMENT

.1 Granular Bedding or Granular Backfill Materials:

.1 Place granular material in layers not exceeding 150 mm in thickness when compacted, to the lines, grades and elevations shown in the Contract Documents. Compact to a minimum density of 95% Standard Proctor Density. Compact each layer before placing the succeeding layer. Ensure the granular material are installed within - 3% and + 3% of optimum moisture content, unless indicated elsewhere in the Contract Documents.

.2 If any granular bedding material is too dry to allow adequate compaction, apply water into the material until uniform distribution of moisture is obtained. Control

water application accurately in amounts so that free water will not appear on surface during or subsequent to rolling or tamping.

.3 If the material is too wet, dry and spread material in thin lifts on subgrade and permit to dry until the moisture content is reduced to the specified moisture content.

.4 Provide tamping with hand operated mechanical tampers such as vibratory plate tampers, jumping jacks or walk-along double drum rollers. Do not use large compaction equipment in tamped backfill zones.

3.3 TOLERANCES

.1 Granular Bedding or Granular Backfill Materials

.1 Place granular materials within -20 mm and +20 mm of design grades, but not uniformly high or low.

END OF SECTION

1. GENERAL

1.1 INTENT

.1 Read this Section in conjunction with other Sections for location, use and placement of "Compacted Earth Fill" specified herein.

1.2 TYPES OF FILL

.1 Compacted Fill.

.2 Tamped Fill.

.3 Waste Fill.

1.3 DEFINITIONS

.1 "Suitable Material" is defined as material obtained from common or borrow excavations, free of organic or frozen materials, that is suitable for compacted embankment construction.

.2 "Unsuitable Material" is defined as organic or frozen material from common or borrow excavations, that is not suitable for compacted embankment construction.

.3 "Compacted Fill" or "Tamped Fill" is defined as suitable material obtained from common or borrow excavations, free of organic, wet or frozen materials, and placed on site, road or embankment construction.

.4 "Waste Fill" is defined as organic or frozen material from common or borrow excavation that is not suitable for site, road, embankment, liner or structural construction.

2. PRODUCTS

2.1 FILL MATERIALS

.1 Compacted and tamped fill material is fine grained materials having a minimum of 50% passing the 0.075 mm sieve size and classified as a low to medium plastic clay based on the unified classification system as modified by PFRA.

.2 Remove tree roots, sod or other organic materials.

.3 Do not use frozen material in the fill.

.4 Remove cobbles and rock fragments having maximum dimensions greater *than* 150 mm.

3. EXECUTION

3.1 GENERAL

.1 Do not proceed with fill placement until the Owner has inspected and approved foundation areas designated for fill placement.

.2 Scarify the foundation to obtain a suitable bond with the earthfill immediately prior to placing the first layer of earthfill.

.3 Construct earthfills to the lines, grades and elevations shown in the Contract Documents.

.4 Suspend all earthwork operations at any time when satisfactory work cannot be conducted on account of rain, floods, cold weather or other unsatisfactory conditions.

3.2 DENSITY CONTROL

.1 Compacted Fill material to be compacted to a dry density equal to or greater than 98% of the maximum dry density obtained in the Standard Proctor Compaction Test performed in accordance with ASTM D698.

.2 Tamped Fill material to be compacted to a minimum 98% of the maximum dry density obtained in the Standard Proctor Compaction Test performed in accordance with ASTM D698.

3.3 MOISTURE CONTROL

.1 Maintain moisture content for Compacted Fill materials within -3% to +3% of optimum moisture content as determined by ASTM D698 test procedures.

.2 Maintain moisture content for Tamped Fill materials within -2% to +2% of optimum moisture content as determined by ASTM D698 test procedures.

.3 When the moisture content in the fill material is lower than that specified for placement, add water and mix with the material to achieve uniform moisture content in the material to conform to the requirements.

.4 When the moisture content in the fill material is higher than that specified for placement, dry the material by scarifying, disking, mixing and harrowing to achieve uniform moisture content in the material to conform to the requirements.

.5 Moisture content control on waste fill will not be required.

.6 Do not apply water to fill material in a manner that causes segregation or the finer materials to be washed out.

.7 Water added to fill material for moisture control purposes will be free of deleterious materials.

3.4 PLACEMENT AND COMPACTION

.1 Drain and clean all earth foundations of loose, thawed, frozen, soft, or other deleterious material including ice, snow and organic materials and topsoil.

.2 Work the surface to obtain a suitable bond with the earth fill immediately prior to placing the first layer. Scarify the top 150 mm of the surface and compact to 95% of the maximum dry density obtained in the Standard Proctor Compaction Test performed in accordance with ASTM D698.

.3 When the surface of the prepared foundations or the compacted fill material is too dry or too smooth to bond properly with the layer of fill material to be placed thereon, moisten the surface and work with a disc, scarifier, or other equipment, to provide a satisfactory bonding surface before the succeeding layer of fill material is placed.

.4 When the surface of the prepared foundations or the compacted fill material is too wet for proper compaction, remove it and allow it to dry, or work it with a harrow, disc or other equipment to reduce the moisture content to the required amount; then compact the fill material before the succeeding layer of fill material is placed thereon.

.5 Maintain slopes at less than 1V:1H for earth foundations on which fill is to be placed.

.6 Place compacted fill material in continuous horizontal layers not exceeding 150 mm in thickness when compacted. Spread, blend, disc, blade, smooth and compact each lift to provide a homogeneous fill without stratification. Commence placement of fill at the lowest elevation of foundation. Use sheepfoot type compaction equipment.

.7 Place waste fill materials in continuous horizontal lifts not exceeding 300 mm in thickness such that there will be no voids or bridging of material. Spread and compact each lift by complete coverage of tracked equipment. Blade the compacted waste fill embankment to a smooth, uniform, free-draining shape.

.8 Join new fill to existing slopes by terracing or excavating into slopes to remove all dried and loose material.

.9 Schedule fill placement operations such that the foundation areas or previously compacted earthfill does not freeze and that compacted earthfill is not placed on frozen subgrade. Remove and replace any such frozen layers of compacted earthfill at no cost to the Owner.

.10 Scarify each lift of fill to a minimum depth of 70 mm following compaction, using a disc or other Owner approved equipment to ensure complete bond between that lift and the overlying lift.

.11 Reroute construction traffic or increase fill thickness over soft foundations in areas where fill surface starts rutting. If rutting has occurred, scarify, regrade and moisture condition the fill surface prior to placement of overlying fill.

.12 Re-compact or remove any portion of the fill, which has suffered a reduction in density due to frost, rain or any other reason before placing succeeding layers. Protect compacted fill material and foundations prepared for the fill from freezing.

.13 Remove any non-conforming materials, which accumulate on the surface of any layer, or prepared foundation before any material is placed for the succeeding layer.

.14 Maintain adequate grading during construction to protect the work from surface drainage damage.

3.5 COMPACTION EQUIPMENT

.1 Supply necessary compaction equipment capable of meeting the specified compaction requirements.

.2 Hauling equipment is not acceptable for compaction.

.3 The Owner's Representative reserves the right to order the discontinuation of any compaction equipment that does not produce the specified compaction requirements or causes excessive breakage around structures or is not capable of compacting the fill material to the required density in a reasonable time.

3.6 TOLERANCE

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

.2 Compact all surfaces to within -25 mm and + 25 mm from the lines, grades and elevations shown in the Contract Documents.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Cutting, grading, filling, rough contouring, compacting the site for earthwork, site structures, pathways and planting beds.

1.2 RELATED SECTIONS

.1 Section 02 41 19 - Selective Demolition.

.2 Section 31 05 13 - Soil Materials.

.3 Section 31 05 16- Aggregate Materials.

1.3 PRICE AND PAYMENT PROCEDURES

.1 Unit Prices: Section 01 22 10 - Measurement Schedule.

1.4 REFERENCES

.1 The City of Calgary Parks Development Guidelines and Standard Specifications: Roads Construction. (Current edition).

.2 AASHTO T 180-15 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 inch) Drop.

.3 ASTM C136/A136M-14 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D698-12e2 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft^3 (600 kN-m/m^3)).

.5 ASTM D1556/D1556M-15 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

.6 ASTM D1557-12e1 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

.7 ASTM D2167-15 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

.8 ASTM D2419-14 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

.9 ASTM D2434-68(2006) - Standard Test Method for Permeability of Granular Soils (Constant Head).

1.5 Submittals

.1 Submit minimum of 0.5 kg samples of each type of excavated or imported fill materials to be used. Forward samples to the appointed testing firm. Pack tightly in containers to prevent contamination.

.2 Ensure such test results clearly indicate type of materials and composition, hardness, compatibility and suitability for proposed usage.

1.6 QUALITY ASSURANCE

.1 Perform Work in accordance with the following documents:

.1 Calgary Parks Development Guidelines and Standard Specifications: Landscape Construction. (Current edition) or approved equivalent.

.2 Calgary Parks Development Guidelines and Standard Specifications: Roads Construction. (Current edition) or approved equivalent.

.2 If conditions are discovered by the Contractor that vary from those indicated in the documents, notify the Consultant.

.3 Examine the site for amounts of fill or excavation required, and also the amount of topsoil to be removed; be fully aware of all existing conditions on the site and make allowance for the same.

.4 If conditions are discovered by the Contractor that vary from those indicated in the documents, notify the Consultant.

.5 Existing underground service on the site must remain in use during construction. Excavate with extreme care in areas of these services to avoid disruption.

.6 Verify all existing utilities by contacting the appropriate authorities on ALBERTA 1st call 1-800-242-3447, toll free. Do not start excavation until after this has been done.

Part 2 Products

2.1 MATERIALS

.1 All imported fill and base materials are to be reviewed at the source and accepted by the Consultant prior to hauling operations

.2 Site-excavated soil: approved site-excavated material free of vegetation, organics, or other deleterious matter; includes only site-excavated material removed by required or authorized excavation. Do not use frozen soil for fill or backfill.

.3 Imported fill material: suitable soil free from organic or other deleterious matter to the approval of the Consultant; required only if there is not sufficient site excavated soil for backfilling and grading operations.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that survey bench mark and intended elevations for the Work are as indicated.

3.2 PREPARATION

.1 Identify required lines, levels, contours, and datum.

.2 Stake and flag locations of known utilities.

.3 Locate, identify, and protect utilities that remain, from damage.

.4 Notify utility company to remove and relocate utilities as required.

.5 Protect above and below grade utilities that remain.

.6 Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 PROTECTION

.1 Schedule and execute all the work in a careful manner with due consideration for the public and to prevent injury to any persons and damage to any property. Avoid interference with the use of, or passage to and from, adjoining buildings and facilities.

.2 Stake and flag locations of known utilities. Before commencing excavation or backfill, determine the exact location of all underground utility installations such as electrical services, storm sewer, sanitary sewer, water pipes, gas lines and power cables. Contact all utility companies and give notice of the extent of excavation and other site work involved.

.3 Repair all damage to any utilities, at the Contractor's expense, to the satisfaction and in accordance with all rules, regulations and specifications of municipal and provincial authorities and any other authority having jurisdiction.

.4 Follow the requirements of the ATCO Crossing Agreement for work within the ATCO Utility Right of Way.

3.4 SUBSOIL EXCAVATION

.1 Excavate subsoil from areas to be further excavated, re-landscaped, or re-graded.

.2 Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.

.3 Remove subsoil not being reused from site.

.4 When excavating through roots, perform work by hand and cut roots with sharp axe.

.5 Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key placed fill material to slope to provide firm bearing.

.6 Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

.7 Minimize disturbance to the subgrade soil.

.8 Stockpile as specified in Section 31 05 13 Soil Materials.

3.5 FILLING

.1 Install Work in accordance with the following documents:

.1 Calgary Parks Development Guidelines and Standard Specifications: Landscape Construction. (Current edition) or approved equivalent.

.2 Calgary Parks Development Guidelines and Standard Specifications: Roads Construction. (Current edition) or approved equivalent.

.2 Use site-excavated material for backfill and fill where not specified otherwise. Use imported fill material only if there is not sufficient site excavated soil. The material is to be accepted by the Consultant before use.

.3 Fill areas to contours and elevations with unfrozen materials.

.4 Place fill material on continuous layers and compact in maximum 200 mm lifts.

.5 Maintain optimum moisture content of fill materials to attain required compaction density.

.6 Slope grade away from building minimum 2%, unless noted otherwise.

.7 Make grade changes gradual. Blend slope into level areas.

.8 Remove surplus fill materials from site.

.9 Cut out soft areas of subgrade not capable of compaction in place. Backfill and compact to density equal to or greater than requirements for subsequent fill material.

.10 Scarify and proof roll subgrade surface to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

.11 Place fill material on continuous layers and compact.

.12 Employ a placement method that does not disturb or damage other work.

.13 Maintain optimum moisture content of fill materials to attain required compaction density.

.14 Make grade changes gradual. Blend slope into level areas.

3.6 TOLERANCES

.1 Top Surface of Subgrade: Plus or minus 30 mm from required elevation.

3.7 FIELD QUALITY CONTROL

.1 If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

.2 Frequency of Tests: per lift of subgrade, and upon inspection of final subgrade preparation.

END OF SECTION

1. GENERAL

1.1 INTENT

.1 Read this Section in conjunction with other Sections for location, use and placement of "Trench Excavating and Backfilling" specified herein.

.2 This Section is intended to be used as a reference section for excavating, backfilling of trenching required for installation of underground services which may include pipes, fittings, valves, manholes, vaults, catch basins, ducts, duct banks, conduits, cable, wire, etc.

DEFINITIONS

.1 "Common Excavation" is defined as all excavation, hauling, placement and compaction of materials within the project work area excluding materials classified under topsoil stripping, rock excavation, borrow excavation or other specified excavation operations as shown in the Contract Documents or as designated by the Owner's Representative.

.2 "Borrow Excavation" is defined as all imported excavation from borrow areas excluding materials classified under topsoil stripping, excavation of frozen material or other specified excavation operations as shown in the Contract Documents or as designated by the Owner's Representative.

.3 "Waste Excavation" is defined as all excavation, hauling, and placement of materials, within the project work area and at designated waste areas, that are not suitable for use or are surplus to requirements for the completion of the project work excluding materials classified under topsoil stripping, rock excavation or other specified excavation operations as shown in the Contract Documents or as designated by the Owner's Representative.

2. PRODUCTS

2.1 FILL MATERIALS

.1 **General**

.1 Do not use frozen fill materials.

.2 Remove cobble, stones and rock fragments have maximum dimension greater than 75 mm from fill material or other object other objects which could be detrimental to the pipe or the embedment materials.

.2 **Native Backfill Material**

.1 Native backfill containing no debris; tree roots, sod or other organic materials.

.3 **Granular Materials**

Refer to Section 02265.

.4 **Non-shrink Backfill**

Non-shrink Backfill is a very weak mixture of Portland Cement or Lime/Fly Ash, concrete aggregates and water that resists settlement when placed in a utility trenches and is capable of being readily excavated.

.1 Compressive Strength – 0.2 to 0.5 Mpa with a maximum 56 day strength of 0.5 Mpa.

.2 Aggregate consisting of washed sand conforming to the requirement of C.S.A. Standard CAN#-A23.1-M77. Aggregate gradation to be within the following limits:

Sieve Size	Percent Passing by Weight
10 mm	100%
5 mm	95 - 100%
2.5 mm	80 - 100%
1.25 mm	50 - 100%
0.630 mm	25 - 65%
0.315 mm	10 - 35%
0.160 mm	2 - 15%
0.080 mm	0 - 10%

.3 Minimum slump - 75 mm. Maximum slump - 125mm.

.4 Calcium chloride admixture may be used. Air entrainment admixture may be used to improve workability.

.5 Cold Weather Requirements: Non shrink backfill delivered in cold weather will conform to the requirement specified in Section 18 of C.S.A Standard CAN3-A23.1-M77.

2.3 GRANULAR FROST INSULATION

.1 Processed lightweight aggregates (LWA) used as granular frost insulation material in pipe bedding and insulating cover due to high thermal insulation value and low thermal conductivity compared to natural soils.

.2 Approved products:
- Granulite
- Aggrelite by Atrium Lightweight Materials Inc.
- Liteweight 730
- or approved equal

2.4 CELLULAR CONCRETE INSULATION

.1 Insulating material will be precast cellular concrete blocks with wet density equal to 475 kg/m^3.

.2 Approved products:

- Cematrix CMI-475
- Or approved equal

3. EXECUTION

3.1 PREPARATION

.1 Notify Owner's Representative at least 2 days prior to beginning excavating operations.

.2 Prior to commencing excavation:

.1 Contact all appropriate utility companies and establish exact location and current status of all utilities, voltage of underground and overhead power lines and pressure of natural gas lines.

.2 Notify Owner if any utility lines have been omitted from or incorrectly indicated in the Contract Documents.

3.2 PROTECTION OF EXISTING FACILITIES

.1 Locate utility lines, fencing, survey reference points, instrumentation, culverts, and all other existing facilities before commencement of Work. Protect these items from damage.

3.3 UNAUTHORIZED EXCAVATION

.1 Unauthorized excavation is any excavation beyond lines, elevations and dimensions indicated in the Contract Documents without specific authorization by the Owner.

.2 Fill unauthorized excavation to lines, elevations and dimensions indicated, as directed by the Owner's Representative.

.3 Unauthorized excavation and remedial work will be at Contractor's expense.

3.4 EXCAVATION LINES

.1 Excavate to the lines, grades and elevations indicated in the Contract Documents or as determined by the Owner's Representative

.2 The Owner's Representative will determine if unsuitable bearing materials are encountered at indicated foundation elevations. Carry excavation deeper to remove unsuitable bearing materials and replace excavated material with suitable materials.

.3 The Owner's Representative will determine if bearing conditions are fulfilled at elevations above those indicated in the Contract Documents. Adjust excavation elevations to accommodate raised foundation level.

3.5 SHORING AND BRACING

.1 If required to provide safe working conditions and to prevent cave-ins and loose soil from falling into excavations, protect excavations by temporary shoring, bracing, or other suitable methods.

.2 Where the excavation is made to accommodate structures, remove sufficient material to allow for the proper placing and bracing of forms.

.3 No extra payment will be made for supplying, placing, maintaining and removing sheeting, bracing, shoring, or other means of temporary support.

3.6 EXCAVATION

.1 Strip Topsoil and stockpile in the designated areas.

.2 Remove and dispose of all water, snow and surface ice prior to excavation.

.3 Schedule and coordinate the work such that excavations are trimmed to grade prior to becoming frozen.

.4 Excavate to the required lines, grades and elevations.

.5 Immediately notify the Owner's Representative of unsuitable organic soils or other unsuitable or unstable materials encountered during excavation and remove unsuitable materials to the depth and extent directed.

.6 Prevent loss of soil and sloughing of slopes if springs or seepage are encountered within excavation.

.7 Remove boulders, loose bedrock, soil blocks and other fragments that may slide or roll into excavated areas, which, in the opinion of the Owner's Representative or the Contractor, are unsafe or appear to endanger persons, work or property. The fact that such removal may enlarge an excavation beyond the required excavation lines will not relieve the Contractor from the necessity of doing such scaling and removal.

.8 All excavation within roadways to be performed by a hydraulic tracked excavator. Earthmovers (buggies) will not be used, unless authorized by the Owner's Representative.
Excavate trenches to the lines, grades and elevations shown on the Contract Documents. For pipe trenches, comply with Pipe Trench Width Schedule.

.9 Where a trench box and/or cage will be employed for a trench excavation refer to Uni-Bell's latest edition of "Handbook of PVC Pipe – Design and Construction" for the trench design and method of installation.

.10 Where shoring will be employed for trenching and/or protection of utilities and structures the Contractor must engage the services of qualified professional engineer who is registered or licensed in province of the project to design and inspect shoring and anchoring required for work.

.11 Grade and shape pipe trench to give uniform and even bearing for each length of pipe. Dig bell holes at each joint as required.

3.7 BORROW EXCAVATION

.1 Use all suitable materials removed by Common Excavation in embankments before taking material from borrow areas.

.2 Obtain additional suitable embankment material from designated borrow areas.

.1 Owner's Representative to designate location and extent of borrow areas, and allowable depth of excavation.

.2 Shape edges of borrow areas on slopes of 4H:1V or flatter or as directed by the Owner's Representative and provide drainage.

.3 Trim and leave borrow pits in a condition to permit accurate measurement of material removed.

3.8 DISPOSAL OF EXCAVATED MATERIAL

.1 General

.1 Obtain prior approval by Owner for stockpile areas. Strip topsoil from stockpile areas except do not strip topsoil stockpile areas.

.2 If stockpiling is required, stockpile materials meeting the classifications of different zones in separate stockpiles.

.3 Prepare stockpile sites and construct stockpiles taking every precaution necessary to prevent segregation of particle sizes and contamination with other materials.

.4 Finish the surfaces in stockpiles to safe, stable lines and slopes 3H:1V or flatter or as directed by the Owner's Representative and leave the surfaces in a neat and workmanlike manner.

.5 Maintain stockpiles in a condition acceptable to Owner.

.6 Do not block drainage courses with stockpiled material.

.7 Space all stockpiles at least three metres from adjacent material stockpiles with a different classification.

.8 Remove all stockpiled materials from stockpiles and incorporate into the Work of the Contract.

.2 Suitable Materials

.1 Load, haul and place, suitable materials from common and borrow excavations where placement of compacted and tamped fills are designated.

.3 Unsuitable Materials

.1 Load, haul and place unsuitable waste excavation materials in designated waste fills and waste sites. If no waste fills or waste sites are designated, dispose of material off site in an area located by the Contractor and approved by the Owner's Representative.

.2 Load, haul and place unsuitable materials from borrow excavations in borrow areas, after the removal of all suitable materials. Costs associated with replacement of unsuitable materials in borrow areas to be included in unit rate for borrow excavation.

.4 Excavated Material Disposal Sites

.1 At the completion of the project the Owner will assume ownership of all remaining excavated suitable earth and granular materials. The Contractor will neatly consolidate stockpiles of the different materials at the designated site located at a storage facility near the Drumheller Wastewater Treatment Facility, and as directed by the Owner's Representative.

.2 The Contractor will dispose of unsuitable waste materials at a licensed landfill.

3.10 TOLERANCE

.1 Excavate all surfaces to within + 20 mm and - 20 mm of the lines, grades and elevations shown in the Contract Documents.

3.11 MOISTURE CONTENT CONTROL OF BACKFILL MATERIAL

.1 Uniform moisture content of each layer of fill to be within the Optimum Moisture Content limits specified in Backfilling Schedule, as determined by ASTM D698 test procedures.

.2 When the moisture content in the fill material is lower than that specified for placement, add water and mix with the material to achieve uniform moisture content in the material to conform to the requirements.

.3 When the moisture content in the fill material is higher than that specified for placement, dry the material by scarifying, disking, mixing and harrowing to achieve uniform moisture content in the material that conforms to the requirements.

3.12 PLACEMENT AND COMPACTION OF BACKFILL MATERIAL

.1 Backfill trenches using fill materials as specified in Backfilling Schedule.

.2 Place fill materials in layers not exceeding loose thickness specified in Backfilling Schedule.

.3 Uniformly compact each layer of fill to minimum percentages of Standard Proctor Density specified in Backfilling Schedule, as determined by ASTM D698 test procedures.

.4 Uniform moisture content of each layer of fill to be within the Optimum Moisture Content limits specified in Backfilling Schedule.

.5 Where a trench box and/or cage is employed, ensure that the pipe installation and pipe zone compaction requirements are met. Refer to Uni-Bell's, latest edition of "Handbook of PVC Pipe - Design and Construction" for trench box/ cage design and methods of installation. The installed pipe and its embedment will not be disturbed when using movable trench boxes and/or cages. Movable supports will not be used below the top of the pipe zone unless an approved method is used to maintain the integrity of the embedment material. Before moving supports, place and compact embedment to sufficient depths to ensure protection of the pipe. As supports are moved, finish placing and compaction of embedment material.

.6 Where shoring is employed, the shoring professional will provide the Contractor instructions how the backfill schedule requirements will be achieved. Provide instructions to the Owner's Representative for review and comment at least 7 days prior to commencing backfilling

.7 When there is granular material placed in the pipe zone, install a compacted earth plug at a maximum interval of 50 m. The intent of the earth plug is to minimize water from piping through the granular material. Contractor to record the location of earth plugs and provide this information to the Owner's Representative.

.8 When compacting in the pipe zone, care should be taken to avoid contact between the pipe and the compaction equipment (mechanical tampers, tamping bars, etc.).

.9 Compaction in the haunch area is to be obtained by use of mechanical tampers and tamping bars. Care should be taken to ensure that the pipe does not "float" due to the compacting methods.

.10 When compacting initial backfill, mechanical tampers are to be used adjacent to the pipe. Mechanical tampers shall not be used directly above the pipe until a minimum of 300 mm of backfill material is in place above the pipe.

.11 When compacting backfill in the intermediate zone, roller compacting equipment is not to be used until a minimum of 500 mm of backfill material has been placed above the top of pipe.

.12 The use of hydro-hammer in the pipe zone is not be permitted.

.13 When compacting backfill above the pipe zone, hydro-hammer is not to be used until a minimum of 1,000 mm of backfill material has been placed above the top of pipe.

3.13 UTILITY CROSSINGS

.1 Install crossings to the lines, grades and elevations shown on the Contract Documents.

.2 Comply with requirements of crossing agreement, permit or other crossing requirements issued by utility company.

3.14 PIPE TRENCH WIDTH

.1 Except as otherwise specified, minimum and maximum trench widths, up to a point 300 mm above top of pipe, will be as specified in Pipe Trench Width Schedule.

.2 Maximum trench widths indicated in Pipe Trench Width Schedule exclude an allowance for shoring.

.3 Trench width at any point will not be less than trench width at any depth below such point.

3.15 PIPE TRENCH WIDTH SCHEDULE

Pipe Size (Outside Diameter)	Minimum Trench Width	MaximumTrench Width
850 mm diameter or less	300 mm greater than external pipe diameter	600 mm greater than external pipe diameter or 750 mm total trench width, whichever is greater
Greater than 850 mm diameter	300 mm greater than external pipe diameter	600 mm greater than external pipe diameter

END OF SECTION

1. General

1.1 SCOPE

.1 The Contractor shall provide maintenance and warranty of all plant material. The maintenance work of this section shall include watering, weeding, pruning and other incidental maintenance deemed necessary to ensure healthy plant material for a period of one growing season upon completion of planting. The warranty shall cover any defects in materials and workmanship.

1.2 RELATED SECTIONS

.1 Section 31 05 13 Seeding

.2 Section 32 93 10 Trees, Shrubs and Groundcover

1.3 REFERENCE STANDARDS

.1 “Pruning in Alberta” published by Alberta Agriculture, Food and Rural Development Agdex 270/24-1.

.2 “Backyard Pest Management” published by Alberta Agriculture, Food and Rural Development, Agdex 605-2.

.3 “Manual for Maintenance of Grounds” published by Alberta Infrastructure.

.4 Calgary Parks Development Guidelines and Standard Specifications: Landscape Construction (Current Edition).

1.4 HOURS OF WORK

.1 Perform maintenance work during regular working hours of 07:00 to 18:00, Monday to Friday.

.2 Obtain The Municipality of Drumheller's approval to perform maintenance outside of regular working hours.

1.5 SUBMITTALS

.1 Landscape Maintenance Log

- .1 Keep daily maintenance log throughout the agreement. Complete log during each day of maintenance activity.
  - .1 Submit legible and signed copy of maintenance log data to Municipality of Drumheller and the Consultant each week for verification.
- .2 Failure to maintain and submit log as required may:
  - .1 Delay payment of invoices to Contractor,
  - .2 Extend Maintenance Period at no additional cost to The Municipality of Drumheller,
  - .3 Result in payment reductions or back charges for maintenance.
- .3 Record and update all maintenance activities daily including:
  - .1 Date and time of activities,
  - .2 Location where activities were carried out,

.3 Name of each employee and supervisor on site.

.4 Applications of all chemical pesticides including:

.1 Target weed, insect or other pest,

.2 Mode, type, and rates of application, and;

.3 Weather conditions

.4 Results.

.2 Arborist Qualifications.

.1 Submit certification demonstrating arborist responsible for all tree pruning is certified with the International Society of Arborists.

.3 Herbivore Repellent Schedule:

.1 Provide schedule for application of herbivore repellent for approval. Schedule should include assumptions for additional applications due to adverse weather and/or additional need for control. Winter application is required per manufacturer's recommendations.

1.6 DAMAGE TO PROPERTY

.1 Any damage to existing turf vegetation, hard surfaces, structures or services cause as a result of the Contractor work methods and practices for plant material maintenance shall be reinstated or repaired to the satisfaction of the Consultant. The cost of such reinstatement or repair shall be solely at the Contractor's expense.

.2 Repair and pay for damages caused by contractor's personnel and equipment during the term of the Agreement.

.3 Immediately report damages to The Municipality of Drumheller.

.4 Obtain The City's approval for repairs and replacements. Return grass areas, plants, equipment, paved surfaces and buildings to their original condition before damage.

.5 Mechanical damage to trees and shrubs including tearing of bark, improper pruning of plants, and damages resulting from improper use of chemical pesticides and fertilizers will be considered damage.

.6 Complete repairs and replacements within seven days from date of approval given for repair or replacement.

1.7 QUALITY ASSURANCE

.1 Throughout the maintenance and warranty period, units of plant material that are found to be unacceptable will be replaced by the Contractor at the earliest opportunity. At the discretion of the Consultant, plant material that is identified as dead or in a poor or diseased condition shall be immediately removed from the site. All replacement plant material shall be as per the size indicated on the drawings. Note all plant replacements in the maintenance logs.

.2 When maintenance and replacement of plant material is required during the warranty period, all such costs will be the responsibility of the contractor. No additional costs will be borne by The Municipality of Drumheller.

.3 Where, in the opinion of the Consultant, the Contractor has failed to complete obligations as detail in this Specification; and further, fails to rectify said deficiency within two days of written notification from the Consultant, The Municipality of Drumheller reserves the right to complete the work and deduct incurred expenses from monies owing to the Contractor.

.4 Replacement for plants supplied by The Municipality of Drumheller will not be covered under warranty, but maintenance of this plant material is required.

1.8 DURATION OF MAINTENANCE PERIOD

.1 Maintain exterior landscape work as from the time of planting until one (1) growing season after issuance of the Certificate of Construction Completion (CCC).

.1 Prior to issuance of the Certificate of Construction Completion (CCC) the Contractor shall maintain, at no additional expense to the City, all soft landscaping constructed by the Contractor.

.2 Following Issuance of the Certificate of Construction Completion (CCC), the Contractor shall maintain all soft landscaping for a period of one (1) growing season, beginning the day following issuance of the CCC for planted areas by the City to the Contractor.

.2 Plants that are replaced under warranty shall be maintained and warranted for an additional period of one year, or for the remaining duration of the Maintenance Period, whichever is greater. Ball and burlap trees that are replaced shall be warrantied for the full warranty period, regardless of when it was replanted.

.3 The Maintenance Period may be extended at the discretion of The Municipality of Drumheller and / or the Consultant, at no additional charge, as a result of the following:

.1 Failure to submit proper documentation for the Landscape Maintenance Log;

.2 When inadequate site maintenance occurs;

.3 When the maintenance schedule is not followed;

.4 When unsatisfactory work is performed.

.4 The Municipality of Drumheller, at its discretion, may negotiate with the Contractor an additional two (2) years of maintenance upon the termination of this Agreement.

1.9 WARRANTY

.1 The Contractor hereby warrants that the plant material will remain free of defects for a period of two (2) years after planting. The Contractor shall make all corrections, adjustments and replacements required as a result of failure of all plant material.

.2 The Municipality of Drumheller and the Consultant will perform Warranty inspections in the Spring and Fall of every year throughout the Warranty Period. Any plant material identified for replacement by The Municipality of Drumheller during any Warranty Inspection shall be replaced with new plant material within thirty (30) days unless otherwise directed by The Municipality of Drumheller.

.3 Replacement plant materials shall meet the requirements of the initial planting. All plants must be in healthy and vigorous growing condition at the end of the Maintenance Period.

.4 Plants that are replaced under warranty shall be maintained and warranted for an additional period of one year, or for the remaining duration of the Maintenance Period,

whichever is greater. Ball and burlap trees that are replaced shall be warrantied for the full warranty period, regardless of when they were replanted.

.5 Contractor shall remove from the site any plant material which has been determined by the Consultant to have died or failed to grow in a satisfactory manner during the Warranty or Maintenance Period. Dead or diseased plant material will not be stored on site.

.6 The Contractor shall replace dead plant material immediately after removal from the site.

.7 The The Municipality of Drumheller and the Consultant, accompanied by the Contractor, will undertake an End-of-Warranty inspection to identify plant material that will be replaced before the issuance of Final Acceptance Certificate (FAC).

.8 The Warranty does not apply to damage or failure due to vandalism or theft that occurs after planting.

1.10 ACCEPTANCE

.1 Refer to Current Municipality of Drumheller Standards for Landscape Construction or approved equivalent.

2. Products

2.1 WATER

.1 Water shall be free from any contaminants that could adversely affect plant growth.

2.2 FERTILIZER

.1 Organic foliar spray may be used to help plants establish as approved by the Consultant.

2.3 TOPSOIL

.1 Any additional topsoil shall original from the same source as the initial approved material.

2.4 PLANT PROTECTION MATERIALS

.1 Herbivore Repellent:

.1 Organic herbivore repellent such as Plantskydd, Bobbex or approved equivalent: repellent treatment sprayed on trunks and limbs and leaves.

.2 Rodent Guards

.1 Rodent guards shall originate from the same source as the initial approved product.

2.5 MULCH

.1 Mulch shall originate from the same source as the initial approved product.

3. Execution

3.1 GENERAL WORKMANSHIP

.1 The Municipality of Drumheller and / or The Consultant will be the "Sole Judge" for assessing the Contractor's maintenance and workmanship performance.

.2 Schedule timing of operations to growth, weather conditions and use of site. Do each operation continuously and complete within reasonable time period.

.3 Do not perform work in any location or manner that may endanger the health and safety of the public.

.4 No maintenance equipment, materials or other miscellaneous items may be store on site unless approved the Consultant.

.5 Supply sufficient experienced manpower to complete all required maintenance services as scheduled to good horticultural practice and in accordance with specifications.

.6 Perform all landscape maintenance services in the Agreement under the site direction and supervision of an experienced and certified Landscape Journeyman Gardener or a qualified experienced person knowledgeable in horticulture meeting The Municipality of Drumheller's approval.

.7 Provide appropriate well-maintained equipment, tools and other materials necessary to complete all maintenance services to acceptable horticultural standards.

.8 Collect and dispose of excess material, debris, and other extraneous material resulting from the maintenance operation shall be removed from the site daily to approved municipal disposal site immediately following collection.

.9 Coordinate maintenance practices with The Municipality of Drumheller. Alter maintenance schedules, when necessary, to accommodate The Municipality of Drumheller 's site activities.

.10 Contact City immediately when specified maintenance requirements cannot be met for any reason.

.11 Ensure that all workers use appropriate personal protective equipment where there is a danger of injury and as required by Alberta's Occupational Health and Safety Act. Essential protective equipment must meet CSA approval.

3.2 ESTABLISHMENT AND MAINTENANCE SCHEDULE

Growing Season	Phase	Timeline	Summary of Work
Growing Season 1	Initial Establishment	1- 30 days following planting completion	• Water daily as required • Control weeds as specified • Perform diagnostic inspection weekly • Re-seed / re-plant bare spots as required
	Routine Maintenance	30 days to end of growing season 1	• Water daily as required • Control weeds as specified, more as required to prevent seed

			ripening • Re-seed / re-plant bare spots as required
	Fall Cleanup	End of growing season 1	• Autumn preparation • Warranty inspection
	Total Completion	One year after construction completion	• End-of-Warranty inspection

3.3 MULCHING

.1 In the autumn and spring of the maintenance prior, the Contractor shall replace wood mulch to meet the specifications.

3.4 WEEDING

.1 All weeds and grasses within saucers, beds, and mulched areas around plant material shall be removed by hand. Weed whackers or whipper-snippers shall not be used to remove weeks in the vicinity of plant materials.

.2 The application of herbicides shall not be permitted unless otherwise approved the Consultant. Removed weeds and grasses shall be disposed of the project site.

.3 At a minimum, weeding shall occur bi-weekly intervals, with the first operation occurring at the beginning of May and the final operation occurring in early October. All areas shall be weeded immediately prior to the final warranty inspection.

3.5 INTEGRATED PEST MANAGEMENT (IPM) AND INFESTATIONS

.1 Monitor plant material throughout the maintenance period for any sign of disease or insect problems. Ensure immediate treatment to control and repair damage.

.2 Manage and control pests using IPM principles that utilizes regular monitoring to identify pests, considers various control options (biological, physical, cultural, mechanical and chemical) before implementing an effective, economical and environmentally acceptable solution to prevent and suppress pests.

.3 Contractor to work with the Consultant to identify appropriate weed treatment approaches.

.4 General Considerations:

.1 Cultural or non-toxic methods of control shall be given first priority.

.2 Prior to chemical pesticide applications, obtain written approval from The Municipality of Drumheller.

.3 Do not use D.D.T or other chemicals prohibited by Agriculture Canada. All chemicals must be approved by the Design Professional prior to use.

.4 Determine susceptibility of plant species to pesticide damage before any chemical application.

.5 Use equipment and containers free of harmful residues not related to specific control measures applicable to situation.

.6 Perform disease, weed and insect control, in accordance with Municipal, Federal and Provincial chemical application legislation. Provide The Municipality of Drumheller with three days advance notification of intent to apply chemical pesticides on site.

.7 Prepare and apply chemical according to manufacturer's specification. Minimize drift at all times. Erect signs to notify building occupants and the public regarding pesticide use on site.

.8 Carry out treatment with regard to climatic effect on surroundings and occupants of buildings.

.9 Provide ongoing and knowledgeable communications with The Municipality of Drumheller regarding identified pests on site, controls implemented to manage pest and outcome of treatment actions. Record all information in maintenance log.

.5 Insect and Disease Control:

.1 Make weekly inspection of lawns and plants for insect and disease infestations. Apply chemicals based on development stage of insects' life cycles.

.2 Repair and pay for damages caused by application of chemicals.

.3 Effectiveness of treatment program to be determined by inspection by The Municipality of Drumheller. Repeat as required.

3.6 TREE, PERENNIAL AND SHRUB MAINTENANCE

.1 Plant Establishment

.1 Plugs and perennials:

.1 Contractor shall warrant that 90% of installed plants shall remain free from any defect or failure and withstand climatic, maintenance and normal operational conditions after the first growing season.

.2 Contractor shall warrant that 80% of installed plants shall remain free from any defect or failure and withstand climatic, maintenance and normal operational conditions at the end of the Maintenance Period.

.2 Trees:

.1 Contractor shall warrant that 100% of installed trees shall remain free of any defect or failure and withstand climatic, maintenance and normal operational conditions at the end of the Maintenance Period.

.2 Maintenance of Plant Beds and Tree Wells:

.1 Remove and dispose of debris, rubbish, animal waste, dead and unhealthy plants on a regular weekly basis.

.2 Maintain a weed free appearance in plant beds and tree wells.

.3 Re-spread disturbed mulch or replace to maintain original mulch depth of 50mm min.

.4 Install planting media where settlement occurs to maintain original grades.

.5 Respread disturbed mulch or replace to maintain original mulch depth of 50mm min.

.3 Soil Conditioning:

.1 Maintain correct soil conditions in plant beds to promote optimum growth and health for each plant.

.2 Supply and add soil amendments and organic matter according to soil analysis.

.4 Staking and Tree Protection:

.1 Keep stakes and guy wires taut and plants plumb for duration of Maintenance Period

.2 Remove support stakes and staking accessories when plants become self-supporting or when directed by the Consultant.

.3 Install and keep plant protection materials in proper repair and adjustment when required or directed by The Municipality of Drumheller.

.5 Pruning:

.1 Obtain and prune in accordance with proper practices and standards described in “Pruning in Alberta” and as directed by The Municipality of Drumheller. The Municipality of Drumheller will be the "Sole Judge" for assessing all pruning operations.

.2 Only qualified arborists shall conduct pruning activities.

.3 Prune to provide natural branching structure and to encourage healthy natural growth pattern for each plant.

.4 Prune plants with sharp pruning tools and equipment using qualified, experienced and trained personnel. Sterilize pruning tools after completion of each plant cutting operation and especially after pruning any diseased plant.

.5 All improperly pruned plants or plants pruned by Contractor without City’s authorization will be subject to rejection. Contractor will replace rejected plants or rectify improper pruning as determined and directed by City.

.6 Prune plants to remove all dead, diseased, damaged and injured branches, crossing or rubbing branches, stubs, double leaders, suckers, watersprout and multiple shoots.

.7 Do not strip lower branches, raise up crown of trees, shear or top any plant. All such improper pruning will result in rejection of work unless authorized by City. Promptly replace all rejected plants at no cost to the City.

.6 Plant Replacement:

.1 Promptly replace plants that die or become unhealthy during the maintenance and warranty periods. All replacement plants shall be noted in maintenance log.

.2 All plants must be in healthy and vigorous growing condition at end of Maintenance Period.

.7 Fertilization Requirements in Early Spring:

.1 Adjust fertilizer requirements according to soil test analysis or when directed by The City. Use a slow release non-soluble fertilizer.

.2 Apply 10-6-4 or similar fertilizer at rate of 18 g/25 mm of caliper per tree from trunk to dripline of tree.

.3 Apply 16-10-9 or similar fertilizer spikes at rate of one spike per 25 mm of caliper per tree at dripline of tree.

.4 Apply 10-6-4 or similar fertilizer at rate of 5 kg/100 m2 into upper surface of plant beds.

.5 Apply adequate water after fertilizing to ensure penetration of fertilizer into soil and roots.

.8 Watering of Plants:

.1 It is the Contractor's responsibility to water the planted areas as required to supplement precipitation in order to maintain optimal growing conditions.

.2 Watering amount guidelines:

.1 Typical shrub/perennial watering amount: 5 gallons per #1 or #2 container shrub.

.2 Typical tree watering amount: 5 gallons per inch of trunk diameter per tree.

.3 Watering amounts may vary based on soil moisture testing.

.3 Soil moisture testing will be conducted by the Contractor using a soil moisture probe with a range from 0-100%.

.1 Acceptable soil moisture before watering would be 60%.

.2 If testing is above 60%, do not water to prevent waterlogged roots.

.3 Plants require watering if reading is below 60% and watering for that session should continue until a 100% reading is achieved with the probe.

.4 Test soil for each plant at 3 random locations to 12"depth. Tests are to be done immediately before and after every watering.

.5 Fill out maintenance logs with test results, including duration and frequency of watering. These logs will be submitted a minimum of once a month to City Project Manager, Park Inspector and Project Team.

.6 Random moisture inspections will be conducted by the Project Team to verify compliance.

.4 Supply clean water and water truck including all accessories to adequately water and maintain plants where water is not available or inadequate.

.5 Deep water trees and shrubs thoroughly on a regular basis using a deep root feeder to maintain adequate moisture level within root systems and ensure healthy vigorous growing conditions.

.6 Supply clean water and water truck including all accessories to adequately water and maintain plants where water is not available or inadequate.

3.7 SPRING CLEAN-UP

.1 Maintenance Period will commence in early May on such date as mutually agreed upon by the Municipality of Drumheller and the Contractor.

.1 Complete spring clean-up by May 15 or as soon as working conditions are favourable.

.2 Remove and dispose of protective coverings and mulch, if used, in winter protection.

.3 Clean, collect and remove sand, gravel, salt and debris accumulated during winter months from maintained turf, seeded areas and planting beds. Dispose in approved municipal disposal site.

.4 Remove and store off site: snow fence, stakes and sand containers.

.5 Rake, clean and remove all dead vegetation, leaves, debris, and snow mould from turf areas.

.6 Cut back previous year's growth of ornamental grasses close to root mass to allow for regeneration of new growth.

.7 Roll turf areas lightly where grass has lifted due to frost action.

.8 Clean planting beds and planters of debris and dead plant material and remove from site.

.1 If no mulch is used, loosen and lightly cultivate soil without disturbing roots of permanent plantings.

3.8 AUTUMN PREPARATION

.1 Deep water trees and shrubs between October 1 to 15. Continue deep watering plants where unseasonal warm dry temperatures are experienced.

.2 Protect plants from rodent, animal and sun damages by use of appropriate materials. Use chemical repellent, rodent wire mesh, plastic perforated spiral strip, burlap, or other approved material.

.3 Erect snow fencing where directed by The Municipality of Drumheller.

.4 Remove and dispose, at the Contractor's expense, fallen leaves and debris from planting beds, seeded areas and turf areas, unless directed otherwise by the Design Professional or The Municipality of Drumheller.

.1 If The Municipality of Drumheller has an organics compost collection program, the Design Professional may dispose of organic matter at the City's collection facility with The Municipality of Drumheller written consent.

3.9 CLEANLINESS OF SOFT LANDSCAPING

.1 Keep grounds in clean and tidy condition on a routine basis or as a need for clean up occurs and when directed by The Municipality of Drumheller.

.2 Collect and dispose of excess material and debris to municipal disposal site weekly.

.3 Make weekly inspections for vandalism and damage. Immediately report vandalism and damage to The Municipality of Drumheller.

END OF SECTION

1. GENERAL

1.1 INTENT

.1 Read this Section in conjunction with other Sections for location, use, and placement of "Sub-Base Granular Materials" specified herein.

2. PRODUCTS

2.1 GRANULAR SUB-BASE MATERIAL

.1 Granular sub-base material will consist of sound, hard, durable, well graded pit-run or crushed gravel or sand as specified.

.2 Granular sub-base material will not contain clay, loam, roots, plants or other deleterious materials. The materials are to be well graded from coarse to fine within the gradation limits specified, and will not be subject to extreme variation between the lower and upper limits of the gradation envelope specified.

2.2 GRADATION

.1 Gradation to be within the following limits when tested to ASTM C117, and giving a smooth curve without sharp breaks when plotted on a semi-log grading chart.

.2 Sub-Base Granular Material

Sieve Size	Percent Passing by Weight
80 mm	100%
40 mm	60-90%
20 mm	40 - 70%
10 mm	25 - 60%
5 mm	15 - 45%
2.5 mm	10 - 35%
0.63 mm	5 - 23%
0.16 mm	3 - 12%
0.08 mm	2 - 10%

The percent fractures by weight (2 faces) will be 20% or greater.

3. EXECUTION

3.1 PLACEMENT OF SUB-BASE MATERIALS

.1 Process, handle and transport aggregates to avoid segregation, contamination and degradation.

.2 Place sub-base granular material on a prepared subgrade and/or geotextile fabric. Do not place granular materials on snow, ice or frozen surfaces.

.3 Place the sub-base material in uniform layers not exceeding 150 mm compacted depth. Shape each layer to a smooth contour and compact to specified density before placing the next layer. Remove and replace areas that become segregated during spreading at the Contractor's expense. Compact the final lift of the sub-base material to proper grade and cross-section.

.4 Maintain the sub-base material to the specified section, grade and condition required for the placement of other materials or as required by the Owner's Representative. Provide interim drainage to prevent damage to the work and unstable conditions due to high moisture contents.

.5 Do not place the base material until the sub-base material has been inspected, surveyed, proof-rolled, tested and approved by the Owner's Representative.

3.2 COMPACTION OF SUB-BASE MATERIALS

.1 Granular sub-base materials to be compacted by rolling with a pneumatic tired roller, vibratory smooth drum roller or other approved equipment.

.2 During compaction, add water by an applicator in such quantities that the moisture content will be maintained at the optimum level as determined by Standard Proctor test. If the moisture content exceeds the optimum moisture content, aerate the material by mechanical means or cease work temporarily until the material has dried sufficiently to reach the optimum moisture content.

.3 Compact sub-base material to 98% of Standard Proctor Density and within - 2% and + 2% of optimum moisture content.

3.3 TOLERANCES

.1 The final surface to be even, uniformly shaped and compacted within a tolerance of + 10 mm and - 10 mm of established grade but not uniformly low or high, while maintaining surface drainage.

END OF SECTION

1. GENERAL

1.1 INTENT

.1 Read this Section in conjunction with other Sections for location, use, and placement of "Base Granular Materials" specified herein.

2. PRODUCTS

2.1 GRANULAR BASE MATERIAL

.1 Granular base material will consist of sound, hard, durable, well graded crushed gravel, sand, and fine soil particles as specified.

.2 Granular base material will not contain clay, loam, roots, plants or other deleterious materials. The materials to be well graded from coarse to fine within the gradation limits specified, and will not be subject to extreme variation between the lower and upper limits of the gradation envelope specified.

2.2 GRADATION

.1 Gradation to be within the following limits when tested to ASTM C117, and giving a smooth curve without sharp breaks when plotted on a semi-log grading chart.

.2 Base Granular Material

Sieve Size	Percent Passing by Weight
25 mm	100%
20 mm	95-100%
10 mm	55 - 80%
5 mm	35 - 65%
2.5 mm	28 - 52%
0.630 mm	13-35%
0.315 mm	9 - 26%
0.160 mm	6 - 18%
0.080 mm	4 - 10%

The percent fractures by weight (2 faces) will be 60 % or greater.

3. EXECUTION

3.1 PLACEMENT OF BASE MATERIAL

.1 Process, handle and transport aggregates to avoid segregation, contamination and degradation.

.2 Do not place granular materials on snow, ice or frozen surfaces. Place base granular material on prepared subgrade, geotextile fabric, and/or sub-base granular materials.

.3 Do not place the base material until the subgrade or sub-base materials have been inspected, surveyed, proof rolled, tested and approved by the Owner's Representative.

.4 Place the base material uniformly on the approved sub-base material to compacted depths specified. Do not place the base materials in layers exceeding 150 mm compacted depth. Shape each layer to a smooth contour and compact to the specified density before placing the next layer. Areas that become segregated during spreading will be removed and replaced at the Contractor's expense. Compact the final layer of the base material to proper grade and cross-section.

.5 Maintain the base material to the specified section, grade and condition required for the placement of other materials or as required by the Owner's Representative. Provide interim drainage to prevent damages to the work or the causing of unstable conditions due to high moisture contents.

3.2 COMPACTION OF BASE MATERIAL

.1 Granular base materials to be compacted by rolling with a pneumatic tired roller, vibratory smooth drum roller or other approved equipment.

.2 During compaction, add water by an applicator in such quantities that the moisture content will be maintained at the optimum level as determined by Standard Proctor test. If the moisture content exceeds the optimum moisture content, aerate the material by mechanical means or cease work temporarily until the material has dried sufficiently to reach the optimum moisture content.

.3 Compact base materials to 100% of Standard Proctor Density within - 1% and + 2% of optimum moisture content.

3.3 TOLERANCES

.1 The final surface to be even and uniformly shaped and compacted within a tolerance of -10 mm to +10 mm of established grade but not uniformly low or high, while maintaining surface drainage.

END OF SECTION

1. GENERAL

1.1 INTENT

.1 Read this Section in conjunction with other Sections for location, use and placement of "Hot Mix Asphaltic Concrete" specified herein.

.2 The Work includes the supply of aggregates and asphalt cement, asphalt plant mixing, transporting, placement, finishing and compaction to requirements specified herein.

.3 Asphalt concrete Mix A and Mix C of this specification will be used for construction of Arterial and Collector roadways or other high loading applications, as designated by the Owner.

.4 Asphalt concrete Mix B of this specification will be used for construction of Residential roadways or other low traffic areas, as designated by the Owner.

1.2 DEFINITIONS

.1 "RAP" is defined as Recycled Asphalt Product that is obtained from the cold milling of hot mix asphaltic concrete

.2 "A Lot" is a portion of the work being considered for acceptance, and is defined as one day of plant production for each mix type. Any portion of the work may be deemed a lot at the discretion of the Owner's Representative.

.3 "Job Mix Formula" is defined as the aggregate proportioning (including RAP), target gradation, asphalt content and air void content from the Mix Design that subject to approval by the Owner's Representative.

1.3 SAMPLES

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

.2 At least four (4) weeks prior to commencing work submit to the Owner's Representative one 5L container of asphalt cement proposed for use, if requested.

.3 Identify the supplier of the asphalt cement.

.4 Provide access for Owner's Representative to sample material actually incorporated in the work as required.

1.4 SUBMISSIONS

.1 Submit proposed asphalt concrete mix design and trial mix design results to Owner's Representative for review and approval at least two (2) weeks prior to commencing.

.2 Submit new mix design at least two (2) weeks prior to contemplated change in source of asphalt cement or aggregate.

.3 Trial mix designs will be performed by an independent testing consultant and submitted under the signature and professional seal of a qualified materials engineer to the Owner's Representative.

1.5 DELIVERY AND STORAGE

.1 Aggregates:

.1 Deliver and stockpile aggregates in accordance with the requirements of this Section.

.2 Stockpile minimum of 50% of the total amount of aggregate required before commencing production of trial mix design.

.3 Handle and transport aggregates to avoid segregation, contamination and degradation.

.4 Stockpile aggregates in sufficient quantities to meet project schedules. When hauling into stockpiles after plant mixing commenced, do not deposit material against working face of stockpile.

.5 Separate aggregate stockpiles by substantial dividers or stockpiles far enough apart to prevent intermixing.

.6 Reject intermixing or contaminated materials. Remove and dispose of rejected materials as directed by the Owner's Representative within 48 hours of rejection.

.7 Construct stockpiles in uniform lifts using trucks or rubber tired loading equipment, being careful to avoid segregation by spillage of material over the ends of previously placed lifts. Do not use conveyors or tracked equipment in stockpile construction.

.8 Provide a previously stabilized stockpile base or provide a compacted sand base not less than 300mm in depth to prevent contamination. Alternatively, stockpile aggregates on ground but do not incorporate bottom 300mm of pile into work.

.2 Asphalt Cement:

.1 Provide approved storage, heated tanks and pumping facilities for asphalt cement.

.2 Provide, upon request, freight and waybills for asphalt cement shipments received.

.3 Stockpile minimum of 100% of total amount of RAP required before commencing production of trial mix design.

.4 Handle and transport RAP to avoid segregation, contamination and degradation.

.5 Separate aggregate and RAP stockpiles by substantial dividers or stockpiles far enough apart to prevent intermixing.

.6 Reject intermixing or contaminated materials. Remove and dispose of rejected materials as directed by the Owner's Representative within 48 hours of rejection.

.7 Conveyors may be allowed to stockpile RAP subject to approval by the Owner's Representative. No equipment will be allowed on the RAP stockpile. Construct stockpiles being careful to avoid segregation by spillage of material over the ends of previously placed lifts.

.8 Provide free draining gravel stockpile base not less than 300 mm in depth to prevent contamination of RAP.

2. PRODUCT

2.1 MATERIALS

.1 Aggregates:

.1 Coarse aggregate is aggregate retained on the 5,000 µm sieve and fine aggregate is aggregate passing the 5,000 µm sieve.

.2 Aggregate material will be crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps cementation, organic materials, frozen material and any other deleterious materials.

.3 Gradations to be within limits specified, when tested to ASTM C-136 and ASTM C-117 with sieve sizes to CAN/CGSB 8-GP-2M rather than ASTM E11.

.4 Aggregates from source will be processed to meet the following requirements:

.1 Natural fines to be pre-screened and stockpiled with more than 10% of material retained on 5,000 µm sieve and 100% passing the 10,000 µm sieve.

.2 Pre-screened aggregates delivered to crushing plant will be pre-screened and will contain not more than 5% passing the 5,000 µm sieve.

.3 Crushed aggregates will be separated and stockpile in accordance with the following:

.1 Coarse aggregates to contain not more than 40% of materials passing the 5,000 µm sieve.

.2 Fine aggregate to contain not more than 20% of the materials retained on the 5,000 µm sieve.

.5 Physical properties for aggregates:

Requirement	ASTM Test Method	Mix A Base	Mix B Surface	Mix C Surface
Los Angeles Abrasion Gradation B % Loss	C131	30.0 max.	30.0 max.	30.0 max.
Magnesium Sulphate (% loss)	C88			
Coarse Aggregate:		12.0 max.	12.0 max.	12.0 max.
Fine Aggregate:		12.0 max.	12.0 max.	12.0 max.
Lightweight Particles % by mass	C123	1.5 max.	1.5 max.	1.5 max.

.6 Blend Sand:

.1 To consist of natural or manufactured sand passing 5,000 µm sieve.

.2 Stockpile volumes will be maintained to ensure a minimum of 5,000 tonne of plant mix production at all times.

.7 Mineral Filler:

.1 Finely ground particles of limestone, hydrated lime, Portland cement or other non-plastic mineral matter, thoroughly dry and free from lumps.

.2 Add mineral filler when necessary to meet job mix aggregate gradation.

.8 Blended Aggregates:

.1 Aggregate gradation requirements, including RAP:

	Percent Passing Sieve Size			
Sieve Size (µm)	Mix Type A	Mix Type B	Mix Type C	Mix Type M
25,000	100			
20,000	83 – 95		100	
16,000	74 – 90	100	97 – 100	
12,500	64 – 80	95 – 100	80 – 95	100
10,000	56 – 72	85 – 95	70 – 85	95 – 100
5,000	40 – 58	60 – 75	55 – 70	65 – 85
2,500	30 – 46	45 – 60	36 – 55	–
1.25	22 – 40	28 – 45	26 – 45	–
0.630	15 – 33	20 – 36	18 – 38	–
0.315	10 – 27	15 – 28	12 – 28	–
0.160	8.0 – 18	6.0 – 18	8.0 – 16	–
0.080	4.0 – 8.0	4.0 – 8.0	4.0 – 8.0	4.0 – 8.0

.2 Physical properties for blended aggregates:

Requirement	ASTM Test Method	Mix A Base	Mix B Surface	Mix C Surface
Coarse Aggregate Fracture (retained on 5.0 mm sieve size) (% of fractured particles (2 or more faces) by mass)	–	60 min.	70 min.	90 min.
Flat and Elongated Particles (retained on 5.0 mm sieve size (length to thickness ratio greater than 5:1)	–	10 max.	10 max.	10 max.
Flat and Elongated Particles (retained on 5.0 mm sieve size (length to thickness ratio greater than 3:1)		20 max.	20 max.	20 max.
Manufactured Sand * (fine aggregate < 5.0 mm), %		50	50	75
Sand Equivalent Value (Mechanical Method), %	D2419	40 min.	45 min.	45 min.
Maximum RAP (total mass), %	–	20 max.	20 max.	20 max.

*mixes incorporating RAP, 50% of the RAP fines to be considered manufactured sands.

.3 Reclaimed Asphalt Pavement (RAP):

.1 RAP will be obtained from the cold milling of hot mix asphaltic concrete.

.2 Gradation of virgin aggregate plus RAP will meet the gradation of combined aggregates indicated above when RAP is used.

.2 Asphalt Cement:

.1 Asphalt Cement will be prepared by the refining of petroleum and shall not foam when heated to 177° C.

.2 The tolerance allowed by ASTM for testing precision will be applied for acceptance of asphalt cement.

.3 Asphalt cement will meet the following requirements:

Requirement	ASTM Test Method	Values
Kinematic Viscosity at 135°C, mm^2/sec	D2170	200 – 300
Absolute Viscosity at 60°C, 300mm, hg Vacuum, Pa.S	D2171	60 – 100
Penetration at 0°C, 200g, 60 sec; dmm	D5	30 min.
Flash Point (Cleveland Open Cup), °C	D92	201 min.
Thin Film Oven Test Penetration after test at 25°C, 100g, 5sec.; % of Original	D5	50 min.
Ductility at 25°C and 5 cm/min.; cm	D113	100 min.
Solubility in Trichloroethylene, % by Mass	D2042	99.5 min.

.4 At least two (2) weeks prior to commencing work, the Contractor will submit to an approved testing laboratory for design mix, at least 5 litres in a new metal container of the asphalt cement he intends to use in the work along with the name of the supplier of the asphalt cement. Additionally the Contractor will provide if required, a current temperature – viscosity chart for the asphalt cement showing Kinematic Viscosity in mm 2/sec over a temperature range of 105° C to 175° C, and submit the manufacturer's test data and certification that the asphalt cement meets the requirements within these specifications. The Contractor will pay for all shipping costs and for all laboratory tests.

2.2 MIX DESIGN

.1 Mix A, B, and C:

.1 The Contractor will retain a qualified independent testing consultant to perform trial asphalt mix designs. Trial mix designs are to be submitted to the Owner's Representative for review.

.2 The mix design will follow the Marshall Method of mix design as outlined in the latest edition of the Asphalt Institute Manual Series No. 2 (MS-2), and will include five (5) separate trial values of asphalt content.

.3 Contactor will pay for all trial mix designs and submissions.

.4 Include the following data with the trial mix design submission:

.1 Aggregate specific gravity and absorption.

.2 Sand equivalent, coarse aggregate fracture, flat and elongated particles, and percent manufactured sand values.

.3 Asphalt cement supplier/refinery, specific gravity and mixing and compaction temperatures, based on temperature – viscosity properties of asphalt cement.

.4 Aggregate gradation and blending proportions including design asphalt content.

.5 Maximum theoretical density of each trial asphalt content.

.6 Where RAP is to be incorporated into the mix supply, RAP gradation, RAP asphalt cement content and design recycle percentage.

.7 Data to satisfy the requirements of following sections.

.5 Design Mix:

.1 Mix A and Mix C – By Marshall method, 75 blows on each face of test specimens using mechanical compactor.

.2 Mix B – By Marshall method, 50 blows on each face of test specimens using mechanical compactor.

.6 Mix Physical Properties:

Property	**Mix A**	**Mix B**	**Mix C**	**Mix M**
Marshall Stability @ 60°C; kN	10.0 min.	8.0 min.	12.0 min.	6.0 min.
Marshall Flow , mm	2.0 – 4.0	2.0 – 4.0	2.0 – 4.0	2.0 - 4.0
Air Voids (%)	4.3– 4.7	3.3 – 3.7	3.8 – 4.2	2.8 – 3.2
Voids in Mineral Aggregate, %	12.0 min.	14.0 min.	13.5 min.	15 min.
Voids filled with Asphalt, %	60 – 70	70 – 80	65 – 80	70 – 85
Asphalt Film Thickness, um	6.0 min.	7.0 min.	7.0 min.	7.0 min
Tensile Strength Ratio (%)[1]	70 min.	75 min.	75 min.	–

[1] Tested in accordance with AASHTO T283 including optional freeze cycle.

2.3 JOB MIX FORMULA:

.1 Subject to approval by the Owner's Representative, the aggregate proportioning (including RAP), target gradation, asphalt content and air void content from the Mix Design will become the Job Mix Formula for the supply of hot mix asphalt.

.2 Once established, no alterations to the Job Mix Formula will be permitted unless the Contractor submits a new Job Mix Formula and it is approved by the Owner's Representative.

.3 If the sum of any alteration to the Job Mix Formula is in excess of any one of the following limits, a new Mix Design is required.
.1 + or – 5% passing the 5,000 µm sieve size.
.2 + or – 1% passing the 80 µm sieve size.
.3 + or – 0.30% asphalt content.

.4 Properties of the revised Job Mix Formula shall conform in properties to all requirements of this specification.

2.4 TOLERANCES:

.1 All mixtures will be supplied to the approved Job Mix Formula within the range of tolerances specified.

.2 Asphalt cement content: + or – 0.3% of approved Job Mix Formula value

.3 Aggregate Gradation:

Aggregate Passing Sieve Size (µm)	**Tolerance (% By Mass)**
Max. to size 5,000	+ or – 4.0
2,500 and 1,250	+ or – 3.0
630, 160 and 315	+ or – 2.0
80	+ or – 1.0

.4 Temperature: Mix temperature at point of plant discharge will not vary from that specified in the Job Mix Formula by more than + or – 10°C.

.5 Air Voids: + or – 1.0% of the Job Mix Formula value.

.6 Mixture Properties: Marshall Stability, Marshall Flow, Voids Filled with Asphalt, Voids in Mineral Aggregate and Film Thickness as per Mix Design.

.7 Moisture in Mix: Maximum permissible moisture at point of plant discharge is 0.3% by mass of mix.

.8 Asphalt cement recovered from freshly produced hot mix by the Abson Method, ASTM D1856 and subsequently tested in accordance with ASTM D5, will retain a minimum value of 50% of its original penetration value.

3. EXECUTION

3.1 CONTINUITY OF PRODUCTION

.1 During the time period that work is in progress on any project for which this specification is in effect, and at the discretion of the Owner's Representative, the plant may be limited to producing only the mix type required for that project.

3.2 PREPARATION OF HOT MIX MATERIAL

.1 Preparation of Mineral Aggregate:

.1 The mineral aggregates will be dried to ensure the mix is discharged containing not more than 0.2 percent moisture, heated so that when delivered to the mixing unit, they will be at as low a temperature as is consistent with proper mixing and laying and in no case to exceed 163°C. The mineral aggregate may be fed

simultaneously into the same dryer, but in all cases immediately after heating, they will be screened into bins.

.2 Where reclaimed asphalt pavement (RAP) will be incorporated into the mix, the virgin aggregate may be heated to a higher temperature such that when dry mixed with the RAP the temperature is less than 163° C. The RAP will be passed over a 50 mm screen prior to entering the plant.

.3 For batch plants RAP will be introduced into the weigh hopper after some aggregate has been weighed. For approved drum or continuous plant RAP will be introduced through a calibrated cold feeder.

.2 Preparation of Asphalt Cement:

.1 The asphalt cement will be carefully heated to a specified temperature between 118° C and 150° C depending on the temperature viscosity relationship, by approved means designed to secure uniform heating of the storage tank. The temperature differential aggregates and asphalt cement will at no time be more than 4° C.

.3 Composition of Mixture:

.1 The mineral aggregate and asphalt cement will be mixed in a manner to produce a homogeneous mixture in which all particles of the mineral aggregate are uniformly coated and in such proportions as to produce a mixture having asphalt cement content as indicated by the approved job mix formula. When the mixture is prepared in a twin pug mixer, the volume of mineral aggregate and asphalt cement will not be so great as to extend above the tops of the mixer blades when the blades are in a vertical position.

.2 After the hot aggregate and mineral filler have been charged into the mixer, and thoroughly mixed for a period of not less than fifteen (15) seconds, as directed by the Owner's Representative, the asphalt cement will be added and the mixing continued for a period of at least twenty-five (25) seconds, and not more than forty-five (45) seconds.

.3 Asphalt cement recovered from freshly produced hot mix by the Adson Method, ASTM D1856, and subsequently tested in accordance with ASTM D5, will retain a minimum value of fifty percent (50%) of its original penetration value.

3.3 COMPLIANCE WITH SPECIFICATIONS

.1 Aggregate Gradation:

.1 When the gradation does not comply with tolerances set forth in Section 2.1.1 of this specification, the Owner's Representative will initiate the following action:

.1 When two (2) consecutive gradation analyses identify non-compliance with the specified tolerances, the Contractor will be served notice and a third test will be initiated.

.2 If continued non-compliance is indicated from the third test, the Contractor will suspend production. He will not commence production again until he has demonstrated that corrective action has been taken and that the aggregate gradation is within the specified tolerance limits.

.2 Asphalt Temperature:

.1 Plant mix which does not meet temperature requirements of Section 2.1.2, at the point of plant discharge will be rejected.

3.4 PREPARATION FOR PAVING

.1 General:

.1 The Contractor will give the Owner's Representative a minimum of six (6) hours notice of his intention of commencing paving over any previously approved primed or tacked surface.

.2 The hot asphaltic mixture will be laid upon a dry firm base, true to grade and cross-section and free from all screening or other loose or foreign material. No hot mix will be spread when the sub-base is wet or when other conditions prevent proper spreading, finishing or compaction.

.3 If undercutting, and subsequent backfill with asphaltic concrete is done, the backfill operation will be performed sufficiently far ahead of the paving operation to allow the asphaltic concrete time to cool down enough to support equipment.

.2 Asphalt Placing Temperature:

.1 No asphalt will be dispatched to the field unless the temperature as issued by Environment Canada, is rising and meets the following minimum temperature requirements:

.1 Thickness less than 50 mm require +7° C.

.2 Thickness 50mm and less than 70 mm require +4° C.

.3 Thickness greater than 70 mm to 100 mm +2° C.

.2 A tolerance will be permitted for plant start-up temperature.

.3 No surface lift asphalt will be placed regardless of temperature until the road base is 5° C or higher.

.4 For the asphalt base lifts $\geq$ 100 – Compaction requirements shall govern.

.3 Hours of Operation:

.1 No loads of asphalt will be dispatched from the plant after sunset or during hours of darkness unless loads can be placed and compacted in accordance with these specifications, and suitable artificial illumination is provided, all subject to the approval of the Owner's Representative.

.4 Transportation of Hot Asphaltic Mixtures:

.1 To protect the load from adverse weather conditions during transit, trucks will carry at all times tarpaulins of sufficient weights and size to cover the entire open area of the truck box. Regardless of weather conditions, tarpaulins will be used when ordered by the Owner's Representative.

.2 Vehicles used for the transportation of hot mix asphalt from the plant to the site of work will have tight metal boxes previously cleaned of all foreign matter, the inside surface may be lightly lubricated with a thin oil or soap solution just before loading. Excess lubrication will not be permitted.

.3 The speed and weight of hauling trucks will be regulated so that, if in the opinion of the Owner's Representative, no damage will occur to any portion of the work underway. Any damage to the prime coat or the bituminous mat caused by the Contractor's equipment will be repaired by the Contractor at his own expense.

3.5 SPREADING AND FINISHING EQUIPMENT

.1 Asphalt Spreader:

.1 The track mounted spreading machine will be self-propelled and capable of placing a uniform layer of asphalt mix to a depth shown on the plans or as ordered by the Owner's Representative.

.2 The screed will include a tamping bar or vibratory strike-off device for use when required. The screed will strike-off the mix to the depth and cross-sections specified and produce a finished surface of uniform texture.

.3 Control of the screed will be by automatic sensing devices. Longitudinal control will be accomplished by a sensor, which follows a string-line, ski, or other reference. The grade sensor will be movable and mounts provided so that grade control can be established on either side of the paver. A slope control will also be provided to maintain the proper transverse slope of the screed.

.2 Hand Tools:

.1 Only lutes will be used during the spreading operation and when the asphalt is worked by hand in areas in which the paver cannot reach.

.2 Tamping irons used to consolidate the material along curbs, gutters and other structures inaccessible to the rollers will not weigh less than 11 kg and will have a bearing area not exceeding 310 sq. cm. Mechanical compaction equipment, satisfactory to the Owner's Representative, may be used instead of tamping irons.

.3 For purposes of checking the finished surface, Contractors must provide and carry on each paving machine a 3 metre straight edge with an attached level.

.4 The Contractor will supply propane torches for heating joints.

3.6 SPREADING OPERATIONS

.1 Pre-levelling for Asphalt Concrete:

.1 Pre-levelling of uneven or broken surfaces over which asphalt concrete is to be placed will be accomplished by the use of asphaltic concrete placed with a grader, paver, hand or by a combination of these methods as directed by the Owner's Representative.

.2 After placement, the asphalt concrete used for pre-levelling will be compacted thoroughly with a pneumatic-tired roller.

.2 Asphalt Spreading Operation:

.1 The asphaltic concrete will be laid to the design thickness as shown on the contract drawings or as specified. New construction where an established; i.e. curb, is lacking, a string-line reference will be required. The maximum spacing between string-line stakes will not exceed 10 metres. The line will be tensioned to 450 N and secured. Adjacent mats on the same lift are to be controlled by use of the grade sensor. No relaxation of the above procedure will be permitted without written approval of the Owner's Representative.

.2 The spreader will be operated in such a manner as to distribute the asphaltic concrete mix to proper cross-section, width and thickness without causing segregation of the mix. Small segregated areas that may occur will be corrected immediately. The forward motion of the spreader will be controlled so that no irregularities in the pavement surface caused by excessive speed. The rate of placement of the mixture will be uniform, and will be co-ordinated with the production rate of the asphalt plant without intermittent operation of the spreader.

.3 Any failure of the machine to produce a smooth, uniformly dense mat, free from irregularities, will be corrected immediately to the satisfaction of the Owner's Representative.

.3 Areas Inaccessible to Spreaders:

.1 Areas that are inaccessible to the spreading machine may be paved by other methods, as directed by the Owner's Representative. Graders or approved types of truck-attached spreaders will be used to pave inaccessible or irregularly shaped areas. Hand raking will be kept to a minimum.

.2 In small areas or where the use of mechanical equipment is not practical, the mix may be spread and finished by hand. The asphaltic mixture will be dumped on the area and immediately thereafter distributed into place by shovels and spread with lutes in a loose uniform layer of uniform density and correct depth. Material must be handled so as to avoid segregation. Excessive oiling of tools will not be tolerated. Loads will be dumped any faster than can be adequately

distributed by the rakers. Raking must be carefully and skilfully done, in such a manner that after the first passage of the roller over the mixture, a minimum amount of additional patching will be required.

3.7 COMPACTION EQUIPMENT

.1 The Contractor will supply sufficient compaction equipment to:

.1 Provide a compaction rate that will equal or exceed the placing rate of the spreader.

.2 Ensure full compaction of the asphaltic concrete before the temperature of the mat falls below 80° C.

3.8 COMPACTION PROCEDURES

.1 General:

.1 The rollers will be kept in continuous motion while on the hot mat in such a manner that all parts of the pavement receive equal compression.

.2 The surface of the mixture after compaction will be smooth and true to established section and grade. Areas of .09 sq. m. or more in which any mixture shows an excess or deficiency of asphalt, or uneven distribution of asphalt due to insufficient mixing, or which become loose, broken, ravelled, mixed with dirt, or is in any way defective, will be removed and replaced with fresh asphalt at the Contractors' expense and be immediately compacted to conform with the surrounding area.

.3 Areas inaccessible to the roller will be compacted with mechanical or hand tampers.

3.9 JOINTS

.1 Longitudinal and Transverse Joints:

.1 Longitudinal and transverse joints will be made in a careful manner.

.2 Paving joints will not be placed in the same vertical plane. Longitudinal joints will be offset at least 150 mm and transverse joints will be offset at least 2.0 m.

.3 Edges which additional pavement is to be placed will be vertically formed to true line. A lute will be used immediately behind the paver when required to obtain a true line and vertical edge.

.4 The exposed edges of all cold asphalt joints and the face of the concrete curb and gutter will be cleansed and painted with a thin coat of asphalt tack oil.

.5 In making the joint along any adjoining pavement and after the hot mixture is placed by the paver, just enough of the material will be carried back to fill any space left open. This joint will be properly "set up" with the back of the lute at proper height and level to receive the maximum compression under the rolling.

.6 At the end of each day's paving of the surface course and upper lift of the base course mix, the uncompleted paving mats will be provided with vertically cut transverse joints. Joints between old and new pavements or between successive days' work will be carefully made in such a manner as to ensure a thorough and continuous bond between the old and new surfaces.

3.10 SURFACE SMOOTHNESS

.1 General:

.1 The completed surface of the top or wearing surface will be of uniform texture, smooth, uniform as to crown and grade, and free from defects of all kinds. Tolerances in both profile and crown are:

.1 Base Course – 10 mm in 5 m.

.2 Surface Course – 6 mm in 5 m.

.2 When the surface smoothness does not comply with tolerances, the pavement surface will be corrected by the addition of asphalt concrete mixture of an appropriate class to low places or the removal of material from high places by methods satisfactory to the Owner’s Representative. Correction of defects will be carried out until there are no deviations anywhere greater than the allowable tolerances.

.2 Repair of Defective Areas:

.1 Asphalt spreaders will be required for areas greater than 90 sq. m. The required equipment will be on site before placing of asphalt hot mix may commence.

.2 Where sixty percent (60%) of the road requires patching and/or several other patches are required across the width of the street it will be necessary to extend the treatment across the full width of the street.

.3 Placing of a patch on top of another will not be acceptable and in these cases the original asphalt must be removed.

.4 Where, in the opinion of the Owner’s Representative, possible bridging exists, it will be necessary to remove the asphalt and the defective area. The base course will be brought back up to proper grade and use full depth asphalt patching.

.5 All patches should be square with no jagged edges.

.6 Asphalt patches should retain the proper cross-section and the edges will be properly feathered out.

.7 Asphalt skin patching will be subject to the temperature requirements for asphalt surfacing.

3.11 TESTING

.1 Quality Control:

.1 Quality control is the responsibility of the Contractor throughout every stage of the Work from aggregate processing to the final accepted product. Tests performed by the Owner's Representative will not be considered as quality control tests.

.2 The Contractor will be totally responsible for production of materials and construction that meet all specified requirements.

.3 All quality control will be conducted by qualified personnel. The Contractor will bear the cost of all quality control testing and consulting services.

.4 Pre-Production Quality Control Requirements are as follows:

Quality Control Requirement	**Test Standard**	**Minimum Frequency**
Asphalt Cement Certification	--	Once per Year or for change in supplier
Aggregate Physical Properties	See 2.2.5	Once per Year or for change in source
Crushed Coarse Aggregate Gradation Analysis and Fracture Content Manufactured Sand Aggregate Gradation Natural Fine Aggregate Gradation Blend Sand Aggregate Gradation	ASTM C 136 ASTM D 5821 ASTM C 117 ASTM C 126 ASTM C 117 ASTM C 126 ASTM C 117 ASTM C 126	One for every 1000 tonne of each class of material processed into stockpile, or one analysis for each material every production day when production rate is less than 1000 tonne.
Reclaimed Asphalt Pavement (RAP) Asphalt Content and Extracted Aggregate Gradation	ASTM D 2172 ASTM C 117 ASTM C 136	One for each 500 tonne delivered to stockpile, or one for each location when delivery rate is less than 500 tonne
Penetration of asphalt cement recovered from RAP by Abson Method	ASTM D 1856 ASTM D 5	One for each 2000 tonne delivered to stockpile
Trial Mix Design by Marshall Method	ASPHALT INSTITUTE MS-2	One per mix type every 3 years, or as required for a change in asphalt cement supply, aggregate gradation or aggregate source. *
Plant Calibration	--	As required

* A laboratory/plant job mix formula verification is required each year when a trial mix design is not conducted.

.5 Pre-Production Quality Control test data will be reported to the Owner's Representative one week prior to commencing the project, or as requested.

.6 Post Production Quality Control Requirements are as follows:

Quality Control Requirement	**Test Standard**	**Minimum Frequency**
Hot Mix Asphalt Analysis (including Asphalt Content, Aggregate Gradation, Marshall Density and Void Properties)	ASTM D 6307 ASTM C 117 ASTM C 136	One for every 500 tonne of each mix type supplied under this specification. *
Quality Control Charts (including 3 test running average for Binder Content, Aggregate Gradation, Marshall Density and Void Properties)	ASTM D 6307 ASTM C 117 ASTM C 136 ASTM D 3203 ASSHTO T312	For each hot mix analysis. Test results and updated 3 test running average to be submitted to the Owner's Representative as they become available.
Hot Mix Asphalt Temperature	--	Minimum frequency not specified.
Cold Feed Aggregate Analysis	ASTM C117 ASTM C 136	Minimum frequency not specified.
Maximum Relative Density of Hot Mix Asphalt	ASTM D 2041	Minimum frequency not specified.
Compaction Monitoring (Core or Nuclear Density)	ASTM D 2726 ASTM D 2950	Minimum frequency not specified. **

* Where an individual test indicates non-compliance, another test shall be initiated immediately.

** Coring is subject to approval by Owner's Representative.

.7 Post-Production Quality Control test data will be reported to the Owner's Representative daily as the work proceeds.

.2 Quality Control Compliance:

.1 Asphalt Content, Aggregate Gradation and Mixture Properties

.1 The test data derived by Post-Production Quality Control mix testing, will be compared to the tolerances set forth in the production tolerances, Section 2.4, of this specification. The Contractor will document, and make available to the Owner's Representative, any adjustments made to correct noncompliance with the specified tolerances.

.2 The Contractor will suspend mix production when the 3 test running average for any property is outside of the specified tolerance limits for three consecutive tests. Supply will not commence again until it is demonstrated that corrective action has been taken.

.2 Hot Mix Asphalt Temperature

.1 Plant mix that does not meet temperature requirements of the production tolerances, Section 2.4, at the point of plant discharge will be subject to rejection at the discretion of the Owner's Representative.

.3 Acceptance Sampling and Testing:

.1 Within this specification, certain requirements, limits and tolerances are specified regarding supplied materials and workmanship. Compliance with these requirements will be determined from acceptance testing as described in this section.

.2 Acceptance testing is the responsibility of the Owner's Representative.

.3 Initial acceptance testing will be undertaken free of cost to the Contractor.

.4 A lot is a portion of the work being considered for acceptance, and is defined as one day of plant production for each mix type. Any portion of the work may be deemed a lot by the Owner.

.5 Acceptance Testing requirements are as follows:

Quality Acceptance Requirement	**Test Standard**	**Minimum Frequency**
Hot Mix Asphalt Analysis (including Binder Content, Aggregate Gradation, Marshall Density, Maximum Relative Density, Void Properties, Marshall Stability and Flow)	ASTM D 6307 ASTM C 117 ASTM C 136 ASTM D 2041 ASTM D 3203 AASHTO T 312	For each mix type, one test for each 3500 sq.m. of placement, or three tests per lot, whichever is greater.
Compaction Testing (Core Density) and Thickness Determination	ASTM D 2726 ASTM D 3549	For each mix type, one test for each 2000 sq.m. of placement, or three tests per lot, whichever is greater.
Hot Mix Asphalt Temperature	–	No minimum frequency.

.6 Acceptance Sampling Procedures:

.1 Loose mix samples will be acquired from the Work site in accordance with Alberta Transportation Test (ATT) procedure ATT-37. Auger samples may be used if approved by both the Owner's Representative and the Contractor.

.2 The timing of mix sampling will be stratified, with each sample representing a similar production quantity.

.3 Core locations will be selected using stratified random sampling procedures. The lot will be divided into segments meeting or exceeding the minimum frequency indicated in the Acceptance Testing requirements (Section 3.11.3) and of approximately equal area. In each segment, a test site will be located using random numbers to determine the longitudinal and transverse coordinates.

.4 Areas within 3 m of transverse joints, or 0.3 m of a mat edge, are excluded from compaction acceptance sampling and testing.

.7 Reporting Protocols

.1 Test reporting accuracy will be as stipulated in the referenced test procedures, including:

.1 Gradation to the nearest whole number, except the percent passing the 80 mm sieve, which will be reported to the nearest 0.1%.

.2 Binder content to the nearest 0.01%

.3 Air voids and compaction to the nearest 0.1%.

.4 Thickness to the nearest whole millimeter (mm).

.2 Lot averages will be reported to the same accuracy as test results.

.4 Appeal of Acceptance Testing Results:

.1 General

.1 The Contractor may appeal the results of acceptance testing for Compaction Standard, Asphalt Content or Air Voids for any lot subject to rejection or unit price reduction. The notice of appeal will be in writing and submitted to the Owner’s Representative within 48 hours of receipt of the acceptance testing results.

.2 Appeals will only be considered if cause can be shown and the post-production quality control requirements have been satisfied.

.3 Quality Control tests initiated after the Contractor's receipt of the acceptance test results will not be considered when evaluating cause for appeal.

.4 Only Quality Control testing during production for the subject project will be considered when evaluating cause for appeal.

.2 Asphalt Content Appeal

.1 A stratified random sampling plan will be developed by the Owner’s Representative with the same number of segments as the original number of samples for the subject lot. Sufficient core sample will be acquired from each segment to enable asphalt content determinations.

.2 For asphalt content appeal testing, the Contractor will have the option for the testing to be done by the testing laboratory undertaking the project acceptance testing, or an independent testing laboratory selected by the Owner’s Representative.

.3 The average of the appeal test results will be used for acceptance and unit price adjustment, and shall be binding on both the Owner and the Contractor.

.4 If the average appeal test result verifies that any unit price reduction or rejection applies for that Lot, the costs of the appeal sampling and testing will be borne by the Contractor. If the results show that a penalty or rejection no longer applies, the sampling and appeal costs will be the responsibility of the Owner.

.3 Compaction Standard or Air Void Appeals

.1 The testing laboratory conducting the project acceptance sampling and testing will routinely retain companion samples sufficient for the determination of maximum relative density and/or Marshall density.

.2 For compaction standard or air void (Marshall Density) appeal testing, the Contractor will have the option for the testing to be done by the testing laboratory undertaking the project acceptance testing, or an independent testing laboratory selected by the Owner's Representative.

.3 The average of the appeal tests will be used for acceptance and unit price adjustment, and will be binding on both the Owner and the Contractor.

.4 If the new compaction standard verifies that any unit price reduction or rejection applies for that Lot, the costs of the appeal sampling and testing will be borne by the Contractor. If the result shows that a unit price reduction no longer applies, the appeal testing costs will be the responsibility of the Owner.

.5 If the new average air void content result verifies that any unit price reduction applies for that Lot, the costs of the appeal testing will be borne by the Contractor. If the results show that a unit price reduction no longer applies, the sampling and appeal costs will be the responsibility of the Owner.

.4 Core Density and Thickness Appeals

.1 Core density and thickness appeals will only be considered if a case can be made that the stratified random sampling plan was biased or testing was in error.

3.12 END PRODUCT ACCEPTANCE OR REJECTION

.1 General:

.1 The Contractor will provide an end product conforming to the quality and tolerance requirements of this specification. Where no tolerances are specified, the standard of workmanship will be in accordance with accepted industry standards.

.2 Acceptance of any Lot at full or increased payment will occur if there are no obvious defects and the Lot mean results for asphalt content, pavement density, air voids and thickness meet or exceed the specified tolerances. No obvious

defects include roller marks, tire marks, cracking or tearing, excessive bleeding, and surface segregation.

.3 Unit price reductions will only be applied on the basis on full acceptance testing in accordance with the Acceptance Testing Requirements Section 3.11.3.5.

.2 Asphalt Content:

.1 For full payment, the Lot Mean Asphalt Content must be within + 0.30% of the approved Job Mix Formula value, as specified in Section 2.4.

.2 Payment adjustment for asphalt content is as follows:

Asphalt Content Deviation from Job Mix Formula Value (%)	**Payment Adjustment Factor (PA_{AC})**
+ or – 0.30 or less	1.00
+ or – 0.31 to + or – 0.50	As per Chart A
Greater than + or – 0.50	Reject *

* Subject to removal and replacement at the discretion of the Owner's Representative.

.3 Pavement Compaction:

.1 For full or increased payment, the Lot Mean Pavement Compaction must be equal to or greater than 93% of the Lot Mean Maximum Relative Density.

.2 Payment adjustment for pavement compaction is as follows:

Pavement Compaction % of Maximum Relative Density	**Payment Adjustment Factor (PA_{COM})**
93.5 to 95.5 *	1.02 **
93.0 to 93.4	1.00
90.0 to 92.9	As per Chart B
Less than 90.0	Reject ***

* Where no individual test result is less than 93%, otherwise the payment adjustment factor is 1.00.

** For Category A Projects only.

***Subject to removal and replacement at the discretion of the Owner's Representative.

.4 Air Void Content:

.1 For full payment, the Lot Mean Air Voids must be within + or - 1.0% of the Job Mix Formula value, as specified in Section 2.4.

.2 Payment adjustment for air void content is as follows:

Air Void Content % Deviation from	**Payment Adjustment Factor (PA_{AV})**

Job Mix Formula Value	
Less than 1.0	1.00
1.0 to 2.0	As per Chart C
Greater than 2.0 (Lower Lifts)	0.80
Greater than 2.0 (Upper Lifts)	0.60

.5 Thickness (New Construction and Top Lift Only):

.1 Pavement of any type found to be deficient in thickness by more than 6% mm will be removed and replaced by pavement of specified thickness, at the Contractor's expense.

.2 The Lot Mean Thickness for any Lot will be determined on the basis of the acceptance cores described in the Acceptance Testing Requirements, Section 3.11.3.4. Core thickness will be determined in accordance with ASTM D 3549.

.3 If the deficiency of any individual core exceeds 6% mm, additional cores may be extracted in the proximity to the location of the core of excessive deficiency, to identify the extremities of the pavement area subject to be removed and replaced. The Contractor will pay for such additional coring.

.4 For full payment, the Lot Mean Thickness must not be deficient by greater than 2%.

.5 Payment adjustment for thickness is as follows:

Thickness Deficiency (% of Specified Thickness)	**Payment Adjustment Factor * (PA_T)**	
	Total Thickness (Single or Multiple Lifts)	**Top Lift Thickness (Multiple Lifts)**
2% or Less	1.00	1.00
2% to 6% Deficient	As Per Chart D	As Per Chart D
More than 6% Deficient	Reject **	Reject **

* A single Thickness Payment Adjustment Factor shall be applied, Total Thickness or Top Lift Thickness, whichever results in the greatest adjustment.

** Subject to removal and replacement at the discretion of the Owner's Representative.

.6 Smoothness:

.1 The completed asphalt concrete surface will be true to the dimensional and tolerance requirements of the specifications and drawings. Unless detailed otherwise in the contract documents, the tolerances in both profile and crown are:

.1 Base Course – 10 mm in 3 m

.2 Surface Course – 5 mm in 3 m

.2 When deviations in excess of the above tolerances are found, the pavement surface will be corrected by methods satisfactory to the Owner's Representative. Correction of defects will be carried out until there.

.7 Segregation:

.1 The finished surface will have a uniform texture and be free of segregated areas. A segregated area is defined as an area of the pavement where the texture differs visually from the texture of the surrounding pavement.

.2 All segregation will be evaluated by the Owner's Representative to determine repair requirements.

.3 The severity of segregation will be rated as follows:

.1 Slight - The matrix of asphalt cement and fine aggregate is in place between the coarse aggregate particles, however there is more stone in comparison to the surrounding acceptable mix.

.2 Moderate - Significantly more stone than the surrounding mix, and exhibit a lack of surrounding matrix.

.3 Severe - Appears as an area of very stony mix, stone against stone, with very little or no matrix.

.4 Segregated areas will be repaired by the Contractor as directed by the Owner's Representative. The following methods of repair are identified.

.1 Slight - Squeegee asphalt to completely fill the surface voids.

.2 Moderate - slurry seal for full mat width.

.3 Severe - removal and replacement or overlay.

.5 All repairs will be regular in shape and finished using good workmanship practices to provide an appearance suitable to the Owner's Representative.

.6 Any other methods of repair proposed by the Contractor will be subject to the approval of the Owner's Representative.

.7 Repairs will be carried out by the Contractor at their expense.

3.13 PAYMENT ADJUSTMENT FOR NON-COMPLIANCE

.1 The Unit Price applicable to each Lot quantity of asphalt concrete will be calculated as follows:

Adjusted Unit Bid Price = (Unit Bid Price) x (PA_{AC}) x (PA_{COM}) x (PA_{AV}) x (PA_{T})

Where:

PA_{AC} = Asphalt Content Payment Adjustment

PA_{COM} = Pavement Compaction Payment Adjustment

PA_{AV} = Air Void Payment Adjustment

PA_T = Thickness Payment Adjustment

CHART A
ASPHALT CONTENT
PAYMENT ADJUSTMENT FACTOR

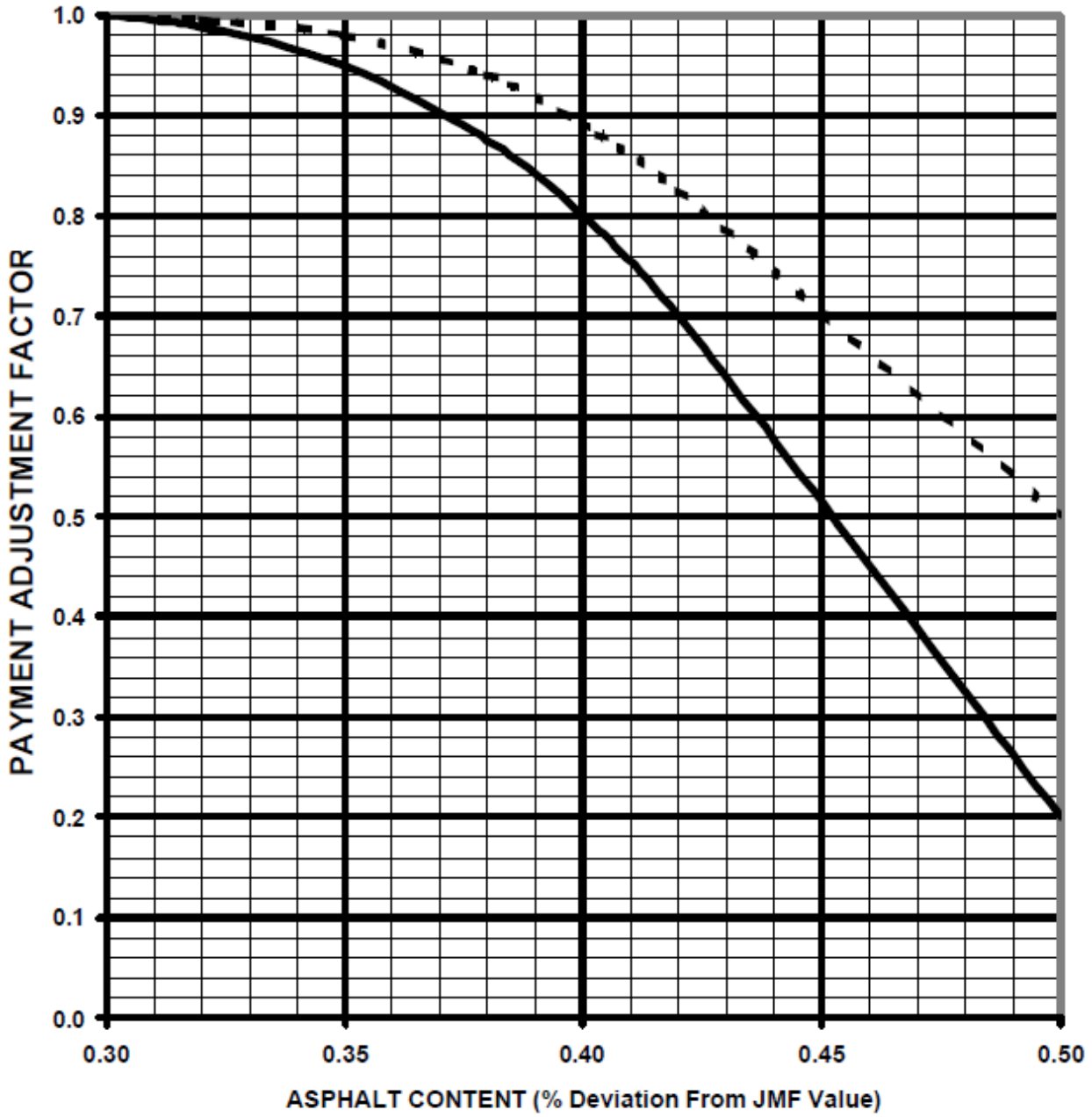


CHART B
COMPACTION
PAYMENT ADJUSTMENT FACTOR

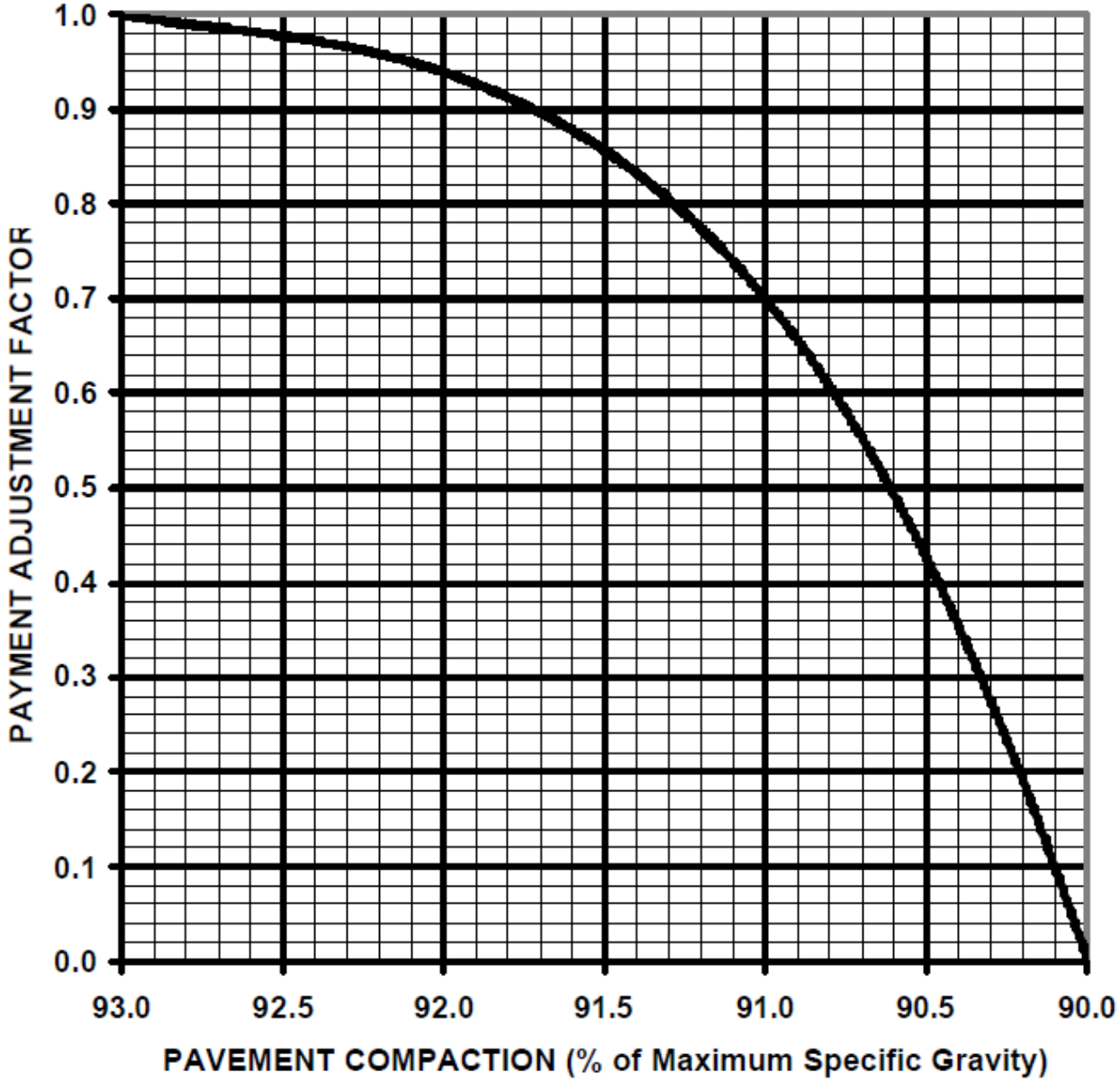


CHART C
AIR VOID CONTENT
PAYMENT ADJUSTMENT FACTOR

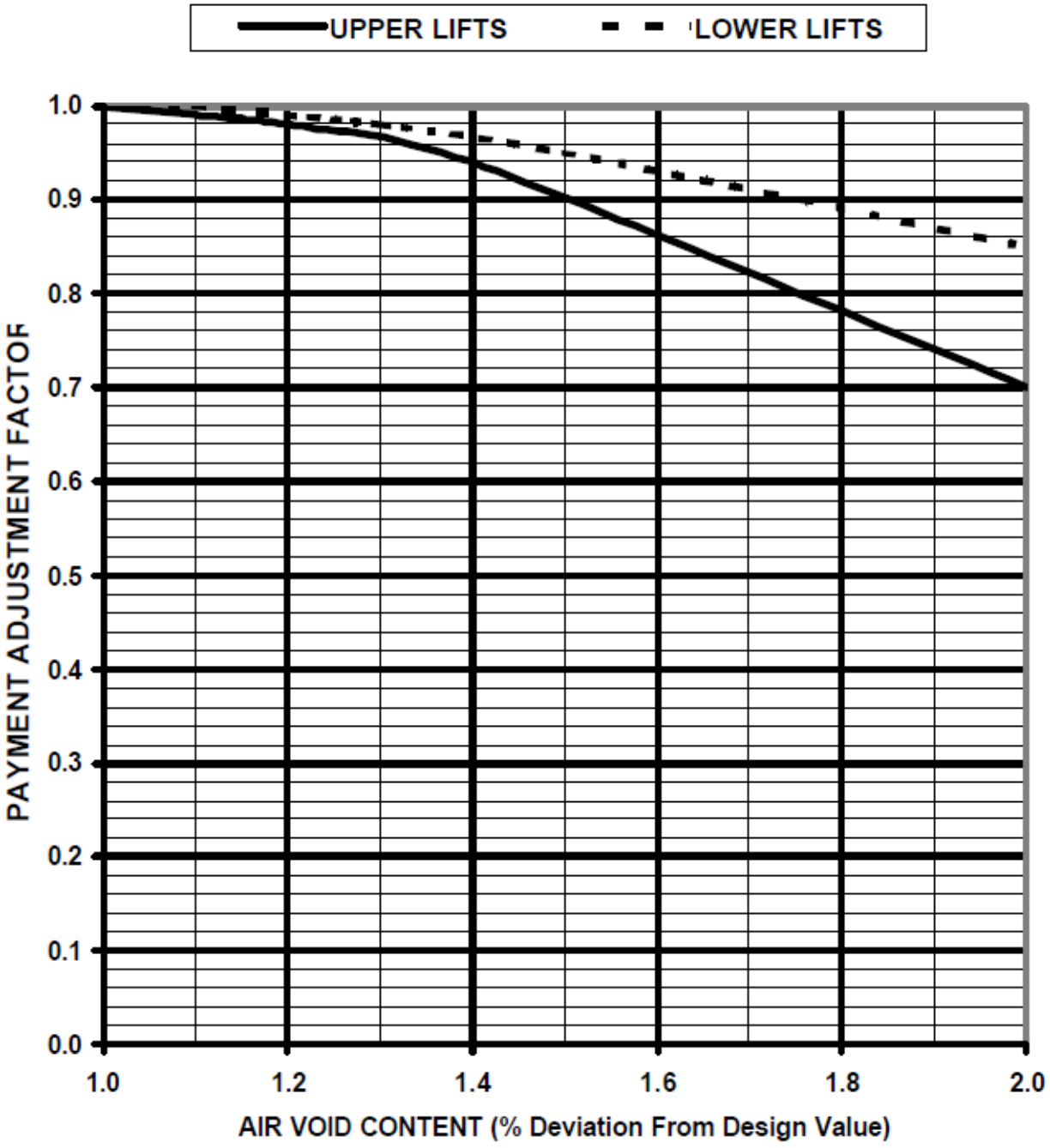
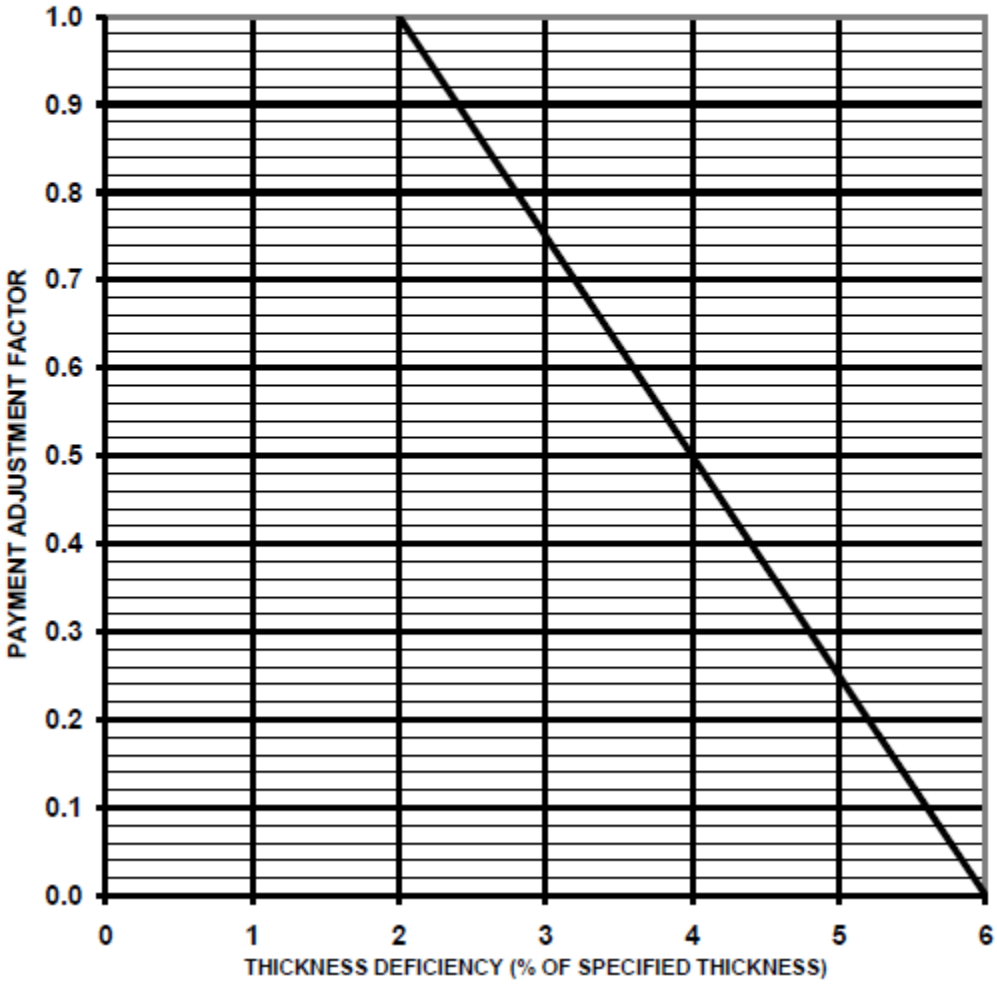


CHART D
AVERAGE THICKNESS
PAYMENT ADJUSTMENT FACTOR



END OF SECTION

1. GENERAL

1.1 INTENT

.1 Read this Section in conjunction with other Sections for location use and placement of “Concrete Sidewalks, Curb & Gutters and Swales” specified herein.

1.2 SUBMITTALS

.1 Provide concrete mix design for review.

.2 Submit product literature for curing compound.

.3 Provide shop drawings for review with profiles and dimensional information for any sidewalks, curb & gutters and swales that differ from the detailed drawings.

1.3 TESTING

.1 Owner may appoint and pay for services of testing agency to do the following:

.1 Test fine and coarse aggregate.

.2 Take three test cylinders from load, or fraction thereof, of each type of concrete placed in any one day. Test cylinders will be cured on job-site under same conditions as concrete it represents.

.3 Test one cylinder in 7 days and remaining two cylinders in 28 days.

.4 Take at least one slump test and one entrained air test for each set of test cylinders taken.

.5 Take one additional test cylinder when the temperature is likely to fall below 5°C within 48 hours after placement and no provisions have been made to heat the concrete to greater than 10°C. Test cylinder will be cured on job-site under same conditions as concrete it represents and to be tested in 7 days.

.6 Immediately report results of field tests to the Contractor, for information only.

.2 Submit the following to testing firm's laboratory:

.1 Proposed concrete mix design.

.2 Samples of fine and coarse aggregate, obtained in accordance with CSA A23.2-94, Sampling Aggregates For Use in Concrete.

.3 Results of Petrographic Examination to CSA A23.2-94, of aggregate representative of materials to be used for project.

.3 Advise testing firm in advance of concrete placement.

.4 The Owner may order additional testing at any time. Pay for those tests which indicate failure to comply with requirements.

2. PRODUCTS

2.1 GENERAL

.1 The Work covered in this Section consists of the furnishing of all labour, plant and material and performing all operations in connection with waste excavation, sub-grade preparation, granular base, forming, supply and placement of reinforcing, supply and placement of concrete, surface finishing, jointing, concrete protection, backfilling, tolerances, maintenance and incidental items required to complete this item of Work.

2.2 MATERIALS

.1 Concrete:

.1 Concrete will be produced to provide 32 MPa minimum compressive strength at 28 days. Maximum course aggregate size will be 25 mm, aggregates will comply with latest revision of CAN3-A23.1. Water/cement ratio will meet CAN3-A23.1, Table 7, for Class A Exposure. Slump will be 40 mm to 75 mm at time of placement. Air content will be 5.5% to 8% at time of placing. Submit a mix design to the Owners Representative two weeks prior to commencing work for approval.

.2 After September 15, Concrete will be produced to provide 27.5 MPa minimum compressive strength at 7 days and 32 MPa minimum compressive strength at 28 days. Maximum course aggregate size will be 25mm, aggregates will comply with latest revision of CAN3-A23.1. Water/cement ratio will meet CAN3-A23.1, Table 7, for Class A Exposure. Slump will be 40mm to 75mm at time of placement. Air content will be 6% to 8% at time of placing. Submit a mix design to the Owner's Representative two weeks prior to commencing work for approval.

.2 Cement:

.1 Cement will meet the requirements of CAN3-A5 and will be Portland Cement, Type HS Sulfate Resistant.

.3 Granular Base:

.1 Refer to Section 02273.

.4 Curing Compound:

.1 Curing Compound will comply with latest revision of ASTM C309 and be a Fugitive Dye Type.

.5 Formwork:

.1 Formwork will be steel or wood, free from warps, dents, nail-holes and other defects and will be of adequate strength to restrain concrete loads.

.2 Form release agent will be a non-staining mineral type with chemically active release agents containing compounds that react with free lime to provide water soluble soap, such as Formshield by W.R. Grace.

.6 Admixtures:

.1 Air-entraining admixture will comply with latest revision of CAN3-A266.1

.2 Water reducing admixture will be a type WN complying with latest revision of CAN3-A266.2

.3 Admixtures to be used only when approved by the Owner's Representative.

.7 Reinforcing:

.1 Reinforcing will be clean and free from defects, kinks, loose rust or mill scale at the time concrete is placed. Remove any coatings of hardened mortar and mill scale from the steel.

.2 Cold drawn steel wire will meet the requirements of ASTM Designation A-82.

.3 Wire mesh will meet the requirements of ASTM Designation A-185.

.4 Bar reinforcing will meet ASTM Designation A-184 and ASTM Designation A-304 intermediate grade new billet deformed steel.

.8 Accessories:

.1 Form oil: non-staining mineral type.

.2 Formwork: pre-manufactured and profiled steel or wood forms.

.3 Poured Joint Filler: Asphalt elastic compound to ASTM D1190-96.

.4 Preformed Joint Filler: asphalt impregnated type to ASTM D1751-83.

.5 Curing Compound: to ASTM C309-97, Type 2 white pigmented, Class B resin-based, liquid membrane-forming type.

3. EXECUTION

3.1 SUBGRADE PREPARATION

.1 Subgrade will be excavated to the grade and section required to meet final curb and gutter, swale and sidewalk grades, alignments shown the contract documents and as specified by the Owner's Representative.

.2 Excavation includes the removal and disposal of all material of whatever nature encountered, taken within the boundaries necessary for preparation and construction of concrete sidewalk, curb and gutter or monolithic sidewalk, catch basins and other structures to the required cross-section, alignment and depth. Remove all deleterious matter encountered at subgrade level and replace with approved gravel fill compacted in place. The subgrade must provide a uniform bearing capacity over the area of the structure. Excavation behind the concrete structure will be limited to 500 mm unless otherwise specified by the Owner's Representative. Where existing lawns are encountered the Contractor will cut the sod in a neat straight line to facilitate restoration with full width sod placement. Stockpile sufficient suitable earth materials necessary to backfill the concrete structures. Dispose of surplus excavated materials.

.3 Compact the top 150 mm of the subgrade to a minimum of 95% of Standard Proctor Density prior to placing granular materials.

.4 Where unstable material is encountered during excavation, notify the Owner's Representative and if directed, excavate the unstable material and backfill the area with approved pit-run gravel fill. The Contractor will be responsible for the replacement, at his own expense, of any failure of the sidewalk, swale or curb and gutter which, in the opinion of the Owner's Representative, was caused by an unstable base.

3.2 GRANULAR BASE

.1 Granular base will be placed and compacted to a uniform 75 mm minimum thickness below all concrete curb and gutter, sidewalk, swales and other structures. Granular base will be compacted to minimum of 98% of Maximum Standard Proctor Density. If there is a possibility of excessive absorption of water from the concrete by the gravel base, sprinkle the base with water as required.

3.3 FORMING

.1 Vertical surfaces will be formed to full depth. Forms will be securely positioned to the
required lines and grades. All forms will be coated with form release agent.

.2 Extruding and slip forming will be permitted subject to evaluation of the form cross section and mechanical equipment being proposed. Automatic grade and alignment control will be required.

.3 Do not place concrete until forms and/or string lines have been reviewed by the Owner's Representative.

3.4 CONCRETE

.1 Ready mixed concrete will be mixed and delivered in accordance with the requirements set forth in ASTM Designation C-94, CSA Standard A.23.1.3 or the latest revision thereof and will be subject to all provisions herein relative to materials, strength, proportioning, consistency, measurement and mixing.

.2 Hand mixing is not permitted.

.3 For site mixing, Contractor will submit specifications for batching and mixing equipment to the Owner's Representative for approval.

.4 Deliver concrete to the point of deposit, rehandling of concrete will not be permitted. Concrete placement temperature will not be less than 20 degrees C or greater the 25 degrees C. Concrete operations will be continuous until the section, panel or scheduled pour is completed with the interval between placement of successive batches not greater than 45 minutes.

.5 Place the concrete in a manner to prevent segregation of ingredients taking special care to place the concrete against the forms, particularly in corners, in order to prevent voids, rough areas and honeycombing.

.6 Place concrete to the full specified depth. After spreading, strike-off and compact with an approved vibrating screed operating at a minimum of 5000 cycles per minute. Take every precaution to make all concrete solid, compact, watertight and smooth. Prevent concrete spillage into valve boxes, catch basins and related appurtenances.

.7 Concrete surfaces will be finished to a smooth uniform finish, free of open texturing and exposed aggregate. Excess mortar will not be worked to the surface by excess trowelling. Neat cement will not be used as a drier to facilitate finishing. A broom finish surface will be applied to provide a non-skid texture. Outside edges of sidewalks and each edge of joints will be finished with a 50 mm edging tool having a 6 mm radius. Maintain the concrete structures cross section, grade and alignment when constructing the joint and when completing the concrete finishing.

.8 Finish surfaces will be to within 3 mm in 3 metres from line, level or grade as measured with a straight edge placed on the surface. End all pours at a construction joint.

.9 Provide 300mm long 10M rebar dowels at 300 mm on-centre to tie in to existing concrete structures and tie into successive pours. Drill 12 mm diameter by 150 mm deep holes in concrete structure. Set dowels into holes with hammer.

.10 After initial set of concrete, the face of curb form will be removed and the curb will be finished with an approved nylon brush pulled lengthwise along the curb and gutter. Take adequate care in removing forms to avoid marring the concrete, patch as may be necessary immediately after removal of forms.

.11 All concrete will be cured and protected in accordance with CAN3-A23.1. Spray exposed surfaces with curing compound immediately after form removal and/or patching. After the application is complete and set the surface will have a uniform appearance and colour.

.12 Contractor will mark the sidewalk or curb and gutter with an approved marking tool indicating Contractor's name and year constructed. The letters and numerals of the marking tool will be 40 mm high. Make marks at the ends of each block and if the construction begins or terminates within the middle of the block, the Contractor will also mark these locations. Mark the corner of each apron and driveway.

.13 Contractor will take all necessary action to ensure the cross section, grade and alignment of the concretes structure is maintained until the concrete has hardened sufficiently. This may include the installation of hand forms on extruded or slip formed concrete.

.14 Heavy equipment used for road construction will not be used near the concrete for a period of 7 days after the pour or until the concrete has reached 70% of the specified 28 day compressive strength.

3.5 SURFACE, EXPANSION AND CONTRACTION JOINTS

.1 Surface joints will be 15 mm deep by 5 mm wide and constructed by means of a marking tool or other approved method. Surface joints will be constructed parallel and perpendicular to the concrete structure edge as shown on the Standard Drawings.

.2 Contraction joints will be constructed 35 mm deep by 5 mm wide where shown on the drawings, but not more than 3 metres apart, by means of marking tool or other approved method. Round joint edges with an edger having a radius of 6 mm. Where sidewalk is adjacent to curb, joints of curb and gutters and sidewalk will coincide.

.3 Expansion joints will be installed around manholes and catch basins and along any buildings or permanent structures or where specified. Use an approved mastic pre-formed material, 15 mm by 90 mm cross-section, laid plumb and straight 6 mm below the finished sidewalk grade.

.4 Saw cut joints as required with a concrete saw capable of producing a true straight joint of constant depth.

.5 Carefully fit, cut and mark the sidewalk around all openings, iron covers, manholes, vaults, valve boxes, lamp standards, hydrants, poles and other surface installations. The surface joint must be neatly tooled and marked. Place expansion joint material to the full depth of the sidewalk around all surface structures.

.6 Construct surface, expansion and contraction joints ensuring the cross section, grade and alignment of the concrete structure is maintained.

3.6 FINISHING

.1 Remove forms on the face concrete structures after initial set of concrete.

.2 Do not add water before or during finishing operation.

.3 Finish concrete surfaces as follows:

.1 Do not trowel surfaces while bleed water is still present. Work surfaces as little as possible to achieve finish.

.2 Edge Finishing: finish edges, including joints, with 50 mm wide edging tool having 6 mm radius edge.

.3 Where broom finish is specified, use approved nylon brush to provide uniform texture and pattern.

.4 Ensure all joints, edges and surface works have a uniform, consistent and sealed finish.

.5 Ensure the concrete structure cross section, grade and alignment tolerances are achieved when finishing is complete.

3.7 DRIVEWAYS

.1 Driveways will be constructed where shown on the drawings or where directed by the Owner's Representative.

3.8 PROTECTION

.1 The Contractor will provide all equipment, materials and labour necessary to protect the concrete work from rain, dust, frost or other weather elements. The Contractor will provide all barricades, temporary structures, tarps and other measures for the protection of the concrete structures for a period of 5 days after finishing.

.2 If mean daily temperature falls below 5^{o} C, provide cold weather protection as set out in CAN3-A23.1

.3 The Contractor will provide and maintain all equipment, materials and labour necessary to protect the concrete work from people, vehicles, animals and to protect the public. Protection of the concrete structures and the public include barricades, flashers, signage, temporary ramps, temporary walkways, flagging, construction fencing and other protective measures.

.4 The Contractor will remain onsite to address any concrete finish issues that may arise until the concrete has sufficiently cured where the surface cannot be easily marked.

3.9 WHEEL CHAIR RAMPS

.1 Wheel Chair Ramps will be constructed at all intersections for new construction or in existing sidewalks as shown on the drawings and as directed by the Owner's Representative.

3.10 REINFORCING

.1 Reinforce monolithic and separate sidewalk, at public lanes, private and commercial driveways, with 10M bars @ 300 mm on-centre longitudinally with 50 mm cover of concrete on the edges and as shown on the Drawings.

.2 Reinforce curb & gutter and swales at public lanes, commercial driveways, and road crossings with 10M bars as shown on the Drawings.

.3 Reinforce aprons, private and commercial driveways with 10M bars @ 300 mm on-centre longitudinally and transversely with 50 mm cover of concrete on the edges.

.4 Bar reinforcement will be supported above the compacted granular subgrade to ensure 50 mm cover of concrete. When overlapping bar reinforcement, the overlap length will be 36 bar diameters with the bars wired together.

.5 Reinforce concrete structures as shown on the drawings, as indicated in the specifications and as directed by the Owner's Representative.

3.11 BACKFILL

.1 Concrete will be cured for 7 days prior to backfilling. All concrete will be backfilled to the require grades to accommodate landscape and hard surface works.

.2 In landscaped areas adjacent to the concrete structures, backfill with suitable earth materials compacted to minimum of 95% of Maximum Standard Proctor Density. Compact the backfill to the grade necessary to accommodate the specified surface restoration treatment (topsoil, sod, granular material, mulch, landscape features, etc.).

.3 In hard surface areas adjacent to concrete structures, backfill with suitable earth materials compacted to minimum of 98% of Maximum Standard Proctor Density.

Compact the backfill to the grade necessary to accommodate the specified surface restoration treatment (concrete paving stone, asphalt, foundation, etc.).

3.12 ROAD RESTORATION

.1 Where the concrete structures are to be constructed on a road that is gravelled or paved, the excavation for the installation will be limited to 500 mm from the edge of the concrete structure. Excavation beyond the limits will be the responsibility of the Contractor and any additional costs removals and rehabilitation work will be at the Contractors expense.

.2 Asphalt will be saw cut to achieve a neat vertical face for the rehabilitation work tie-in. Remove and dispose of materials necessary to effect construction of the work. Rehabilitate the road to specified structural sections with the specified granular and asphalt materials.

4. TOLERANCES

.1 Concrete structures will be constructed to meet the following tolerances for the finish concrete surfaces:

.1 Trueness of surface: 6 mm maximum deviation in 3 m length.

.2 Elevation: 10 mm maximum deviation from design.

.3 Alignment: 15 mm maximum deviation from design.

.4 Cross section: 5 mm maximum deviation from design.

.2 Concrete structures determined to be non-compliant with the tolerances will not be measured for payment or will be replaced as directed by the Owner's Representative.

5. ADJUSTMENT OF PAYMENT FOR LOW STRENGTH CONCRETE

.1 Where the average applicable 28-day or 7-day compressive strength of the test cylinders exceeds the minimum design strength, the concrete will be paid for at the contract unit prices.

.2 Where compressive strengths of the test cylinders for any portion of the work falls below the requirements specified herein, payment will be as follows:

% Minimum Allowable Strength	% Payment
100% or greater	100%
80% - 99.9%	Bid Unit Price x Ave. Test Strength / Minimum Allowable Strength
70% - 79.9%	No payment or replace if directed by the Owner's Representative
Less than 70%	Replacement

6. MAINTENANCE STANDARDS

.1 Maintenance standards will apply from substantial performance of the contract through to the warranty period and final acceptance for all sidewalks, curb and gutters, swales and other related concrete structure works. Maintenance work will be completed before the expiration of the warranty period unless the deficiencies are hazardous to the Public then the maintenance work will be performed immediately by the Contractor.

6.1 SURFACE CONDITION

.1 Where the surface of a section of concrete exhibits a loss of surface mortar and/or aggregate more than 3 mm deep or if there is evidence of loose or lifting mortar, replace that section of concrete as directed by the Owner's Representative.

.2 A replacement section of concrete is a 3.0m length of curb and gutter, swale or similar concrete structure, and a 1.5 m length of sidewalk flag section or similar concrete structure.

.3 Where possible, replacement sections of concrete to be defined by existing surface, expansion or contraction joints.

6.2 SIDEWALK FAILURES

.1 Replacement of affected sections will be required when one or more of the following exists:

.1 Any crack greater than 3 mm in width.

.2 Any crack with vertical displacement or chipping or spalling edges.

.3 Any longitudinal crack greater than or equal to 1.5 mm in width.

.4 Displacement at a joint of greater than or equal to 12 mm.

.5 Dished surface of sidewalk where water ponds.

.6 Reverse crossfall or crossfall greater than 8% or less than 0.7%.

.7 Random cracking of any size.

.8 Spalling or loss of mortar to the finish surface.

.9 Any feature considered detrimental to pedestrian safety or the walk appearance.

6.3 SECTIONAL REPLACEMENT

.1 All breakout must end at a contraction, expansion or surface joint. Saw cut edge of surface mark to a minimum depth of 30 mm. Contraction joints may be hand chiselled to produce a true straight joint. The concrete edge must be exposed and cleaned to produce a good bond. Replacement sections will be connected to adjacent concrete structures with 150mm long 10M rebar dowels at 300mm on-centre.

.2 Saw cuts may be permitted to separate curb and gutter from the sidewalk flag section on monolithic sidewalks, at the discretion of the Owner's Representative.

6.4 GROUTING

.1 Grouting of cracks is not permitted.

6.5 MORTAR, TAR AND/OR ASPHALT ON WALK

.1 Mortar, tar and/or asphalt on the flag section of the concrete sidewalk is not permitted.

END OF SECTION

1. GENERAL

1.1 INTENT

.1 Read this Section in conjunction with other Sections for location, use and placement of "Proof Rolling" specified herein.

.2 This Section is intended to be used as a reference Section. Provide proof rolling equipment and perform the Proof Rolling as required. Proof Rolling work is considered incidental to the Contract.

2. PRODUCTS

2.1 PROOF ROLLING EQUIPMENT

.1 Perform proof rolling using a loaded test vehicle of 8,200 kg axle load or a roller of 45,400 kg gross mass with four pneumatic tires each carrying 11,350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 915 mm maximum.

.2 Owner's Representative may authorize use of other acceptable proof rolling equipment.

3. EXECUTION

3.1 GENERAL

.1 Proof roll at level in grade indicated. If alternative proof rolling equipment is authorized, Owner's Representative will determine level of proof rolling.

.2 Where proof rolling reveals areas of defective subgrade, Owner's Representative will determine limits of unsuitable subgrade excavation and specify replacement material.

3.2 SUBGRADE PROOF ROLLING

.1 Perform subgrade proof rolling on a daily basis prior to the placement of geotextile fabric, sub-base granular material, and base granular material immediately after the subgrade material has been shaped, graded and compacted to the specified density and moisture content. The loaded vehicle to be driven slowly (walking pace) in a systematic pattern so that each successive pass is next to or partially overlaps the previous pass. Where the area to be tested is large enough, successive passes will be conducted at right angles across the previous passes. While the test is being performed, the Owner's Representative will observe the surface for deflections, cracking or rutting.

.2 Once the subgrade proof roll is complete and deficient areas have been sub cut and repaired, the Contractor is now responsible for the condition of the road. Any further road failures in the future due to weather or any other conditions will be the responsibility of the Contractor to repair at his cost.

3.3 SUB-BASE PROOF ROLLING

Perform sub-base proof rolling on a daily basis prior to the placement of base granular material and immediately after the sub-base granular material has been placed, shaped, graded and compacted to the specified density and moisture content. The loaded vehicle to be driven slowly (walking pace) in a systematic pattern so that each successive pass is next to or partially overlaps the previous pass. Where the area to be tested is large enough, successive passes will be conducted at right angles across the previous passes. While the test is being performed, the Owner's Representative will observe the surface for deflections, cracking or rutting.

3.4 BASE PROOF ROLLING

.1 Perform base proof rolling immediately prior to the placement of asphalt and after the base material has been placed, shaped, graded and compacted to the specified density and moisture content. The loaded vehicle to be driven slowly (walking pace) in a systematic pattern so that each successive pass is next to or partially overlaps the previous pass. Where the area to be tested is large enough, successive passes will be conducted at right angles across the previous passes. While the test is being performed, the Owner's Representative will observe the surface for deflections, cracking or rutting.

3.5 TOLERANCES

.1 Where an area of subgrade material deflects, then rebounds more than 10 mm, the area will be deemed as failing the proof roll test. The failed areas identified by the Owner's Representative will be repaired to a passing condition and re-tested by proof roll method again at no cost to the Owner.

.2 Where an area of sub-base granular material deflects, then rebounds more than 10 mm, the area will be deemed as failing the proof roll test. The failed areas identified by the Owner's Representative will be repaired to a passing condition and re-tested by proof roll method again at no cost to the Owner.

.3 Where an area of base granular material deflects, then rebounds more than 5 mm, the area will be deemed as failing the proof roll test. The failed areas identified by the Owner's Representative will be repaired to a passing condition and re-tested by proof roll method again at no cost to the Owner.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Concrete pavers, sand setting bed, jointing sand

1.2 RELATED SECTIONS

.1 Section 31 05 16 - Aggregate Materials.

.2 Section 31 22 13 - Rough Grading: Preparation of site for paving and base.

.3 Section 31 22 19 - Finish Grading: Preparation of subsoil at pavement perimeter.

1.3 PRICE AND PAYMENT PROCEDURES

.1 Unit Prices: Section 01 22 10 - Measurement of quantities affecting this section.

1.4 REFERENCES

.1 ASTM C936/C936M-16 - Standard Specification for Solid Concrete Interlocking Paving Units.

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submittal procedures.

.2 Product Data: Provide characteristics of paver unit, dimensions, special shapes.

.3 Samples:

- .1 Pavers: Submit two (2) samples of each paver size, illustrating style, size, colour range and surface texture of units being provided.
- .2 Edge Restraint: 90cm samples of edging.

.4 Submit sieve analysis for grading of bedding and joint sand, and granular base.

.5 Installation Data: Manufacturer's installation requirements indicating substrate requirements, installation methods.

1.6 MOCK-UP

.1 Provide Consultant minimum 48hrs notice prior to the creation of the mock-up

.2 Construct a 2m x 5m mock-up to establish a standard of construction, workmanship, and appearance. Show base and sub-base, sand bedding, bond pattern, spacing, edge restraint, expansion joints, transition between vehicular and non-vehicular unit pavers, texture, and colour.

.3 Do not continue with work of this Section until Consultant has approved mock-up.

.4 Where applicable, mock-up can be used as final installation if installed in correct location and mock-up approved by landscape architect. Otherwise, remove mock-up upon completion of all unit paving work or when otherwise directed by Consultant.

.5 Indicate layout, pattern and relationship between paving joints and adjacent amenities, site furnishings, etc.

.6 Mockup should capture each unique paving pattern and capture at least a portion of each paver type used.

1.7 QUALITY ASSURANCE

.1 Contractor Qualifications
- .1 Unit Paving Contractor shall have minimum 5 years proven experience in precast concrete unit paving and provide minimum 3 references of previous clients complete with contact information.
- .2 Unit Paving Contractor shall have successfully installed precast concrete unit pavers for vehicular applications and submit reference client contact information.
- .3 Unit Paving Contractor shall have successfully installed precast concrete unit pavers in projects of similar scale and magnitude (project in excess of 1500m2 area of unit pavers) and submit reference client contact information.

.2 Install pavers only during dry periods above 5 degrees Celsius.

DELIVERY, STORAGE AND HANDLING

.1 Deliver concrete pavers to the site in steel banded or plastic banded cubes. Unload and store at job site so that no damage occurs to product or site.

.2 Cover sand and aggregate with plastic to prevent exposure to rainfall.

MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Stock Materials: Provide ten (10) of each paver size.

Part 2 Products

2.1 Bedding and joint Sand

.1 Shall meet the recommended requirements of ICPI Tech Spec #17 - Bedding Sand Selection for Interlocking Concrete Pavements in Vehicular Applications

.2 Properties
- .1 Aggregate grain size 0/4mm (0.063mm dia. Sieve pass $\geq$ 5% mass and 2mm sieve pass 30-60% mass)
- .2 Water permeability $\geq$ 10-5 m/s
- .3 Stone hardness La $\leq$ 20
- .4 Angularity Ecs $\geq$ 35
- .5 Broken surface proportions OC90 $\geq$ 90%

.3 Clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.

.4 Do not use stone dust.

.5 Do not use limestone screenings or sand for the bedding that does not conform to the grading requirements of CSA A23.1-FA1.

.6 Do not use mason sand, or sand conforming to CSA A179 for the bedding sand.

.7 Bedding Sand Material Requirements: Conform to the grading requirements of CSA A23.1-FA1 with modifications as shown in Table 1 below.

.8 Grading Requirements

.1 Sieve according to CSA A23.2A.

Table 1

Grading Requirements for Bedding Sand			
ASTM C 33		CSA A23.1-FA1	
Sieve Size	Percent Passing	Sieve Size	Percent Passing
3/8 in.(9.5 mm)	100	10 mm	100
No. 4 (4.75 mm)	95 to 100	5 mm	95 to 100
No. 8 (2.36 mm)	80 to 100	2.5 mm	80 to 100
No. 16 (1.18 mm)	50 to 85	1.25 mm	50 to 90
No. 30 (0.600 mm)	25 to 60	0.630 mm	25 to 65
No. 50 (0.300 mm)	10 to 30	0.315 mm	10 to 35
No. 100 (0.150 mm)	2 to 10	0.160 mm	2 to 10
No. 200 (0.075 mm)	1	0.075 mm	1

Table 2

Grading Requirements for Joint Sand				
	ASTM C 144	ASTM C 144	CSA A179	
Sieve Size	Natural Sand Percent Passing	Manufactured Sand Percent Passing	Sieve Size	Percent Passing
No. 4 (4.75 mm)	100	100	5 mm	100
No. 8 (2.36 mm)	95 to 100	95 to 100	2.5 mm	90 to 100
No. 16 (1.18 mm)	70 to 100	70 to 100	1.25 mm	85 to 100
No. 30 (0.600 mm)	40 to 75	40 to 100	0.630 mm	65 to 95
No. 50 (0.300 mm)	10 to 35	20 to 40	0.315 mm	15 to 80
No. 100 (0.150 mm)	2 to 15	10 to 25	0.160 mm	0 to 35
No. 200 (0.075 mm)	0 to 1	0 to 10	0.075 mm	0 to 1

.1

POLYMERIC JOINT SAND

.1 Product Specifications:

Sieve Analysis	ASTM C-144 with ICPI Tech Spec 9 modifications
Compression Strength	800 PSI
Set Time ASTM C266 (modified)	Initial: 55 minutes Final: 170 minutes
Vertical Pull-off Resistance After 28 days	800 PSI
Required Bedding Type	Drainage bed (sand-set), as recommended by the ICPI

Minimum Joint Width	1/8”
Maximum Joint Width	1”
Joint Depth	Fill paver joints completely. Minimum depth: 1.5

CONCRETE UNIT PAVERS

.1 Paving Colour 1:
- .1 Product: 65mm Broadway Paver
- .2 Manufacturer: Barkman
- .3 Size: 300 x 150 x 65mm
- .4 Colour: Natural
- .5 Contact: Darren Prebushewski, 403-946-4630, DPreb@BarkmanConcrete.com
- .6 Or approved equal

.2 Paving Colour 1:
- .1 Product: 65mm Broadway Paver
- .2 Manufacturer: Barkman
- .3 Size: 300 x 150 x 65mm
- .4 Colour: Ash
- .5 Contact: Darren Prebushewski, 403-946-4630, DPreb@BarkmanConcrete.com
- .6 Or approved equal

.3 Paving Colour 1:
- .1 Product: 65mm Broadway Paver
- .2 Manufacturer: Barkman
- .3 Size: 300 x 150 x 65mm
- .4 Colour: Charcoal
- .5 Contact: Darren Prebushewski, 403-946-4630, DPreb@BarkmanConcrete.com
- .6 Or approved equal

.4 Paving Colour 1:
- .1 Product: 65mm Broadway Paver
- .2 Manufacturer: Barkman
- .3 Size: 300 x 150 x 65mm
- .4 Colour: Sandstone
- .5 Contact: Darren Prebushewski, 403-946-4630, DPreb@BarkmanConcrete.com
- .6 Or approved equal

Part 3 Execution

3.1 Examination

.1 Sub-grade to be unfrozen and free from snow or ice.

.2 Check graded sub grade for conformity with elevations and sections before placing granular base material. Evenness shall not exceed +/- 3cm over 4m.

.3 Prior to installation, testing procedures shall confirm the following conditions.
- .1 Density: 98% SPD
- .2 Water permeability ≥ 10-5 m/s
- .3 Load bearing capacity ≥ 45MN / m2

.4 Verify that substrate is level or to correct gradient, smooth, capable of supporting pavers and imposed loads, and ready to receive work of this Section.

.5 Verify gradients and elevations of substrate are correct.

.6 If none of the above conditions have been met, unit paving contractor is to contact Landscape Architect before proceeding with work.

.7 If the sub-base or base are too moist, do not proceed with work until it has adequately dried out.

3.2 Sand Bedding Layer

.1 Spread and screen to a minimum nominal 25mm thickness unless otherwise noted.

.2 Deviation of evenness shall not exceed +/- 10mm over 4000mm.

.3 Once screened and levelled to required contours and grades, the sand laying course shall not be disturbed in any way. Do not walk or drive on bedding material in any way.

3.3 Concrete Unit Paver Installation

.1 Install paving stones on sand base to tiled pattern shown in drawings.
- .1 Butt paving units together with minimum 4mm.
- .2 While installing, mix unit pavers from different pallets to ensure colour uniformity throughout to accommodate for slight colour differences from different batches of production. Discernable differences in colour from failing to mix pallets will not be accepted.
- .3 Check paver layout with alignment aids to ensure straightness. Lateral tolerance from drawings +/- 2.5cm over 4m distance.
- .4 2 rows of pavers to be laid parallel to 17th avenue concrete rolled curb and header. Pavers to be laid in 1/3 bond patterns, maintaining staggered bond throughout the pattern and along curves with a minimum 1/4 overlap of each paver.

.2 Cutting:
- .1 Cut stones where required to fit accurately and neatly. Cutting shall provide a straight even surface without cracks or chips using a guillotine cutter or a concrete saw.
- .2 Do not install pavers which are less than 50% original length on the shortest dimension.

.3 Where this situation will occur, contractor shall modify paver pattern in this area, use a smaller sized paver, or provide an alternate measure to avoid pavers which are less than 50% original length on the shortest dimension.

.3 Sand Jointing:
- .1 Carry out continuously while layout of pavers.
- .2 Add joint material as specified by manufacturer and sweep before any vibration compaction.
- .3 Do not saturate sand or expose to excess moisture prior to compaction.

.4 Vibration Compaction:
- .1 Sweep away excess sand before compaction.
- .2 Use 100-150 kg vibrating weight on plate compactor.
- .3 Apply 15-25 kN centrifugal force.
- .4 Refill joints with sand until completely full.

.5 Height Tolerances:
- .1 +/- 2mm between adjacent paving stones.
- .2 3-5 mm above borders and cast in place concrete.
- .3 5-10mm above gutters and curbs
- .4 Deviation of surface cannot exceed +/- 1cm over 4m unless otherwise shown on grading plan.

3.4 Cleaning

.1 Broom clean excess sand from finished paving stones.

.2 Do not use pressure spray, suction or high velocity sweeping machines to clean surface – joint sand may be removed.

3.5 Maintenance and Repair

.1 Contractor is required for the period of one (1) year:
- .1 Repair broken or misaligned edge restraints.
- .2 Repair horizontally or vertically displaced stones which are out of specified tolerances.
- .3 Repair depressions which collect water.
- .4 Repair broken unit pavers.

END OF SECTION

1. GENERAL

1.1 INTENT

.1 Read this section in conjunction with other sections for location, use and placement of “Pavement Markings” specified herein.

1.2 REFERENCES

.1 Pavement markings to be in accordance with the latest edition of the “Manual of Uniform Traffic Control Devices for Canada” by the Traffic Association of Canada (TAC).

.2 CAN/CGSB-1.5-M91, Low Flash Petroleum Spirits Thinner

.3 CGSB 1-GP-12C-68, Standard Paint Colors

.4 CGSB 1-GP-71-83, Method of Testing Paints and Pigments

.5 CGSB 1-GP-74M-79, Paint, Traffic, Alkyd

2. PRODUCTS

2.1 MATERIALS

.1 Paint: CGSB 1-G-12C, yellow 505-308, black 512-301, white 513-301

.2 Thinner: CAN/CGSB-1.5

.3 Glass beads: Overlay type: CGSB 1-GP-74M

3. EXECUTION

3.1 EQUIPMENT REQUIREMENTS

.1 Paint applicator must be an approved pressure type (mobile) distributor capable of applying paint in a single, double and dashed lines. Applicator to be capable of applying marking components uniformly, at rates specified, and to dimensions as indicated, and to have positive shut-off.

.2 Distributor to be capable of applying reflective glass beads as an overlay on freshly applied paint as required.

3.2 CONDITION OF SURFACES

.1 Pavement surface must be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.

.2 Complete any surface preparation requirements recommended by the paint manufacturer.

3.3 APPLICATION

.1 Provide traffic control as required to apply markings.

.2 Owner's Representative to review Contractor pavement markings layout prior to paint application. Contractor to co-ordinate the review.

.3 Unless otherwise approved by Owners Representative, apply paint only when air temperature is above 10°C, wind speed is less than 60km/h, and no rain is forecast within the next four (4) hours.

.4 Apply traffic paint evenly at rate of 3 m^2/L.

.5 Do not thin paint unless approved by Owner's Representative.

.6 Symbols and letters to conform to dimensions indicated.

.7 Paint lines to be of uniform color and density with sharp edges.

.8 Thoroughly clean distributor tank before refilling with paint of different color.

.9 Apply glass beads at a rate of 200 g/m^2 of painted area immediately after application of paint.

.10 Protect pavement markings until dry.

.11 Protect adjacent structures, buildings, sidewalks, landscaping and other surface features against spillage and over-spray during painting operations.

3.4 PAVEMENT MARKINGS

.1 Directional Dividing Line
- .1 100 mm wide single solid yellow "Directional Dividing Line" along the center line of all paved roads.

.2 Stop Line
- .1 600 mm wide solid white "Stop Line" at each stop sign. The "Stop Line" to extend from the lip of gutter to the painted road centerline.

.3 Parking Stall Line
- .1 100 mm wide single solid white "Parking Stall Line" along three sides of each parking stall.

.4 Handicap Parking Symbol
  .1 100 mm wide white Handicap symbol and border line with light blue fill.
  .2 Handicap parking symbols to be located along the entrance of the parking stall.

3.5 CLEAN UP

.1 Remove spillage and over-spray of paint from pavement, sidewalks, building and other surface features. Use methods and materials without damaging and leaving visible residue on substrates.

3.6 TOLERANCE

.1 Paint markings to be within – 12 mm and + 12 mm of dimensions indicated.

END OF SECTION

GENERAL

1.1 Scope of Work

.1 Supply and installation of irrigation point of connection, controller, sleeves, sprinklers, electric control valves, copper and plastic piping, sensor, wire control system, sprinklers and all related items necessary to provide a properly operating automatic irrigation system to cover the applicable landscape.

.2 Prepare and submit As-Built Irrigation Plans and Operation Manual.

.3 Provide a one (1) year Maintenance & Warranty period following award of Substantial Completion.

1.2 Related Work Specified Elsewhere

.1	General Requirements	Section 01 00 06
.2	Piping, Valves, & Fittings (except plumbing)	Section 23 21 13.23
.3	Electrical Hangers Supports and Inserts	Section 26 05 29
.4	Electrical Conduits	Section 26 05 33.13
.5	Operation and Maintenance of Planting	Section 32 01 90
.6	Plant Material and Soils Mixes (Exterior)	Section 32 93 00
.7	Spreading and Grading Topsoil	Section 31 22 19.13

1.3 Quality Assurance

.1 The Contractor performing this work shall be a Certified Irrigation Contractor (CIC) certified by **The Irrigation Association** (IA), and have experienced, trained and insured personnel qualified to carry out the 'Work' of this project. "Qualified" implies certified, formally trained, or licensed.

.2 A written guarantee of the installed irrigation system shall be provided to the Owner, which will cover workmanship and materials for a minimum of one (1) year from the date of Substantial Completion. The Contractor shall warranty maintenance on the system for a minimum of one (1) year.

1.4 Submittals

.1 The Contractor shall submit evidence of project personnel having certification in High-Density Polyethylene (HDPE) Butt-Fusion prior to commencing the work.

.2 The Contractor shall submit shop drawings, product literature, and specifications for approval by the Consultant prior to construction.

.3 The Contractor shall submit a suitably scaled As-Built drawing of the irrigation system, prepared in AutoCAD 2013 (or newer version). All components of the irrigation system shall be shown as installed; with clear measurements from an identifiable reference point (datum) to the location of all the various components that make up the irrigation system.

.4 The Contractor shall submit the As-Built drawing prior to issue of Substantial (or Construction) Completion. The Contractor shall maintain the As-Built drawing throughout the Maintenance & Warranty Period and issue a revised As-Built Irrigation Plan at Final Acceptance.

.5 The Contractor is to prepare and deliver to the Consultant within ten (10) calendar days prior to completion of construction the following information on two (2) hard copies bound in 3-ring cover binders and one (1) digital copy saved to a USB drive.

.1 Index sheet stating Contractor's address and telephone number, list of equipment with name and addresses of local manufacturer's representatives.
.2 Catalogue and parts sheets for all materials and equipment installed under this Contract.
.3 The Contractor warranty document.
.4 Complete operating and maintenance instructions on all major equipment.
.5 Construction details.
.6 Complete trouble-shooting guides to common irrigation problems.
.7 Fall shut-down (Winterization) and spring start-up procedures.
.8 Chart of approximate watering times for spring, summer, and fall showing the proposed run times for each zone relative to differing weather conditions and plant water requirements.
.9 Maintenance materials to be furnished:

.1 Two (2) sets of tools required for removing, disassembling, and adjusting each type of sprinklers installed on this project.

.10 The above-mentioned equipment shall be turned over to the Owner at the conclusion of the project. Before Final Inspection can occur, evidence that the Owner has received material must be shown to the

1.5 Test Reports and Permits

.1 The Contractor shall submit to the Consultant at Substantial (or Construction) Completion all applicable Permits required for the work.

1.6 Site Conditions

.1 Verify the existence and location of all utilities and services prior to commencement of the work.

.2 Consult with the Consultant to adjust the design, if necessary, to suit existing site conditions and grades prior to commencement of the work.

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

.4 Ensure that sequencing of the irrigation work is in coordination with the works of other trades and that sleeves are installed where appropriate.

.5 Ensure all piping sleeves are installed where appropriate.

1.7 Supervisor

.1 At the time of Tender, submit to the Consultant the name of the proposed Superintendent, together with information regarding their qualifications and previous Superintendent experience on projects of similar size and scope. The chosen Superintendent must be acceptable to the Owner and Consultant.

.2 The Superintendent shall devote their time exclusively to the Work of this Contract and shall remain on the job during normal working hours. Additionally, the Superintendent shall attend all site coordination and progress meetings.

.3 Superintendents will not be changed during the progress of the Work, without prior written permission of the Owner.

.4 At the discretion of the Consultant and/or the Owner, any employee of the Contractor (or Sub-contractor) who is deemed unfit or unsuitable to carry out the Work, shall be dismissed from the Work for the remainder of the project.

1.8 Regulations

.1 The Contractor shall be responsible for obtaining all permits and licenses applicable to the irrigation system and shall include costs for such permits and licenses in the bid prices.

.2 The Contractor shall ensure that there is compliance with all applicable codes and regulations for all Work performed during the project.

1.9 Notification to the Consultant

.1 Report to the Consultant, through the Construction Manager, any conditions or defects encountered on the site during or prior to construction, upon which the Work of this section depends, and/or which may adversely affect its performance.

.2 Notify the Consultant, through the Construction Manager, for inspection, testing and approval of the irrigation system as specified in this section. Provide the Consultant and Construction Manager minimum 48 Business hours' notice prior to required inspections or meetings.

1.10 Measurement and Payment

.1 Payments will be on a unit basis. Payment shall include the supply and installation of all materials shown on the drawings, and all materials incidental to the completion of the Work. Payment shall also include all costs for the Maintenance & Warranty of the system.

.2 Progress claims submitted by the Contractor shall be based on the unit prices submitted or the percentage of work completed in the Tender Form at the date of the claim and require approval by the Consultant and Construction Manager prior to payment.

.3 No payment shall be made for materials delivered and stored onsite that have not been properly installed and tested

PRODUCTS

2.1 High Density Polyethylene (HDPE) Pipe

.1 The pipe shall be PE4710 PR160 Standard Dimension Ratio and shall be listed by the Plastic Pipe Institute as a PE4710 or PE3608 resin with a hydrostatic basis (HDB) of 160psi for water at 23º C. The material shall comply with ASTM D1248 as a Type III Class C, Category %, Grade P34 material and with ASTM D3350-14 as a 445474C cell material for PE4710 and 345464C cell material for PE3608. The material shall have a design factor of 0.63 for water service at 23º C.

.2 Pipe pressure rating, sizing, and jointing methods shall be as per drawings and spec.

2.2 Polyvinylchloride (PVC) Pipe

.1 Polyvinylchloride pipe shall conform to CSA B137.3. All pipe shall be in new condition extruded from virgin materials and continuously and permanently marked with the manufacturers name, material, size, pressure rating and CSA approval.

.2 Series 200 shall be used in 25mm size pipe and Series 160 in 38mm and larger irrigation pipe. Schedule 80 pipe shall be used in the point of connection.

.3 Jointing methods: solvent weld for 50mm diameter and smaller size pipe.

.4 Fittings for PVC pipe shall be schedule 40 PVC suitable for solvent welding or threaded connections for lateral connections. Schedule 80 fittings shall be used in the point of connection

.5 Threaded connections of PVC to metal shall have male threads on the PVC and female threads on the metal.

.6 PVC pipe cement and primer combination shall be as recommended by the manufacturer to be suitable for the materials and application, when used as directed, and meet local codes.

2.3 Polyethylene pipe- low density

.1 Polyethylene pipe shall be Poly Prime 100 series pipe.

.2 Pipe pressure rating, sizing, and jointing methods shall be as per the drawings.

.3 Fittings shall be SCH 80 PVC insert fittings with Stainless Steel clamps.

2.4 Sleeving and Wire Conduit

.1 Wire conduit shall be 38mm from controller to landscape and shall be installed by electrical contractor.

.2 Wire conduit shall be 38mm diameter Grey PVC.

.3 Sleeving shall be SDR35 material shall.

.4 Outdoor sleeving shall have the diameter of sleeve shall be minimum twice the diameter of the sum of the irrigation pipes passing through the sleeve. The size of the sleeving shall be measured in 50mm increments and noted on the design drawings or details.

.5 Extend sleeving minimum 300 mm beyond edge of adjacent hard surface. Tape ends of sleeve to prevent filling with debris.

2.5 Electric Control Valves

.1 The control zone valve shall be a Normally Closed 24 VAC 50/60 cycle Hz solenoid globe pattern design. The valve pressure rating shall not be less than 175 psi. The valve shall have a flow rate of 0.1 - 40 gpm and pressure loss should not exceed: 5 psi.

.2 Diaphragm shall be of nylon reinforced nitrile rubber. The valve shall have both internal and external manual open/close control (internal and external bleed) to manually open and close the valve without electrically energizing the solenoid. The valve's internal bleed shall prevent flooding of the valve box. The valve shall have a flow control handle.

.3 The valves shall house a fully-encapsulated, one piece solenoid. The solenoid shall have a captured plunger with a removable retainer for easy servicing and a leverage handle for easy turning. These 24 VACS 50/60 Hz solenoid

2.6 Sprinklers

.1 The Hunter Pro-Spray Nozzle shall be used or approved equivalent.

.2 The Nozzle shall be installed on a Hunter Pro-Spray PRS30 Spray Body

2.7 Valve Boxes

.1 Valve boxes shall be made of heavy-duty UV resistant plastic.

.2 Valve boxes shall be sized and installed as shown on the drawings or details. Provide valve box extensions where required

.3 Valve boxes shall have a locking lid.

.4 Valve boxes shall be installed with minimum 350mm depth, 25 mm diameter washed gravel at bottom of box.

.5 Valve boxes shall be Green in color.

2.8 Irrigation Controller

.1 The irrigation controller shall be a Hunter ACC2 (Part #A2C-1200-P) controller.

.2 Hunter Wireless Rain/ Freeze -Clik Sensor shall be installed as per drawings and manufacturers recommendations. Sensor is to be installed 3m (10ft.) above finish grade.

2.9 Control Wire

.1 Wires shall conform to the Canadian Electric Code and any other regulatory conditions, which may govern this type of installation.

.2 Control wire from the controller to valves shall be minimum 14-gauge direct burial type, CSA approved type PE direct burial wire, Paige Electric P7079D or equivalent, and conforming to Canadian Electrical Code. Control wires shall be any colour other than white (reserved for common) and green (reserved for ground).

.3 Common wire shall be CSA approved 12-gauge direct burial type PE wire, Paige Electric P7079D, or equivalent white-colour wire is reserved exclusively.

.4 All wire splices shall be made with 3M DBR-Y Splice kits.

2.10 Irrigation Point of Connection

.1 38mm Backflow preventer shall be Watts 007 D.C.V.A or approved equivalent.

.2 Water Meter to be obtained from the Town of Drumheller, see Detail #1 on drawing IR-02.

.3 All parts at the irrigation point of connection are to be installed as per Irrigation Plan Detail #1 on drawing IR-02

.4 In the instance that the irrigation system is inoperable, due to Contractor actions, the Contractor shall be responsible for all methods (i.e. truck watering) and associated costs for supplemental irrigation of all plant material.

2.11 Quick couplers

.1 Quick couplers shall be 25mm diameter one-piece brass construction.

.2 Supply and submit to the Owner one (1) swivel ell key compatible with quick coupler.

.3 The Quick Couplers shall be installed as per the detail # 4 on IR-02

2.12 Electrical Products

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

.2 Wire conduit shall be Grey PVC non-metallic electric conduit. All electrical conduit inside the building is to be installed by the electrical contractor.

.3 Pull and Junction Boxes: installed according to CSA C22.2 No.40-1973 (R1981), sheet steel, screw-on or hinged covers.

2.13 Backfill Material

.1 Native Excavated Material: Clean native excavated soil, free from organic matter, stones larger than 25 mm, building debris, and other foreign substances.

.2 Sand: Natural coarse sand.

.3 Gravel: 19 mm diameter crushed gravel.

2.14 Miscellaneous Components

.1 Miscellaneous Components shall be indicated by type, size and location on the drawings or details. Install according to the manufacturer's specification.

EXECUTION

3.1 Recycling and Protection of Existing Work

.1 Protect existing and proposed landscape features and building elements from damage or contamination. Coordinate with the work of other trades to reduce waste, mixing of waste, soil compaction or erosion, overspray, or run-off from cleaning operations.

3.2 Layout

.1 All staking and measurements shall be taken from permanent objects, buildings, or survey bench markers and not from objects such as turf boundaries, which are subject to change.

.2 As staking progresses, all additions, changes, or equipment locations, shall be noted on the copy of the "working drawings" from which the "As-Built" drawings will be prepared.

.3 System layout changes necessitated by unforeseen conflicts or changes to the site conditions shall be approved in writing by the Consultant.

3.3 Excavation

.1 Keep excavations free of water.

.2 Excavate the pipe trench to minimum of 350 mm of cover over pipe for Laterals.

.3 Excavate the pipe trench to minimum of 450 mm of cover over pipe for Mainlines.

.4 Trenching, laying of pipe and backfilling shall be continuous so that the amount of open trench at the end of each work day is minimized. Any open trench or other excavations shall be barricaded and marked with high visibility flagging tape.

3.4 Pipe Laying

.1 Lay the pipe in a straight line between fittings, placing it on firm soil at all points in the trench.

.2 Prevent dirt from entering exposed ends of pipe.

.3 Install piping inside of sleeves where shown on drawings or details.

3.5 Backfilling

.1 Backfill excavated subgrade material in 150 mm lifts, placing and compacting to minimum 85% S.P.D. until 150 mm below finish grade.

3.6 Water Line Flushing

.1 Flush all irrigation water lines prior to connection with drip irrigation header pipe to remove any accumulated dirt and other foreign materials.

3.7 Controller

.1 Install the Hunter controller in a location acceptable to the Consultant and Client.

.2 A copy of the As-Built Irrigation Plan reduced by 50% size shall be laminated and permanently fastened inside the controller cabinet next to the controller.

.3 The Contractor shall program the controller with start and run times as per the irrigation schedule. The Contractor shall seasonally adjust the irrigation controller to meet, but not exceed, the plant water requirements.

.4 The Contractor shall inform the Consultant of any deviations to the irrigation schedule from that shown on the drawings.

3.8 Wire

.1 All wiring shall be installed in accordance with Local, Provincial and National Electrical Codes

.2 All 24Vac wire cable and spare wire that is to be installed inside the building shall be installed in conduit.

.3 Irrigation control wiring shall be installed in grey, non-metallic electrical conduit and installed adjacent to the water pipe. The irrigation control wiring cannot be placed directly in the sleeves with the water pipe when routing the irrigation control wiring between the planters.

3.9 Clean Up

.1 The job site shall be kept in a neat, clean and orderly condition at all times during the irrigation installation.

.2 All scrap and excess materials shall be regularly removed from the site and not buried in trenches.

3.10 Inspections and Testing

.1 The Contractor shall provide the Consultant and Construction Manager with minimum 48 hours' notice prior to scheduled inspections.

.2 Test irrigation main line for leaks prior to connection of any laterals.

3.11 Winterization

.1 When the system is to be shutdown for the winter season, the Contractor shall completely drain and winterize the system.

.2 The Contractor shall not leave drain valves and test cocks open for the winter.

3.12 Spring Startup

.1 In the following spring after Substantial Completion, the Contractor shall set the system in operation by May 1 or as weather permits.

.2 Once the irrigation system has been put in operation for the season, the Contractor is required to submit and implement a proposed watering schedule for the irrigation season. This schedule shall be adjusted as required throughout the season to ensure that plant water requirements are met but not exceeded.

.3 The Contractor shall perform all maintenance and repair procedures necessary to ensure system is completely functional and operating to original design intent.

3.13 Maintenance

.1 Protect & maintain the entire irrigation system throughout the Maintenance & Warranty Period. Include replacement of any defective materials and complete all repairs necessary due to faulty workmanship.

.2 The Maintenance & Warranty Period shall be one (1) year following Substantial Completion.

.3 The Contractor shall be responsible for conducting the winterization and spring start-up of system until the irrigation system is awarded the Final Acceptance Certificate.

3.14 Final Acceptance

.1 The complete irrigation system will be inspected by the Consultant and the Construction Manager (or Owner) at the completion of the Maintenance Period.

.2 During the Maintenance & Warranty Period, if it is found that irrigation system has been poorly maintained, or there has been a failure to rectify deficiencies within a reasonable timeframe, issuance of Final Acceptance and payment of the maintenance portion of the Contract Price may be withheld at the discretion of the Owner and the Consultant.

End of Section

Part 1 General

1.1 SECTION INCLUDES

.1 Trees, Shrubs and Groundcover Planting.

.2 Placement of soil materials.

.3 Mulch materials.

1.2 RELATED SECTIONS

.1 Section 01 22 00 Measurement Schedule.

.2 Section 01 33 00 Submittal Procedures.

.3 Section 31 05 13 - Soil Materials.

1.3 REFERENCES

.1 Canadian Standards for Nursery Stock (Current Edition).

.2 NAA (National Arborist Association) - Pruning Standards for Shade Trees.

.3 Nomenclature: to “International Code of Nomenclature for Cultivated Plants (Current Edition)

.4 Size and Development of Trees: to “Metric Guide Contract Documents for Nursery Stock (Current Edition).

.5 Alberta Horticultural Guide: Alberta Horticultural Agdex 220/01 (Current Edition).

1.4 QUALITY ASSURANCE

.1 Nursery Qualifications: Company specializing in growing and cultivating the plants with minimum three (3) years documented experience.

.2 Installer Qualifications: Company specializing in installing and planting the plants with minimum three (3) years documented experience.

.3 Tree Pruner Qualifications: Company specializing in pruning trees with proof of Arborist Certification.

.4 Tree Pruning: NAA – Pruning Standards for Shade Trees.

.5 Establishment Services: Performed by installer.

1.5 REGULATORY REQUIREMENTS

.1 Plant Materials: Certified by Federal Department of Agriculture. Described by the Canadian Nursery Landscape Association Canadian Standards for Nursery Stock; free of disease or hazardous insects.

.1 Plants that show evidence of disease or hazardous impacts at the time of planting, or within 30 days of the time of planting, must be immediately removed and replaced at Contractor’s cost. Municipality of Drumheller Representative shall be the sole judge of the infestation condition of the root, tree or perennial.

.2 The Municipality of Drumheller reserves the right to reject any and all plant material that does not meet specified requirements.

1.6 SUBMITTALS

.1 Provide Consultant with written documentation indicating the commercial nursery and installer at least 60 days prior to commencement of the planting.

.1 Provide Consultant with written confirmation of plant material availability.

.2 Pre-order plant materials by no later than December 31st, 2021.

.3 The Contractor shall provide the source of the supplied stock to the Consultant prior to planting. All trees and shrubs shall be winter hardened and from Alberta grown seed or mother plant stock grown in Zones 2 or 3 in accordance with Agriculture Canada Plant Hardiness Map.

.2 If required, the Contractor will provide a list of substitutions for approval

.3 Provide Consultant with receipt of purchased plant material from the Nursery.

1.7 SUBSTITUTIONS

.1 Contractor to confirm in writing unavailable plant material and request substitution for approval by the Consultant.

.2 Substitution requests must contain the following information:

.1 Scientific name

.2 Pot size and plant size in the nursery

.3 Supplier

.4 Source of plant material

.3 Plant substitutions must be of similar genus and species and of equal or greater size as those originally specified.

1.8 SOURCE QUALITY CONTROL

.1 Plant Material Review:

.1 All plant material supplied by the Contractor to be reviewed at the project site by the Consultant prior to planting.

.2 Plant material that is rejected by the Consultant to be replaced at the Contractor's expense.

.3 Consultant may review the plant material at the source should the Contractor choose and provide the Consultant with seven (7) days notification prior to requested review. The Contractor shall accompany the Consultant during the review.

1.9 DELIVERY, STORAGE, AND PROTECTION

.1 Protect trees from damage and drying out from the time of digging until planting. Trees with broken or abraded trunks or branches will be rejected.

.2 Protect root balls with burlap and, if required, wire baskets. Maintain moisture levels in root zones.

.3 When delivery distance is less than 30 km and vehicle speeds are under 80 km/h, tie tarpaulins around plants or over truck boxes.

.4 When delivery distance exceeds 30 km and/or vehicle speeds exceed 80 km/h, use enclosed vehicle to transport trees.

.5 Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

.6 Protect and maintain plant life until planted.

.7 Deliver plant life materials immediately prior to placement. Keep plants moist.

.8 Fully support root ball of trees during all lifting operations.

.9 Do not lift trees by the trunk or branches. Trees to be moved by lifting the root ball.

.10 Remove broken and damaged roots with clean cuts using sharp pruning shears.

.11 All live plant materials will be properly acclimatized prior to planting to ensure late season planting does not cause an increased risk of mortality. Acclimatization includes the plants being kept at the climatic conditions on site for at least two (2) weeks prior to planting.

.12 Deliver Soil Amendments in waterproof containers.

1.10 ENVIRONMENTAL REQUIREMENTS

.1 Do not install plant life when ambient temperatures may drop below 2 degrees C or rise above 32 degrees C.

.2 Do not install plant life when wind velocity exceeds 48 k/hr.

.3 Do not plant into frozen ground.

Part 2 Products

2.1 TREES, SHRUBS AND GROUNDCOVERS

.1 Trees, Shrubs and Groundcover: Species and size identifiable in plant schedule, grown in climatic conditions similar to those in locality of the Work. Plants shall be measured in their normal positions.

.2 Type of root preparation, sizing, grading and quality: Comply with CNLA Canadian Standards for Nursery Stock (Current Edition).

.3 Source: Grown in Zone 2 or 3 in accordance with Agriculture Canada Plant Hardiness Map within 200 km of project site.

.4 Plant Material: Plants shall be true to type and structurally sound, well-branched, healthy and vigorous and free of disease, insect infestations, rodent damage, sun scale, 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 growth on all edges and all parts shall be moist and show live, green cambium tissue when cut.

.5 Plant Material: Root pruned regularly, but not later than one growing season prior to arrival on site.

.6 Trees: With straight trunks, well and characteristically branched for species.

.7 Container Grown Plant Material:

.1 Container Grown Plant Material refers to all perennials and trees not applied by seed or sod.

.2 Root ball to container relationship to be of sufficient ratio to ensure room for healthy, vigorous root development.

.3 Plant material shall have been container grown for a minimum of one growing season but not longer than two growing seasons.

.4 The plant material root systems must have the ability to "hold" growing medium when removed from the container.

.5 Root bound plant material is not acceptable.

2.2 SOIL MATERIALS

.1 Topsoil: As specified in Section 31 05 13 - Soil Materials.

.2 Soil Amendments: As specified in Section 31 05 13 - Soil Materials.

2.3 MULCH MATERIALS

.1 Parkland Premium Mulch or approved equivalent, to be approved by Consultant prior to purchase and delivery.

2.4 PLANT PROTECTION MATERIALS

.1 Plant protection to be applied once plants are initially planted as well as once during the following year of maintenance. Further applications will be considered if required.

.2 Herbivore Repellent:

.1 Organic herbivore repellent such as Plantskydd, Bobbex or approved equivalent: repellent treatment sprayed on trunks, limbs and leaves.

Part 3 Execution

3.1 PRE-PLANTING OPERATIONS

.1 Verify that prepared soil is ready to receive work.

.2 Saturate soil with water to test drainage.

.3 Place flags on site to identify location of trees and shrubs as per Contract Documents. The Consultant will review all tree and shrub locations prior to start of planting.

.4 Trees and shrubs:

.1 Excavate the depth of the pit to be equal to the height of the root ball.

.2 Excavate the width of the tree pit to be a minimum of 100 mm to 150 mm greater than the diameter of the root ball.

.3 Increase tree pit widths in heavy or compacted soils to three to five times the width of the root ball as directed by the Consultant.

.4 Scarify the sides of tree pits to eliminate glazed surface.

.5 Ensure planting pits in heavy or compacted soils exhibit the ability to drain freely. Notify the Consultant if planting beds in any soil condition do not drain freely or if planting pit fills with groundwater.

.6 Protect bottom of planting pit(s) from freezing.

.7 Ensure planting pits are kept well drained and free of contaminants and construction debris.

.8 Remove water collected in bottom of planting pit prior to planting.

3.2 PLACING SOIL AMENDMENTS

.1 Immediately prior to placing each plant in planting pit, evenly spread Soil Amendment Type A to a depth of 10mm at the bottom of the planting pit.

3.3 PLANTING

.1 In event of discrepancy between Drawings and Municipality of Drumheller Standard Specifications, seek clarification from Consultant to determine which is to govern.

.2 Place plants for best appearance for review and final orientation by Consultant prior to planting.

.3 Set plants vertical.

.4 Container grown plant material: Remove entire container (including biodegradable containers) without disturbing root ball. Score root ball vertically at six (6) locations evenly spaced around entire root ball to minimize girdling of roots.

.5 Do not remove plants from containers until ready to be planted. Plant immediately upon removal from container.

.6 Protect all plant materials from drying out while planting.

.7 Place 10mm of Soil Amendment Type A under each container plant.

.8 Set plants in pits or beds.

.9 Measure minimum depth of plant pit from downward side of slope when planting on an incline.

.10 Backfill planting pits with approved topsoil in 150 mm lifts to 2/3 of the depth of the planting bed, tamping each lift of soil around the root system to eliminate air voids.

.11 Do not use frozen or saturated growing medium for backfill operation.

.12 Prior to placing remaining 1/3 soil, fill planting bed with water. Complete backfill operation only after water has completely penetrated into soil.

.13 Build 100 mm high by 150 mm wide saucer around outer edge of tree and shrub dripline to assist with establishment watering.

.14 Install hemp square per supplier’s instructions.

.15 After plant installation remove all labels attached by wire or cord.

.16 Dispose of container material at an off-site waste disposal facility.

.17 Spray planting beds with approved herbivore deterrent immediately after planting per manufacturers specifications.

.18 Prune trees and shrubs after planting operations if required for health. Notify Consultant prior to pruning.

3.4 PLANT SUPPORT

.1 Install tree support as per nursery recommendations.

3.5 SCHEDULE - PLANT LIST

.1 Refer to Drawings.

END OF SECTION

1. GENERAL

1.1 INTENT

.1 Read this Section in conjunction with other Sections for the location, use, and placement of "Water Service Connections" specified herein.

.2 This Section may also be used as a reference section. All materials specified in Part 2, Products, may not necessarily be required.

2. PRODUCTS

2.1 GENERAL

.1 For service connection sizes 20 mm to 50 mm diameter, pipe to be Copper Tubing, PEX pipe , PE Municipal Tubing or Q-line water service tubing (IPEX).

.2 For service connection sizes 100 mm to 300 mm diameter, pipe to be Polyvinyl Chloride (PVC) Pressure Pipe as specified in Section 02512 – PVC Pipe and Fittings or High Density Polyethylene (HDPE) Pipe as specified in Section 02513 – HDPE Pipe and Fittings.

.3 Valves and Valve Boxes for service connection sizes 100 mm to 300 mm diameter to be as specified in Section 02515 – Valves and Valve Boxes.

2.2 PIPE

.1 Copper Tubing:

.1 For services 20 mm to 50 mm diameter, copper tubing conforming to latest revision ASTM B88M, type K, annealed. (As described in AWWA C-800 - Appendix - Collected Standards for Service Line Materials).

.2 PEX Pipe – (cross linked polyethylene pipe):

.1 For services 20 mm to 50mm diameter, cross-linked polyethylene pipe will be manufactured in accordance with CSA B137.5 and ASTM F876 and to comply with NSF 14 and 61 (PW). The Pipe and resin (compound) will be manufactured in an ISO 9001 certified production facility. The degree of cross linking for pipe will not be less than 80% when tasted in accordance to ASTM D2765 Method B. Pipe will have CSA / NSF approved pressure rating of:

- 160 psi @ 23 ºC / 73.4 ºF
- 100 psi @ 82 ºC / 180 ºF
- 80 psi @ 93 ºC / 200 ºF

.2 The outside diameter of the pipe will be copper tube size (CTS) and will have a standard dimension ratio (SDR) 9.

.3 The pipe will carry the following marks every 1.5 meters minimum: manufacturer's name, nominal size, ASTM, CSA & NSF designations, SDR (standard dimension ratio), pressure/temperature rating, potable tubing, manufacturing date & machine number and footage mark. The pipe will have consecutive footage marks every 1.5 meters (minimum) starting with 0 at the beginning of each coil.

.4 The pipe will be shipped in protective cardboard boxes marked with the product name and size.

.5 Use stainless steel inserts when connecting Municipex or Blue 904 pipe to main cocks and service valves.

.6 Approved Products 20mm to 50mm diameter:

- Rehau – Municipex
- IPEX – Blue 904
- Wirsbo - Aquapex
- Or approved equal

.3 PE Polyethylene Municipal Tubing:

.1 For services 20mm to 50mm diameter PE 3408, Series 160 to CAN3-B137.1.

.4 Q-line Water Service Tubing (aluminum tubing bonded in polyethylene layers):

.1 For services 20 mm and 52 mm diameter, manufactured by IPEX to the latest revisions of AWWA C903, ASTM F 1282 and CSA B137.9 and as approved by the National Plumbing Code of Canada.

2.3 COUPLINGS

.1 Water Service Tubing Couplings:

.1 Compression type suitable for 1 MPa working pressure. Couplings to be supplied without internal pipe stop.

.2 Approved Products:

- Ford "Pack Joint" couplings
- Ford "Grip Joint" couplings
- Mueller "Oriseal" couplings
- Emco/Cambridge Brass "Successor" couplings
- A.Y. McDonald Mfg. "T" Compression couplings for sizes 20 & 25 mm diameter.

.2 Universal Transition Couplings:

.1 To be used to join any type of water service connection pipe in sizes 20 mm to 50 mm.

.2 Approved Products:
- PHILMAC Universal Transition Standard Couplings
- PHILMAC Universal Transition Reducing Couplings
- PHILMAC Universal Transition Elbow, Tees and Adaptors

2.4 CORPORATION STOPS, CURB STOPS AND CURB STANDS

.1 Corporation (Main) Stops:

.1 Corporation stops to be brass ball valve construction with or without Teflon coating. Body to be red brass to latest revision ASTM B62, compression type outlet fitting and inlet having AWWA thread conforming to latest revision AWWA C800. Valves to be full round port, reduced port not permitted. All brass fittings and valves will be certified by a NSF or ANSI accredited test lab per ANSI/NSF Standard 61, Section 8. Proof of certification is required.

.2 Approved Products:
- Mueller B-25008 c/w "110 Compression" outlet for sizes 20, 25, 38,and 50 mm diameter.
- Ford FB-1000 "Ballcorp" c/w "Pack Joint" outlet for sizes 20, 25, 38, and 50 mm diameter.
- Emco/Cambridge Brass c/w "Successor" outlet for sizes 20, 25, 38, and 50 mm diameter.
- A.Y. McDonald Mfg. "T" Compression outlet for sizes 20, 25, 38, and 50 mm diameter.

.2 Curb Stops:

.1 Curb Stops to be of brass construction. Balls to be Teflon coated brass or industrial chrome plated stainless steel c/w Teflon seats. Body to be red brass without drain. Inlets and outlets to compression type fittings suitable for the specified pipe. Valves to be full port, reduced port not permitted. All brass fittings and valves will be certified by a NSF or ANSI accredited test lab per ANSI/NSF Standard 61, Section 8. Proof of certification is required.

.2 Approved Products:
- Cambridge Brass c/w Successor outlet for sizes 20, 25, 38 and 50 mm diameter.
- A.Y. McDonald Mfg. “Q” Compression outlet for sizes 20, 25, 38 and 50mm diameter.
- Ford B44 c/w “pack joint” outlet for sizes 20, 25, 38 and 50mm diameter.

.3 Curb Stands (Service Boxes):

.1 Depth of bury to be 2.7 m (9') to 3.3 m (11'). A minimum of 3.15 m is recommended under roadways or in areas where soil is predominately gravel.

.2 Curb stand sliders (top box) will be 31.75 mm (1 1/4") O.D., galvanized Standard Schedule 40, wrought iron pipe conforming to latest revision AWWA C800. Distance from top of cap to bottom of slider to be 610 mm minimum, 1,000 mm maximum.

.3 Casing will be 25 mm O.D. (1"), galvanized Standard Schedule 40, wrought iron pipe conforming to latest revision AWWA C800 for 20 and 25 mm valves. For 40 mm and 50 mm valves increase casing to 33.4 mm O.D. with 3.38 mm wall thickness.

.4 Cap to be cast-iron, ribbed, marked "WATER" c/w 32mm pentagonal head brass plug. The exterior of the cap is to be bituminous coated.

.5 Bottom box to be 90 mm (3.5”) I.D. for 20 and 25 mm valves and 150 mm (6") I.D. for 40 and 50 mm valves, cast or ductile iron. The exterior and interior of the bottom box will be factory coated epoxy “Type A” conforming to latest revision AWWA C213.

.6 The operating rod will be 12.70 mm (1/2") minimum, 15.9 mm (5/8") maximum, supplied as a single unit comprised of a solid AISI Type 304 stainless steel pinned to a manganese bronze clevis with a brass rivet.

.7 The operating rod will be manufactured with a "W" centering bend (standard pigtail) to fit a standard 25 mm I.D. galvanized casing pipe. Bottom 25 mm of rod to be forged square (cold forged) complete with 3.5 mm brass or stainless steel rivet to clevis.

.8 The manufacturer’s name will be embossed onto the clevis, and cast into the bottom boot to the satisfaction of the Owner’s Representative.

.9 The manufacturer will supply and insert the brass cotter pin into the clevis and apply sufficient bending to prevent the cotter pin from falling out of the clevis during shipping and storage of the rod.

.10 Approved Products:
- Western Water and Sewer
- Trojan

.4 Curb Stands Stainless Steel Inserts:

.1 Use stainless steel inserts when connecting PEX pipe, PE Municipal tubing or Q-line tubing to curb stops and curb stop valves.

.2 Approved Products
- Ford.
- Mueller.
- A.Y McDonald.
- Or approved equal.

2.5 SERVICE SADDLES

.1 Stainless steel (Type 304 or 304L), bronze (Waterworks Bronze 85-5-5-5 to ASTM B62 or ASTM A40B) or combination of both and free from scale, grease and contaminants. Service saddles to fit nominal pipe sizes 100 to 400 mm and adaptable to the following pipe types and respective O.D. ranges:

- Non-Isolating Saddles suitable for PVC with C.I.O.D. and rough barrel Asbestos Cement Class 150 Pipe.

- Isolating Saddles suitable for steel, cast iron and ductile iron pipe.

.2 Two component (body and strap) design with fastening devices on each side of outlet. Body to be heavy cast stainless steel or cast bronze tapped with AWWA taper (cc) threads, stainless steel straps with 13 mm stainless steel bolts and nuts with NC rolled threads lubricated to prevent galling.

.3 Double 50 mm stainless steel straps with stainless steel bolts and nuts with NC rolled lubricated threads for pipe larger than 100 mm diameter. Single 50 mm stainless steel straps with stainless steel bolts and nuts with NC roller lubricated threads for 100 mm diameter and smaller.

.4 Repair clamps to be fabricated, flexible, all T304 stainless steel construction, fully passivated, with double bolt closure (fasteners) minimum. Body to be minimum 300 mm (12") long.

.5 Outlet to be 20 mm to 50 mm AWWA Taper thread for standard service connections. For use on chlorination points only, outlet to be 20 mm to 50 mm IP thread.

.6 Fasteners to be 15.88 mm (5/8") NC thread T304 stainless steel. Hex nuts and washers to be T304 stainless steel, lubricated to prevent galling.

.7 Adequately secure gaskets to metal components to resist shifting. Use Neoprene gaskets for Non-Isolating water services. Use SBR isolating compound of high dielectric strength and low water absorption for isolating water services. The opening in the gaskets will be the same as the nominal diameter of the saddle outlet. Gaskets will extend 6 mm minimum beyond the saddle component's edge. Service saddles will conform to the following table:

		STRAP TYPE	
Nominal Pipe (mm)	**Nominal Outlet (mm)**	**Non Isolating**	**Isolating**
100,150	20, 25	S or D	SW
100	40,50	S	SW
150	40,50	D	SW
200	20, 25	S or D	SW

200	40, 50	D	SW
250,300,400	20, 25, 40, 50	D	SW

Where S – Single strap minimum width 45 mm with two fastening devices, one on each side of the outlet.

D – Double strap, two single straps, minimum width of 45 mm each, complete with four fastening devices, two on each side of the outlet.

SW – Single wide strap, minimum width 100 mm c/w four fastening devices, two on each side of the outlet.

.8 Service saddles are to be used on all service connections or manual air relief valves tapped to PVC series rated pipe.

.9 Service saddles to have permanent markings showing Manufacturer's Name, O.D. Range, and Type (i.e. Isolating or Non-Isolating).

.10 Approved Products:

Non-Isolating Saddles
- Robar 2706
- Or approved equal

Isolating Saddle
- Robar 2786
- Or approved equal

3. EXECUTION

3.1 GENERAL

.1 Drill and direct tap water mains under normal pressure by means of a tapping machine and thread in corporation main stop with tapping machine. Use only when tapping PVC C900 or C905 pipe. Do not direct tap PVC series pipe. Single and multiple tap service connections will be tapped in the top half of the pipe at the 10:00 o'clock and 2:00 o'clock positions. Adjacent service taps are not to be any closer than 600 mm between services and no closer than 600 mm to a pipe or fitting joint.

.2 Use a service saddle on all dry tap installation and for all 25 mm and larger services.

.3 Form a gooseneck with service pipe to the right of the corporation stop, as viewed from the property line to the main, formed so that no flattening of the service occurs.

.4 Locate corporation curb stop on property line for street servicing or 300 mm outside property line for land servicing or as specified on the applicable drawings.

.5 Set service boxes plumb over the centre of the corporation curb stop and set the top of service box to proper elevation.

.6 In areas of clay soil, water service will be a minimum of 2.7 m below the final grade or as specified. In areas where the soil is predominantly gravel, water services will be 3.3 m below final grade or as specified. Where minimum cover on the service cannot be achieved, the service will be installed with an insulating frost shield unless otherwise directed by Owner's Representative.

.7 Support and centre curb stop on an approved; fiberglass, concrete, or treated wooden block 50 mm x 150 mm x 200 mm.

.8 Test water service under the operating pressure for a period of one hour. The entire test will be inspected by the Owner's Representative and approved before backfilling.

.9 Backfill for water service will be consistent with the connecting water main Work.

3.2 NEW WATER SERVICE INSTALLATION

.1 Install services to individual lots, to the locations specified in Contract Documents. Install services to existing buildings to best suit the interior plumbing as required.

.2 Install service to 3.7 m inside the property line or as specified on the drawings.

.3 Mark location of service box by setting a 50 mm x 100 mm x 750 mm blue marker to a depth of 300mm adjacent to the box and clearly marked with black stenciled letters "W.V.".

.4 Plug the open end to prevent intrusion of dirt and debris.

.5 Tracing wire will be installed along water service pipe, as directed by Owner's Representative.

3.3 REPLACEMENT OF EXISTING WATER SERVICE

.1 Replace existing service from the main to property line. If the existing curb stand is located within property, notify the Owner's Representative for direction.

.2 Notify the occupants, residents or business a minimum of 48 hours in advance of any interruptions to the existing service.

.3 Provide temporary water to occupants, residents or business for interruptions exceeding 24 hours.

.4 Locate existing water service tie-in location prior to making the service connection to the water main. Install services to existing buildings to best suit the existing service connection location.

3.4 SANITARY, STORM AND WATER SERVICE COMMON TRENCH INSTALLATION

.1 Lay water and sewer service pipe 300 mm apart when services are in a common trench and the water service pipe size is less than 50 mm. Maintain a horizontal separation of 1.4 m at property line when the water service pipe size is 50 mm or greater. The water service will be centered in the common trench with sanitary on the left side and storm sewer on right side, when viewed from property line to the main. Install each service as described in the appropriate sections for each of the respective services.

.2 Where the sewer service (or services) are above the water service, lay the sewer services on a shelf of undisturbed ground of such width to ensure complete bedding or, lay water service at a specified depth, backfill and compact to required elevation to accommodate sewer service.

.3 Prior to commencing backfilling of the trench arrange for the Owner's Representative to inspect the installation of the services.

.4 If the bedding under a service is disturbed, replace and compact bedding as specified.

.5 Backfill for services will be consistent with connecting main backfill.

END OF SECTION

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Division 32 - Exterior Improvements

Division 33 – Utilities

END OF TABLE

Part 1 General

1.1 SECTION INCLUDES

.1 Wood slats for Waste Bin Enclosure

.2 Wood for Benches

.3 Hardware and attachment brackets

1.2 RELATED SECTIONS

.1 Section 06 10 00 - Site Furnishings

1.3 REFERENCES

1.4 References:

.1 Conform to the requirements of the local building code identified on the structural Drawings as amended by all subsequent regulations issued to the date of this Specification and applicable acts of authorities having jurisdiction.

.2 All references to the standards and publications noted in this Specification shall be to the edition referenced in the local building code identified on the structural Drawings, or to the edition referenced in the latest published editions or revisions of all standards published by the Canadian Standards Association issued to the date of this Specification, whichever is the later edition or revision.

.3 All references to the standards and publications noted in this Specification which are not referenced by the local building code or by the standards published by the Canadian Standards Association shall be to the latest edition and revision published to the date of this Specification.

.4 Standards referenced by the publications noted in this Specification apply even if they are not included in the list. Where such reference is made, it shall be to the latest edition and revision published.

.5 Where there are differences between the Agreement and the standards, codes, or acts, the most stringent provisions govern.

.6 ASME B18.2.1 Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Bolts.

.7 ASME B18.6.1 57.15mm GRK Fasteners #10 Coated SILVER Countersinking-Head Star R4 Multipurpose Wood Screws

.8 ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.9 ASTM A307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.

.10 ASTM A563 Standard Specification for Carbon and Alloy Steel Nuts.

.11 ASTM A653/A653M Standard Specification for Steel Plate, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.12 ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

.13 ASTM D2898 Standard Practice for Accelerated Weathering of Fire-Retardant- Treated Wood for Fire Testing.

.14 ASTM D3201/D3201M Standard Test Method for Hygroscopic Properties of Fire-Retardant Wood and Wood-Based Products.

.15 ASTM D5664 Standard Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant- Treated Lumber.

.16 ASTM D6841 Standard Practice for Calculating Design Value Treatment Adjustment Factors for Fire-Retardant-Treated Lumber.

.17 ASTM E84 Standard Test Method for Surface Burning Characteristics of Building

.18 ASTM F1667 Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.19 AWPA M2 Standard for the Inspection of Preservative-Treated Products for Industrial Use.

.20 AWPA M4 Standard for the Care of Preservative-Treated Wood Products.

.21 CAN/ULC S101 Standard Methods of Fire Endurance Tests of Building Construction and Materials.

.22 CSA B111 Wire Nails, Spikes and Staples.

.23 CSA G40.20-13/G40.21 General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.

.24 CSA O80 Series-15 Wood Preservation.

.25 CSA O86 Engineering Design in Wood.

.26 CSA O141 Softwood Lumber.

.27 NLGA (National Lumber Grades Authority) Standard Grading Rules for Canadian ULC Fire Resistance Directory.

1.5 PERFORMANCE REQUIREMENTS

.1 Fire-Resistance Ratings: As tested in accordance with CAN/ULC S101; testing by a qualified agency.

.1 Identify products with appropriate markings of applicable testing agency.

.2 Indicate design designations from ULC's "Fire Resistance Directory" or from the listings of another qualified testing agency.

1.6 SUBMITTALS FOR REVIEW

.1 Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

.1 Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply

with requirements. Indicate type of preservative used and net amount of preservative retained.

.2 Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials.

.3 For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.

.4 For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

.5 For connectors, include installation instructions.

.2 Samples: One of each different type of wood member exposed to view, minimum 300mm in size, illustrating wood grain, stain, and finish.

.3 Provide letter outlining steps to be taken during construction to ensure adequate weather protection of wood structures.

1.7 SUBMITTALS FOR INFORMATION

.1 Material Certificates: Issued by an approved grading agency.

.1 For dimension lumber specified to comply with minimum allowable unit stresses, indicate species, grade, and design values for each use.

.2 For exposed items, omit grade stamp and provide certificates as to species, grade, stress grade, seasoning, moisture content, and other evidence as required to show compliance with the Specifications.

.2 Evaluation Reports: For the following, from CCMC or ICC-ES:

.1 Wood-preservative-treated lumber.

.2 Fire-retardant-treated lumber

.3 Power-driven Fasteners

.4 Post-installed anchors

.5 Metal framing anchors

.3 Qualification Data: For installer and testing agency.

1.8 QUALITY ASSURANCE

.1 Grading Agencies: Certified by NLGA

Installer Qualifications: Company specializing in performing the Work of this Section with minimum three years of experience.

Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.9 DELIVERY, STORAGE, AND PROTECTION

.1 Protect wood products from weather during transit to Project site.

.2 Stack wood products flat with spacers beneath and between each bundle to provide air

.3 circulation.

.4 Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

.5 Store plywood panels flat and level.

.6 Keep finish faces inward and cover stacks to protect from bumping and abrasion.

.7 Protect tongue and groove plywood panel edges and corners.

.8 Protect panels from sunlight, water, or excessive humidity.

.9 Store materials off the ground.

Part 2 Products

2.1 DIMENSION LUMBER FRAMING

.1 Grading Rules: NLGA. All softwood lumber shall conform to CSA 0141 and CSA 086.

.1 Factor mark each piece of lumber with grade stamp of grading agency unless noted otherwise

.2 Do not grade stamp lumber exposed to view. Deliver to site with certificates as to species, grades, stress grades, seasoning, moisture content, and other evidence as required to show compliance with the Specifications.

.2 Dress lumber, S4S, unless noted otherwise.

.3 Maximum Moisture Content: 19% unless noted otherwise.

.4 Joists, Built-Up Beams, and Blocking: SPF #2, or any species and grade with minimum design values as follows:

.1 Modulus of elasticity, E: 9,500 MPa.

.2 Bending, Fb: 11.8 MPa.

2.2 MATERIALS

.1 No. 2 Structural Grade, Western Red Cedar, square edge, face surface smooth.

.2 IPE Timber Plank, square edge, face surface smooth with preservative treatment.

2.3 WOOD-PRESERVATIVE-TREATED LUMBER

.1 Preservative Treatment by Pressure Process: CSA O80; Use Category UC3.2 for exterior construction not in contact with ground, and Use Category UC4.1 for items in contact with ground.

.1 Preservative chemicals must be acceptable to authorities having jurisdiction and contain no arsenic or chromium.

.2 For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

.3 For exposed items indicated to receive an applied finish, use process that does not include water repellents or other substances that might interfere with application of indicated finishes.

.4 For items that will remain unfinished, use process that includes water-repellent treatment.

.2 After treatment, redry materials to a maximum moisture content of 19%. Do not use material that is warped or that does not comply with requirements for untreated material.

.3 Mark treated materials with treatment quality mark of an inspection agency acceptable to authorities having jurisdiction. For exposed items indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

.4 Treat items only as indicated on the Drawings.

.5 Any fasteners in contact with treated wood must be hot-dip galvanized or stainless steel.

2.4 WOOD TREATMENT

.1 Cedar treatment: Clear, transparent oil-based finish containing no water, to be approved by the Design Professional.

2.5 FASTERNERS AND ACCESSORIES

.1 Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Where rough carpentry is exposed to weather (during or after construction), in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153 or of Type 304 stainless steel.

.2 Nails, Spikes, and Staples: ASTM F1667.

.3 Power-Driven Fasteners: Fasteners with a CCMC or ICC-ES evaluation report acceptable to authorities having jurisdiction.

.4 Through Bolts and Anchor Bolts: ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers, hot dip galvanized to ASTM A153.

.5 Wood Screws: ASME B18.6.1 or as specified on the Drawings.

.6 Lag Screws: ASME B18.2.1.

.1 All lag screws to be machined threaded, not cast threaded.

.2 Pre-drilled hole sizes in wood members for lag screws to be in accordance with CSA O86.

.3 Lag screws are acceptable only where specifically indicated on the Drawings. Do not substitute lag screws for self-tapping wood screws.

.7 Post-Installed Anchors: Fastener systems with a CCMC or ICC-ES evaluation report acceptable to authorities having jurisdiction.

.8 Self Drilling Dowels:

.1 See section 2.5.2

.9 Steel brackets, supports and other miscellaneous items as specified in Section 05 50 00 – Metal Fabrications

.10 Steel Connections and Brackets: ASTM A36/A36M ASTM A167, galvanized steel.

.11 Hardware: ASTM A325M ASTM A325, structural quality, galvanized steel.

.12 Galvanized Coating for Untreated Wood: Hot dip galvanized to ASTM A653/A653M, Z275 zinc coating designation.

.13 Galvanized Coating for Treated Wood: Hot dip galvanized to ASTM A653/A653M, Z275zinc coating designation.

.14 Nails, Spikes, and Staples: ASTM F1667.

.15 Laminating Adhesive: CSA-O112, ASTM D2559.

.16 Metal Primer: Zinc-rich.

2.6 METAL FRAMING ANCHORS

.1 Provide products with design loads, as published by manufacturer, that meet or exceed those indicated.

.1 Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

.2 Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

.3 Provide framing anchors with minimum metal thickness of 1.3mm unless noted otherwise.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that site conditions are ready to receive work and opening dimensions are as indicated on Shop Drawings and instructed by the manufacturer.

.2 Examine supporting construction in areas to receive wood framing, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of the Work.

.3 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

.1 Comply with Part 9 of the National Building Code of Canada unless noted otherwise.

.2 Provide temporary shores, guys, braces, and other supports during erection to keep wood framing secure, plumb, and in alignment against wind loads, seismic loads, temporary construction loads, and loads equal in intensity to design loads.

.1 Any failure to make proper and adequate provisions for stresses during erection shall be solely the responsibility of the Installer.

.2 Fasteners required for erection purposes are the responsibility of the Contractor and are to be included in the bid.

.3 Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

.4 Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

.5 Comply with AWPA M4 and revisions specified in CSA O80 Series, Supplementary Requirements to AWPA M2 for applying field treatment to cut surfaces of preservative treated lumber.

.1 Use inorganic boron for items that are continuously protected from liquid water.

.2 Use copper naphthenate for items not continuously protected from liquid water.

3.3 SITE APPLIED WOOD TREATMENT

.1 Apply preservative treatment to manufacturer's written instructions.

.2 Brush apply two (2) coats on wood requiring cutting or drilling after treatment.

.3 Allow preservative to dry prior to erecting members.

3.4 ERECTION TOLERANCES

.1 For rectangular floor areas, the corner-to-corner diagonal measurements should not deviate from each other by more than 13mm or 0.25% of the length of the shortest side of the rectangle, whichever is greater.

.2 Posts:

.1 Plumbness: 0.25% of wall height (1:400) maximum deviation from plumb measured at any point along the wall.

.2 Position: plus or minus 10mm from theoretical at base.

.3 Length: plus or minus 10mm from theoretical.

.4 Stud Spacing: plus or minus 16mm from specified.

.3 Walls:

.1 Plumbness: 0.25% of wall height (1:400) maximum deviation from plumb measured at any point along the wall.

.2 Position: plus of minus 10mm from theoretical at base.

.3 Length: plus or minus 10mm from theoretical

.4 Stud spacing: Plus or minus 16mm from specified.

END OF SECTION

1. GENERAL

.1 reference is to a clause by that number in the Standard General Condition.

1.2 Section includes

.1 Final grade topsoil for finish landscaping.

.2 Placement of Mulch

1.3 Related requirements

.3 Section 01 43 00 - Quality Assurance: Testing fill compaction.

.4 Section 31 05 13 - Soil Materials.

.5 Section 31 22 13 - Rough Grading

.6 Section 32 93 00 - Trees, Shrubs And Ground Cover Planting: Topsoil fill for trees, plants and ground cover.

1.4 Material

.7 Topsoil: As specified in Section 31 05 13.

.8 Mulch: As specified in Section 31 05 13.

Part 2 EXECUTION

2.1 Examination

.9 Section 01 71 00: Verify existing conditions before starting work.

.10 Verify building and trench backfilling have been inspected.

.11 Verify substrate base has been contoured and compacted.

2.2 Protection of Existing Work

.12 Protect and prevent damage to trees, landscaping, site furnishings natural features, existing buildings, existing pavement, and utility lines which are to remain. Make good any damage.

.13 Protect existing mulch beds from soil spillage and other damage by completely covering with suitable protective material before placing and spreading topsoil.

2.3 Substrate preparation

.14 Eliminate uneven areas and low spots.

.15 Scarify surface to depth of 150 mm where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

.16 Locate utility lines before commencement of work and protect from damage.

.17 Remove foreign material, undesirable plants, roots, stones in excess of 20 mm diameter, debris and soil contaminated with toxic materials and petroleum products, from site. Do not bury foreign material beneath areas to be landscaped.

.18 Grade and finish subgrade to eliminate uneven areas, low spots and ensure positive drainage. Finish subgrades to depth required to achieve finished grade according to the soil assembly specified for each planting area. Refer to soil assemblies listed in this section and to drawings for locations.

.19 Subgrade scarification
- .1 For slopes less than 4:1
  - .1 Loosen subsoil by scarifying or tilling using discs, harrows or other suitable equipment to a depth of 75 -100 mm immediately before placing any topsoil. Repeat cultivation in areas where equipment used for hauling and spreading topsoil has compacted subsoil.
- .2 For slopes greater than 4:1 and less than 3:1
  - .1 Loosen subsoil by scarifying or tilling using disks, harrows or other suitable equipment running parallel to slope

2.4 Placing topsoil

.20 Place topsoil in areas where planting, sodding, seeding is required, nominal thickness as scheduled. Place topsoil during dry weather.

.21 Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of subgrade.

.22 Remove roots, weeds, rocks, and foreign material while spreading.

.23 Manually spread topsoil close to plant life, building to prevent damage.

.24 Place topsoil in 300mm lifts and lightly compact.

.25 Topsoil should be placed no sooner than 48 hrs before seed / sod is placed.

.26 Remove surplus subsoil and topsoil from site.

.27 Do not drive on topsoil following placement.

.28 Leave stockpile area and site clean and raked, ready to receive landscaping.

2.5 Preparation of Final Grade

.29 Remove all stones in excess of 20 mm diameter, soil lumps, roots, grass, weeds, construction materials, debris and foreign non-organic materials that may surface after preparation. Dispose of removed material off site.

.30 Thoroughly cultivate topsoil to minimum depth of 100 mm by roto tilling or hand methods where compaction has occurred and to break all soil lumps.

.31 Float until surface is smooth. Cut smooth falls to catch basin rim, finish flush.

.32 Fine grade to eliminate rough or low areas and to ensure positive drainage away from building and sidewalks. Maintain levels, profiles and contours of subgrade.

.33 Leave surface smooth, uniform and sufficiently firm to prevent sinkage pockets when watered. Finished surface shall be even and free from irregular surface changes.

.34 Rake, chain drag and lightly roll topsoil areas, remove all ridges and fill all depressions. On larger areas, use hydraulic power box rake or similar mechanical equipment to: remove soil lumps, rocks and debris; fill and level low areas; and correct other grading deficiencies in preparation of seed or sod bed.

.35 When topsoil will abut existing turf, cut turf to form a straight joint with the new seeded or sodded areas.

.36 Do not cover catch basins, valve covers or manholes.

.37 Use water trucks and sprinklers as necessary to control all airborne dust caused by topsoil placement and grading operations when necessary.

2.6 Placement of Mulch

.1 Following completion of planting trees, shrubs and potted plants, apply mulch to depth described in Contract Documents.

.2 Create shallow dishes around shrubs and trees to promote water retention.

.3 Keep mulch away from tree trunks and shrub stems.

.4 Water in and lightly compact to hold mulch in place

2.7 Clean-Up

.1 Clean up, immediately, any soil, mulch or debris spilled onto roadway, walks and mulched areas.

.2 Restore stockpile area and site to “clean and raked” condition acceptable to Consultant and ready to receive landscaping.

2.8 Tolerances

.38 Top of Topsoil: Plus or minus 13 mm.

2.9 Protection

.39 Protect landscaping and other features remaining as final work.

.40 Protect existing structures, fences, sidewalks, utilities, paving, curbs.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Custom site furnishings.

.2 Site furnishings.

1.2 RELATED SECTIONS

.1 Section 01 22 00 Measurement Schedule.

.2 Section 01 33 00 – Submittal Procedures.

.3 Refer to 06 10 00 – Rough Carpentry.

1.3 SUBMITTALS FOR REVIEW

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for furniture and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Shop Drawings:

.1 Submit shop drawings indicating dimensions, sizes, assembly, anchorage and installation details for each furnishing specified.

.2 Installation procedures to be reviewed and approved by Consultant prior to installation, including timing and sequence of foundations and finishing.

.1 Stage footings and installation procedure.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect furnishings from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SITE FURNISHINGS TO BE RELOCATED BY TOWN

.1 Waste Receptacle

.2 Planters

.3 Bistro Tables

.4 (2) Storage Sheds

2.2 LARGE STORAGE SHED

.1 Existing Storage Shed to be moved to site by Town. Contractor to hook-up to power – see electrical drawings. Contractor to coordinate timing.

2.3 STAGE

.1 Consultant will inform contractor of stage location.

.2 Stage to be provided by Contractor per contract drawings, or approved equivalent supplier.

.3 Contractor to provide engineer stamped shop drawings for stage surface, cladding, footings and all accompanying support structures.

2.4 BENCH

.1 Custom Bench w/ Dinosaur pattern inlays. Final patterns to be confirmed with Consultant prior to shop drawing creation and manufacturing.

.2 To be provided per contract drawings or approved equivalent.

.3 Contractor to provide detailed shop drawings including all materials, dimensions, footings, hardware etc.

2.5 WASTE BIN ENCLOSURE FENCE

.1 Waste bin enclosure fence to be provided by Contractor per contract drawings, or approved equivalent supplier.

.2 Contractor to provide 2 x 300mm wood slat samples for review and approval by Consultant.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for exterior site furnishing installation in accordance with Shop Drawings and/or manufacturer's written instructions.

.1 Visually inspect substrate in presence of the Consultant.

.2 Inform the Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Consultant.

3.2 PREPARATION

.1 Locate and protect utility lines.

.2 Notify and acquire written acknowledgment from utility authorities before beginning installation Work.

3.3 INSTALLATION

.1 Assemble furnishings in accordance with Shop Drawings and/or manufacturer's written recommendations.

.2 Fabricator is responsible for ensuring structural integrity of wood, metal, footings, and hardware connections for all site furniture.

.3 Touch-up damaged finishes to approval of The Municipality of Drumheller and/or Consultant.

3.4 CLEANING

.1 Progress Cleaning:

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion, remove surplus materials, rubbish, tools and equipment.

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by site furnishings installation.

END OF SECTION