

PART E
SPECIFICATIONS

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS, STANDARD DETAILS AND DRAWINGS

- E1.1 *The City of Winnipeg Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.
- E1.1.1 *The City of Winnipeg Standard Construction Specifications* is available in Adobe Acrobat (.pdf) format on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division internet Site at <http://www.winnipeg.ca/matmgt>.
- E1.1.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.
- E1.1.3 Further to GC:2.4(d), Specifications included in the Bid Opportunity shall govern over *The City of Winnipeg Standard Construction Specifications*.
- E1.2 The following Drawings are applicable to the Work:

<u>Drawing No.</u>	<u>Drawing</u>
C101	Geometrics and Grading
M201	Wall Hydrant Connections
S101	Planter Structural Details
L1	General Site Layout and Key Map
L2	Princess Street Plaza and Campus South Entry
L3	Princess Street North and Campus North Entry
L4	Adelaide Street North
L5	William Avenue West and Adelaide Street South
L6	Site Furnishings
L7	Planting Layout and Details

GENERAL REQUIREMENTS

E2. TRAFFIC CONTROL

- E2.1 Further to clause 3.6 & 3.7 of CW 1130-R1:
- E2.1.1 Maintain a minimum of three (3) lanes of traffic southbound on Princess Street during construction times.
- E2.1.2 A minimum of one (1) lane for the westbound traffic on William Ave and a minimum of one (1) lane of traffic in both directions on Adelaide Street and Elgin Ave.
- E2.1.3 During construction, access to the RRCC Adelaide Street Loading zone, and North and South Atrium entries should be maintained useable at all times. Should the Contractor be unable to maintain pedestrian or vehicular access to these locations he shall review the planned disruption with the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of 24 hours notification to the Contract Administrator, prior to disruption of access.
- E2.1.4 Pedestrian and ambulance/emergency vehicle access must be maintained at all times

E3. PEDESTRIAN SAFETY

- E3.1 Throughout the time period of construction a temporary snow fence shall be installed around the excavation area adjacent to any anticipated pedestrian movement. The Contractor shall be responsible for maintaining the snow fence in a proper Working condition. No separate measurement for payment shall be made for this Work.

E4. WATER USED BY CONTRACTOR

- E4.1 Further to clause 3.7 of CW 1120, the Contractor shall pay for all costs associated with obtaining water in accordance with the Water Works By-law. Sewer charges will not be assessed for water obtained from a hydrant.

E5. TRAFFIC DIVERSIONS

- E5.1 The Contractor shall be responsible for the removal of existing curbs and median areas as indicated on the Drawings.
- E5.2 The Contractor shall be responsible for providing the necessary traffic control and signage to ensure the actual project Site is continuously "fenced" with both barricades on the existing streets and snow fencing along the medians and sidewalks where required. No additional payment for this Work will be made; costs should be included in each division of Work within Form B: Prices.

E6. CONNECTION TO EXISTING MANHOLE

- E6.1 Further to City of Winnipeg Specification CW 2130, the Contractor shall supply all tees, wyes, bends and reducers not included in the unit prices but required to make the connections. All costs associated with the supply and installation of these fittings to be included in the unit price bid for "Connection to Existing Manhole".

E7. SAWCUTTING PAVEMENT

- E7.1 At the limits of excavation, the Contractor shall saw cut the existing pavement to produce a clean straight edge when excavated.
- E7.2 For asphaltic concrete pavements, the cost of saw cutting and disposal of any surplus material shall be included in the unit price bid for "Pavement Removals."

E8. ABANDONING EXISTING CATCHBASIN LEADS

- E8.1 Further to Specification CW 2130 and Specification CW 3210, the Contractor shall abandon all existing catch basins as indicated on drawings or as directed by the Contract Administrator.
- E8.2 The Contractor shall abandon the catch basin leads within 1.0M of the existing sewer by using a "DEBLO" plug or an approved equal. The plug shall be inserted from the boulevard side of the roadway and secured in place. The Contractor shall immediately fill in the lead with approximately 0.5 m³ of concrete conforming to Specification CW 2160.
- E8.3 The access to the catch basin lead at the boulevard side shall be by shored vertical shaft. The shaft shall be included in the unit price bid "Abandoning Existing Catch basin".

E9. SIGN SUPPORT CLAMPS AND PARKING METER POLES

- E9.1 The Contractor shall install all new sign support clamps and parking meter poles at the locations as shown on the Drawings or as directed by the Contract Administrator. The City shall supply all sign support clamps and parking meter poles.
- E9.2 All costs in connection with the installation of sign support clamps and parking meter poles are incidental to the Work.

E10. WINNIPEG TRANSIT BUS STOPS

- E10.1 The Contractor shall, at the initial Site meeting, determine in conjunction with the representative from Winnipeg Transit, how to maintain temporary transit stops along Princess Street and William Avenue.
- E10.2 All costs in connection with this item of Work shall be incidental to the overall management and operation of the Site during construction.

E11. CONSTRUCTION FACILITIES AND STAGING

- E11.1 The Contractor shall be responsible for providing his own storage area for storage and handling of all his construction operations. The use of public right-of-ways including the Main Street reconstruction areas will not be allowed

E12. CONTRACTOR EMPLOYEE PARKING

- E12.1 The Contractor shall be responsible for providing employee parking for both his own employees as well as those of any sub-Contractors.

E13. REMOVALS

GENERAL

- E13.1 This Specification covers the removal of existing concrete, asphalt, granular, curbing and excavation as shown on the Drawings. This Specification shall complement Specifications CW 3110-R7, CW 3235-R4 and CW 3240-R4.

CONSTRUCTION METHODS

- E13.2 All removals shall be completed in accordance with the City of Winnipeg Standard Construction Specifications
- E13.3 All excavation of temporary asphalt and concrete sidewalk shall be removed up to the building edge. Care shall be taken adjacent to the building facades and grade level flashing, and in particular adjacent to the power assisted door opening standpipes (3). Unnecessary damage during removal will be the responsibility of the Contractor.

MEASUREMENT AND PAYMENT

- E13.4 Notwithstanding the City of Winnipeg Standard Construction Specifications, removal of all pavements, curbing and excavation as shown on the drawings will be paid for at the Contract Unit Prices for "Removals and Earthwork"

E14. EXPOSING EXISTING UNDERGROUND SERVICES AND UTILITIES

- E14.1 The exact location and depth of some of the existing underground services and utilities within the project limits are unknown
- E14.2 The Contractor shall supply all labour, equipment and materials required to expose all underground services and/or utilities sufficiently far enough in advance of the proposed Works to permit the Contract Administrator where necessary, to adjust the alignment and grade to avoid existing lines and ducts.
- E14.3 Where the existing hydro duct line is adjacent to tree wells on Princess Street, the edge and top of the duct must be day-lighted in the area of exposure through a hydro-vac process. This process must be completed by an authorized hydro-vac day-lighting Contractor.
- E14.4 All costs in connection with this item of Work shall be included in the unit price bid for the various bid items.

E15. LAYOUT OF STREETSCAPING WORK

- E15.1 The Contractor will Work from layout information on the drawings and information provided by the Contract Administrator. The Contractor will be responsible to provide layout and continuously check the locations and elevations of all components and paving patterns of the Work included in this Contract. Any discrepancies between the drawings and the on-Site conditions should immediately be brought to the attention of the Contract Administrator.
- E15.2 Throughout the term of the construction contract the Contract Administrator may have a survey crew on the Site, but they will check the Work done by the Contractor's personnel only. The checking of the Work by the Contract Administrator surveyors will not relieve the Contractor of any responsibility of the correctness of the Work. Should any structure or paving or any part thereof be installed in any location other than that shown on the Drawings, then the error shall be rectified by the Contractor all at his own expense and at the satisfaction of, and in a manner specified by the Contract Administrator.
- E15.3 All costs associated with this item of Work shall be included in the unit prices bid for the supply and installation of the various items in the Contract.

E16. EXISTING CURB STOP BOXES

- E16.1 During the removal and installation of the concrete sidewalk and interlock paving, the Contractor shall take all necessary precautions when working in the vicinity of any existing curb stop boxes or valve boxes.
- E16.2 Any existing curb boxes requiring final adjustments (horizontal and/or vertical) will be paid for under Form B: Prices - "Adjustment of Existing Watermain valve boxes"
- E16.3 Any curb stop boxes or valve boxes damaged as a result of the Contractor's operation shall be replaced at his own cost.

E17. CONCRETE FORMWORK

GENERAL

E17.1 Related Work

E17.1.1 Cast in Place concrete and Standard City of Winnipeg related specifications

E17.2 Reference Standards

E17.2.1 All concrete formwork is to be done in accordance with CAN/CSA-A23.1 and CAN/CSA-A23.2

MATERIALS

E17.3 Formwork lumber: plywood and wood formwork materials conform to CAN-086.

E17.4 Form ties: removal or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25mm dia in concrete surface.

E17.5 Form liner:

E17.5.1 Plywood: Douglas Fir to CSA 0121, concrete form grade, square edge, 19mm thick.

E17.6 Formwork release agent: chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing concrete from sticking to forms.

CONSTRUCTION METHODS

E17.7 Erection

E17.7.1 Verify lines, levels and dimensions before proceeding with formwork and ensure dimensions agree with drawings.

E17.7.2 Construct forms to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.

E17.7.3 Align form joints and make watertight. Keep form joints to minimum.

E17.7.4 Clean formwork in accordance with CAN/CSA-A23:1. Only permitted if in good condition

METHOD OF MEASUREMENT AND PAYMENT

E17.8 No separate measurement will be made for concrete formwork. Payment for formwork shall be included in the costs for those items for which cast in place concrete is required.

E18. CAST IN PLACE CONCRETE

GENERAL

E18.1 The "General Conditions and Supplemental Conditions" of this Specification and all documents listed in the Bid Opportunity shall apply to and govern all phases of the Work hereinafter specified and/or shown on the Drawings.

E18.2 Scope of Work

E18.2.1 The Work of this section comprises the furnishing of all labour, equipment and materials required to complete the supply and installation of all cast-in-place concrete including but not limited to: planter walls, landscape curb, concrete piles, slabs and all foundations, as shown on the Drawings and as hereinafter specified, including, but not necessarily confined to the following:

- (a) Excavation including disposal of excess material.
- (b) Sub grade compaction as required.
- (c) Compacted granular fill work as required.
- (d) Supply, erection and removal of all formwork as required.
- (e) Design of concrete mixes.
- (f) Supply, placing and curing of reinforced concrete slabs
- (g) Reinforced Concrete foundations for planters.
- (h) Supply, placing and curing of all planters.
- (i) Supply, placing and curing of all landscape curbs and tree wells.
- (j) Surface preparation and waterproofing of concrete works.
- (k) Co-ordination of the installation of all electrical and other items to be installed in the concrete works by Manitoba Hydro.
- (l) Co-ordination with other sub-Contractors as required re: installation of pavers and sidewalk construction.
- (m) Co-ordination with other sub-Contractors as required re: application of graffiti protective coating on all vertical concrete surfaces.
- (n) Cleanup.

E18.3 Samples

E18.3.1 At least one (1) week prior to commencing Work, inform Contract Administrator of proposed source of aggregates and provide access for sampling.

E18.4 Certificates

E18.4.1 Minimum one (1) week prior to starting concrete work submit (if requested) to Contract Administrator manufacturer's test data and certification by qualified independent inspection and testing laboratory that the following materials will meet specified requirements:

- (a) Portland cement.
- (b) Cement slurry bonding agent.
- (c) Admixtures.

- (d) Aggregates.
- (e) Water.
- (f) Waterproofing
- (g) Emulsified asphalt.
- (h) Epoxy grout.

E18.4.2 Provide certification that plant, equipment, and materials to be used in concrete complies with requirements of CAN/CSA-A23.1 and that mix design is adjusted to prevent alkali aggregate reactivity problems.

E18.4.3 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CAN/CSA-A23.1 and that mix design is adjusted to prevent alkali aggregate reactivity problems.

E18.5 Construction Quality control and Placement Procedures

E18.5.1 Submit proposed quality control procedures for Contract Administrator's approval

E18.5.2 Submit proposed concrete placement procedures for Contract Administrator's approval

MATERIALS

E18.6 Portland cement to CAN3-A5-M 1983

E18.7 Aggregates to CAN/CSA-A23.1-M90. Coarse aggregates to be normal density.

E18.8 Chemical admixtures to CAN3-A266.2-M78. Contract Administrator to approve accelerating or set retarding admixtures during cold and hot weather placing. Use of calcium chloride is not permitted.

E18.9 Curing and sealing compound to: CAN/CSA-A23.1-M90, CPD Acrylic cure and seal or equal and to ASTM C309-81, Type 1 - chlorinated rubber.

E18.10 Premoulded joint fillers:

E18.10.1 Flexcell Expansion Joint Filler

E18.11 Concrete Mixes

E18.11.1 All concrete Work shall be in accordance with CSA A23.1 Concrete Materials and methods of concrete construction.

E18.11.2 Proportion normal density concrete in accordance with CSA A23.1 to give the following properties:

E18.11.3 Exterior Concrete for all Foundations

- (a) Cement: Type 50 Sulphate resistant
- (b) Maximum Coarse Aggregate: 20mm
- (c) Minimum Compressive Strength at 28 days: 32 Mpa
- (d) Maximum Water/Cement Ratio: 0.45
- (e) Class of Exposure: C-2
- (f) Maximum Slump: 80mm \pm 30mm
- (g) Air Content: 5-8%

- E18.11.4 Concrete for Landscape Curbs and Tree Wells
- (a) Cement: Type 50 sulphate-resistant
 - (b) Maximum Coarse Aggregate: 20mm
 - (c) Minimum Compressive Strength at 28 days: 32 Mpa
 - (d) Maximum Water/ Cement Ratio: 0.45
 - (e) Class of Exposure: C-2
 - (f) Maximum Slump: 80mm + 30mm
 - (g) Air Content: 5-8%
- E18.11.5 Concrete for all Planters
- (a) Cement: Type Agilia by LaFarge - Contact David Tesarski (204) 958-6333
 - (b) Maximum Course Aggregate: 14 mm
 - (c) Minimum Compressive Strength at 28 days: 35 Mpa
 - (d) Maximum Water/ Cement Ratio: 0.33
 - (e) Slump Flow: Highly fluid, self compacting - 450 mm - 750 mm
 - (f) Air Content: 4 - 8%

CONSTRUCTION METHODS

E18.12 Workmanship

- E18.12.1 Do all concrete Work in accordance with CAN/CSA-A23.1. All testing of concrete shall be done in accordance with CAN/CSA-A23.2. Obtain Contract Administrator's approval before placing concrete. Provide 3 Calendar Days notice prior to placing of concrete.
- E18.12.2 Pumping of concrete is permitted only after approval of equipment and mix.
- E18.12.3 Ensure reinforcing bars and reinforcement and inserts are not disturbed during concrete placement.
- E18.12.4 Algila Concrete for all Planter Walls, is to be mixed, supplied and installed as per manufacturer's specifications. Testing of Agilia Concrete as per manufacturer's recommendations.
- E18.12.5 Do not place load upon new concrete until authorized by Contract Administrator as per City of Winnipeg Standards.

E18.13 Construction Joints

E18.13.1 Joint Fillers

- (a) Furnish filler for each joint in a single piece for depth and width required for joint, unless otherwise authorized by Contract Administrator. When more than one piece is required for a joint, fasten abutting ends and hold securely by stapling or other positive fastening.

E18.14 Finishing of Concrete

E18.14.1 General

- (a) Finish concrete in accordance with CAN/CSA/A23.1.

E18.14.2 Slabs, Planter Walls, Landscape Curb and Exposed tree curbs

- (a) All shall be finished by a specialty concrete finisher.

- (b) The size of finishing crews shall be planned with due regard for the effects of concrete temperatures and atmospheric conditions of the rate of hardening of the concrete.
- (c) Finish of all items shall be smooth and clean with no pits, chips, bumps or other surface imperfections.
- (d) Agilia concrete for Planter Walls shall be finished as per manufacturer's specifications.

E18.15 Cleanup and Damage

- E18.15.1 Immediately on completion of concrete Work the Contractor shall remove from Site all equipment, timbers, shores, excavated materials, unused concrete, rubbish etc. caused by his operations, and leave the Site clean, level and ready for other Works.
- E18.15.2 The Contractor shall be responsible for making good all areas damaged by his operations.

METHOD OF MEASUREMENT

E18.16 Cast-in-place concrete (CIP) will be measured on a unit basis as follows:

- E18.16.1 Supply and install CIP reinforced concrete slabs
- E18.16.2 Supply and install CIP reinforced concrete planter walls/with footings and piles
 - (a) 350-450mm planter on William Ave.
 - (b) 150-320mm curved planter wall in plaza
- E18.16.3 Supply and install 200mm raised planter curb
- E18.16.4 Supply and install flush planter curb
- E18.16.5 Supply and install flush concrete curb for tree pit precast panels
- E18.17 The units to be paid for shall be the total number of units installed in accordance with this Specification and acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator. Cast-in-place concrete will be measured and paid for on a lineal metre basis unless otherwise noted in Form B: Prices.
- E18.18 The length to be paid for shall be the total number of linear metres installed in accordance with this Specification and acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator.

E19. PROTECTIVE GRAFFITI COATING

GENERAL

- E19.1 Scope of Work
 - E19.1.1 The Work comprises the furnishings of all labour, equipment, services and materials required to complete the application of graffiti coating on all vertical exposed concrete surfaces higher than 300mm.
- E19.2 Related Work
 - E19.2.1 Contractor shall visit the Site and verify all data and dimensions and report any errors, omissions, or discrepancies to the Contract Administrator prior to any installation.
- E19.3 Submittals for Approved Equal

- E19.3.1 Provide product data on specified product, describing physical characteristics and maintenance instructions prior to commencement of Work for review by the Contract Administrator.

MATERIALS

- E19.4 Graffiti Coating: #M74-0011M75 Aliphatic Acrylic Urethane Gloss Clear Finish by Benjamin Moore and Co. Contact Portage Avenue Paints, Brian Kusmack, Phone 788-0303.
- E19.5 Accessories and Application Equipment: As per manufacturers specifications.

EXECUTION

- E19.6 Surface Preparation and application of graffiti coating to be executed as per manufacturers specification.
- E19.7 Surface Preparation: Remove all loose particles, laitance, oil, grease, form release agents and any other contaminants. New concrete and masonry must be allowed to cure for a minimum of 28 days. Before painting, roughen the surface by abrasive blasting, acid etching or scarifying.
- E19.8 Due to the rapid dry of this coating only small areas may be coated by brush, applicator pad or roller. Care must be taken to achieve the specified wet and dry film thickness. Uniform even coats must be obtained. This paint is best applied by spray, however, this type of application may not be permitted on Site and must be reviewed and approved by the City of Winnipeg Health Department prior to start of application.
- E19.9 Contractor to install Graffiti Coating on cleaned concrete surface. Graffiti Coatings to be installed as per manufacturers specifications and as directed by Contract Administrator on Site.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

- E19.10 Graffiti Coating shall be included in the unit prices bid for vertical concrete elements under this Contract.

E20. CONCRETE COLLARS

GENERAL

- E20.1 The Contractor shall construct a square or rectangular concrete collar around all poles, valves, hydrants, pits, and other appurtenances within the sidewalk paving as directed by the Contract Administrator and as shown on the drawings.
- E20.2 The collar shall be 173 mm thick concrete pavement in accordance with CW-3325. The overall outside dimension of the collar shall generally be 150 mm larger than the diameter of the structure being surrounded or as indicated on details and directed by the Contract Administrator. The purpose of the collar is to provide a uniform edge for the installation of paving stones and brick pavers.
- E20.3 No direct payment will be made for construction of concrete collars, as they shall be considered incidental to concrete sidewalk and paving stone/ brick paver installation.

E21. 100 MM CONCRETE SIDEWALK WITH PAVING STONE AND LIMESTONE INSERTS

GENERAL

- E21.1 Further to Specification CW 3325-R2 the Contractor shall construct the proposed concrete sidewalk with block-outs (for paving stone and limestone block inserts) with a minimum 100 mm depth of Concrete as shown on the Drawings. The "block-outs" shall be constructed utilizing forming techniques capable of accommodating the proposed stone paving to the dimensions and tolerances as shown on the Drawings and as confirmed with paving stone and brick manufacturer.
- E21.2 The concrete sidewalk shall be poured such that the block-outs and remaining sidewalk act as a monolithic section. This includes all concrete, other than reinforced slabs within the plaza area.
- E21.3 Contractor to co-ordinate with City of Winnipeg Traffic Services and Manitoba Hydro for location of conduit, etc. required to accommodate the relocation and reinstallation of street lighting and traffic signalization poles at the NW corner of William and Princess. Contractor to supply and install sleeves for electrical in concrete base as required by Manitoba Hydro. All costs in connection with this Work are included in the unit price bid for "Supply and Install Concrete Sidewalk".
- E21.4 All costs in connection with the additional forming and placement of concrete as a result of the "block-outs", and additional depths in areas as shown on the Drawing are incidental and shall be included in the unit price bid for "Supply and Install Concrete Sidewalk". Minimum 75mm depth compacted granular leveling course shall be included in unit price bid for 'Supply and Install Concrete Sidewalk'.
- E21.5 Sidewalk to be poured adjacent to buildings with approved bond breaker at building face below grade. Cost of bond breakers shall be included in the unit price bid for "Supply and Install Concrete Sidewalk".
- E21.6 Joints
- E21.6.1 Sidewalk joints shall be constructed, where required, in accordance with the details as shown on the drawings, or as directed by the Contract Administrator. The joints shall be vertical and not deviate more than 15mm from the horizontal alignment.
- E21.7 Finishing
- E21.7.1 Traditional - Broom finish-Saw cut joints.
- E21.7.2 Joints shall be saw cut by approved methods as soon as the concrete is sufficiently hard so that it will not be damaged. The time at which all saw cutting is to be undertaken shall be determined by the Contractor
- E21.7.3 Broom finish for the concrete sidewalk will be in accordance with City of Winnipeg specifications CW3310, Section 9.6

MEASUREMENT AND PAYMENT

- E21.8 The Supply and measurement for the concrete sidewalk, with reveals for paving stones, and inserts will be measured on a square metre basis. The surface area to be paid for shall be the total number of square metres supplied in accordance with the specifications and accepted by the Contract Administrator.

E22. PRECAST CONCRETE TRENCH COVERS, TREE GRATES AND “GEO-GRID”

GENERAL

- E22.1 This special provision shall cover the supply and installation of precast concrete covers and tree grates complete with geo-grid.
- E22.2 Items of Work shall include:
- (a) Precast Concrete Trench Covers
 - (b) Precast Concrete Trench Tree Grates complete with Geo-Grid
- E22.3 The Work to be done by the Contractor shall include the furnishing of all overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

MATERIALS

E22.4 General

- E22.4.1 The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Special Provision.

E22.5 Shop Drawings

- E22.5.1 Shop drawings are required for all concrete precast covers, precast tree grate, and geo-grid covers. Drawings showing all sizes and dimensions, position and spacing of reinforcing, openings, connection details, layout plan, finishes, lifting devices, all inserts, estimated camber, members identification marks, and all other relevant information showing immediate adjacent materials for proper coordination shall be submitted to the Contract Administrator for review prior to fabrication.

E22.6 Precast Concrete Covers and Tree Grate

- E22.6.1 Precast concrete covers, plain concrete finish to match sidewalk, with inset galvanized hardware to facilitate lifting, to be supplied by Barkman Concrete or approved equal. Two sizes of covers will be required as shown on the layout drawings. Type B (1370mm x 1370mm), Type C (1370 mm x 1150mm). Hardware to be covered with flush durable cover coloured to match concrete.
- E22.6.2 Precast Tree Grates, plain concrete finish to match sidewalk, with inset galvanized hardware to facilitate lifting, to be supplied by Barkman Concrete or approved equal. Each grate to be made of two pieces as shown on the drawings. Type A (1370mm x1370mm). Hardware to be covered with flush durable cover coloured to match concrete.
- E22.6.3 Barkman Concrete Tree Covers and Sidewalk Panels, sizes and finish as stated above.

Barkman Concrete
909 Gateway Road Winnipeg, MB R3K 3L1
Ph: (204) 667-3310 Fax: (204) 663-4854
Attention: Wayne Wiebe – Product Consultant

E22.7 Geo-Grid Cover

- E22.7.1 Geo-grid cover to be made of corrosion resistant fibreglass reinforced plastic grating. Panels to be cut to suit size as shown on drawings. Panels to be #150SM (40mm x 40mm grid), type of grating to be general purpose, colour dark gray, top surface to be plain.

- E22.7.2 Geo-grid covers to be cut and sanded smooth to dimensions as shown on the drawings. All hardware to be stainless steel. Pre-drill all holes for fastening hardware.

INSTALLATION

- E22.8 After planting trees, concrete tree covers and sidewalk panels will be installed by the Contractor in locations and in the manner indicated on the construction drawings.
- E22.9 Precast tree panels to be set flush with surrounding concrete curb to ensure level and even surface with surrounding curb and sidewalk areas. No gaps or unevenness greater than 5 mm will be acceptable.

MEASUREMENT AND PAYMENT

- E22.10 The supplying and placing of Precast Trench Covers will be measured on a unit price basis. The units to be paid for shall be the total number of items of Precast Trench Covers installed in accordance with this Specification, accepted by the Contract Administrator, as computed from the layout shown on the accepted shop drawings.
- E22.11 Precast concrete components shall be paid for within the Contract Unit Price for Precast Trench Covers, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work included in this Specification.

E23. UNIT PAVERS

DESCRIPTION

- E23.1 This Specification shall cover the supply and installation of unit pavers and bedding course of sand for areas as indicated on the Drawing. This Specification supplements CW3335. In the plaza area and around the perimeter of the North and South atrium areas the Work also includes the excavation, installation of a base course and provision of a concrete base on which to set pavers.

MATERIALS

E23.2 Concrete Pavers

- E23.2.1 Holland Stone, colour to be Natural, Sizes to be 100mm x 200mm x 57mm depth
- E23.2.2 Half Holland Stone, colour to be Natural, Sizes to be 100mm x 200mm x 57mm depth

E23.3 Clay Pavers

- E23.3.1 Clay Paver, colour to be Dark Ironspot, Sizes to be 194mm x 194mm x 57mm depth
- E23.3.2 Clay Paver, colour to be Dark Ironspot, Sizes to be 93mm x 194mm x 57mm depth

E23.4 Limestone Pavers

- E23.4.1 All limestone pavers shall be of standard architectural grade, free of cracks, seams, starts, or defects that may impair its structural integrity, appearance, durability or function. Colour or other visual characteristics indigenous to the particular material and adequately demonstrated in the sampling phase will be accepted provided they do not compromise the structural or durability capabilities of the material.
- E23.4.2 Colour shall be consistent for all limestone pavers.

E23.4.3 Texture and finish shall be as shown on the approved shop drawings and shall be within the range of samples approved by the Contract Administrator. Size to be 250mm x 250mm x 57mm.

E23.5 Submittals

E23.5.1 Contractor to submit sufficient samples of pavers to the Contract Administrator to show texture, finish and anticipated range of colour to be supplied for each type of paver specified above.

CONSTRUCTION METHODS

E23.6 All joints to be tight and not to be wider than 4mm unless otherwise noted on the drawings.

E23.7 All pavers shall be set flush with contiguous adjacent concrete and curb materials. Sand depth to vary to ensure constant surface finish.

E23.8 Shipping and Handling

E23.8.1 Packing and Loading

E23.8.2 Finished limestone pavers shall be carefully packed and loaded for shipment using all reasonable and customary precautions against damage in transit. No material which may cause staining or discoloration shall be used for blocking or packing.

E23.9 Site Storage

E23.9.1 Upon receipt at the building Site or storage yard, the paving stone shall be stacked on timber or platforms at least 75mm above the ground, and extreme care shall be taken to prevent staining during storage. If storage is to be for a prolonged period, polyethylene or other suitable plastic film shall be placed between any wood and finished surfaces, and shall be used also as an overall protective covering.

MEASUREMENT AND PAYMENT

E23.10 The supplying and placing of Unit Pavers will be measured on an area basis. The area to be paid for shall be the total number of square metres of Unit Pavers installed in accordance with this Specification, accepted by the Contract Administrator, as computed from the Site.

E23.11 The supply and placement of sand bedding and infill material for Unit Pavers is incidental to the Works and no separate measurement and payment will be made.

E24. TREE PLANTING TRENCH AND PLANTING BED PREPARATION

GENERAL

E24.1 This specification shall cover tree pit and planting bed preparation. The Work to be done by the Contractor under this specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all Work as specified.

MATERIALS

E24.2 All materials supplied under this Specification shall be of a type acceptable to the Contract Administrator, and shall be subject to inspection and testing by the Contract Administrator.

E24.3 The Contractor shall be responsible for the supply, safe storage and handling of all materials as set forth in this Specification. All materials shall be handled in a careful and Workmanlike manner, to the satisfaction of the Contract Administrator.

E24.4 Planting Soil

E24.4.1 Planting Soil shall consist of black top soil, a fertile friable natural loam containing by volume not less than 4% and no more than 25% of organic matter for clay loams, and not less than 2% and no more than 25% for sandy loams, with an acidity value ranging from pH 6.0 to 8.0 and capable of sustaining vigorous plant growth. Topsoil is to be free of any mixture of subsoil, clay lumps and free of stones and other extraneous matter. It is not to contain couch or crab grass rhizomes.

E24.5 Bark Mulch

E24.5.1 Bark Mulch shall be wood chip mulch free of small branches and leaves and ranging in size from 5mm to 75mm long and 5mm to 20mm thick. Submit sample of mulch for approval by the Contract Administrator prior to shipping to Site.

E24.6 Water

E24.6.1 Water shall be potable and free of minerals that may be detrimental to plant growth.

E24.7 Fertilizer

E24.7.1 Fertilizer shall be complete synthetic slow release fertilizer with maximum 35% water-soluble nitrogen.

E24.8 Insulation

E24.8.1 Planter Insulation shall be 37 mm thick rigid styrofoam.

E24.9 Waterproofing

E24.9.1 Planter waterproofing shall be "Bituthene 3000" membrane.

E24.10 Filter Cloth

E24.10.1 Filter cloth to be Terra Fix 270R.

E24.11 Sub Drain

E24.11.1 Drain tiles to be perforated 150mm diameter drain tile complete with cloth cover.

E24.12 Granular

E24.12.1 Granular shall be clean and washed granite aggregate free of fines and small particles. Aggregate sizes to be no less than 25mm and no greater than 38mm diameter. Sample of granular material to be provided to Contract Administrator for approval prior to shipment to Site.

CONSTRUCTION METHODS

E24.13 The Contractor shall co-ordinate the installation in accordance with the Drawings and as specified herein.

E24.14 Planting Bed Preparation

E24.14.1 General Contractor shall co-ordinate excavation and fill Works for planting beds to ensure minimal additional excavation for shrub beds required by landscaper. All remaining areas to be filled shall be in locations and to the depths shown on the drawings.

E24.14.2 Planting beds areas shall be filled with soil mixture. After filling top of bed shall be set to level shown on drawings. Soil should be lightly compacted and indicated soil depths shall be depths after light compaction.

E24.14.3 All areas and locations provided for planting shall be staked according to layout shown on the drawings. Fill/excavation shall not proceed until the layout has been inspected and approved by the Contract Administrator. Fill/excavation shall not be undertaken until all underground utilities have been located and protected.

E24.15 Raised Planter Preparation

E24.15.1 For planting beds in raised planters install waterproofing, granular material, filter cloth, and styrofoam insulation in the planters as shown on the drawings and as described in this specification. Install topsoil to within 75 mm of top planter and bark mulch to within 25mm of top of planter. Install insulation to within 100mm of top of planter.

E24.16 Installation of Mulch

E24.16.1 Bark mulch shall be spread to a consistent depth over entire planting bed area, taking care not to damage the plants.

E24.17 Tree Planting Trenches

E24.17.1 Contractor shall co-ordinate excavation and fill Works for tree trenches to ensure minimal additional excavation for tree trenches required by landscape sub-Contractor. Tree trenches shall be excavated to the finished depths and widths as shown on drawings.

E24.17.2 Sub-grade shall be scarified to a minimum depth of 200mm.

E24.17.3 Drain tiles to be placed on clean granular and covered with clean granular as shown on the drawings. Drain tiles to be sloped and tied into catch basin drains on Adelaide Street only, as directed on Site by the Contract Administrator and as noted on the drawings.

E24.17.4 Tree trench excavation shall be filled with soil mixture. After filling, top of soil shall be level with surrounding grade of trench concrete curb lip (below top of geo-grid cover) and as determined by the Contract Administrator. Soil should be lightly compacted and indicated soil depths shall be depths after light compaction.

MEASUREMENT AND PAYMENT

E24.18 The supplying and placing of Tree Planting Trenches and Planting Bed Preparation will be measured on an area basis. The area to be paid for shall be the total number of square metres of Tree Planting Trenches and Planting Bed Preparation installed in accordance with this Specification, accepted by the Contract Administrator, as computed from the Site.

E24.19 The supply and placement of drain tile, granular, mulch, insulation for Tree Planting Trenches and Planting Bed Preparation is considered incidental to the Works and no separate measurement and payment will be made.

E25. SUPPLY AND INSTALLATION OF TREES, SHRUBS AND GROUNDCOVERS

GENERAL

- E25.1 This specification shall cover the supply and installation of trees, shrubs, and groundcovers. The Contractor shall furnish all labour, materials, equipment and services necessary to complete the Work as shown on the drawings and specified herein.
- E25.2 All plant material shall be randomly inspected at the source upon request of the Contract Administrator.

MAINTENANCE AND WARRANTY

- E25.3 The Contractor shall be responsible for the maintenance of the planted material for a period of two (2) years from the date of award of Total Performance and commencement of the Two Year Maintenance Period. For any areas planted after September 15th, the maintenance period will commence on May 15th of the following year or such date as mutually agreed upon by all parties. Defective plants shall be replaced within ten (10) Calendar Days of notification to the Contractor.
- E25.4 The Contractor shall, at his/her expense, maintain the Work against any and all defects or deficiencies resulting from insect infestation, disease and mechanical damage due to improper handling, installation or maintenance, for a period of two (2) years from the date of the Certificate of Total Performance. Nursery stock damaged by vandalism or reasons beyond the control of the Contractor shall be replaced by the City of Winnipeg.
- E25.5 End-of-Warranty and Maintenance inspection will be conducted by the Contract Administrator.
- E25.6 The Contract Administrator reserves the right to request material replacement or extend the Contractor's Maintenance and Warranty responsibilities for an additional third year, if, at the end of the first or second year of maintenance, leaf development and growth are not sufficient to ensure future survival of the tree. Such determination is at the discretion of the Contract Administrator.
- E25.7 Replacements
- E25.7.1 During the Maintenance Period, the Contractor shall remove from Site any plant material that has died or failed to grow satisfactorily as determined by the Contract Administrator and replace as per Specifications within a maximum ten-Calendar Day period from notification.
- E25.7.2 The Contractor shall extend Maintenance and Warranty on replacement tree for a period equal to the original Maintenance and Warranty Periods.
- E25.7.3 The Contractor shall continue such replacement, Maintenance and Warranty until plant material is accepted.

MATERIALS

- E25.8 Planting Soil shall consist of black top soil, a fertile friable natural loam containing by volume not less than 4% and no more than 25% of organic matter for clay loams, and not less than 2% and no more than 25% for sandy loams, with an acidity value ranging from pH 6.0 to 8.0 and capable of sustaining vigorous plant growth. Topsoil is to be free of any mixture of subsoil, clay

lumps and free of stones and other extraneous matter. It is not to contain couch or crab grass rhizomes.

E25.9 Water shall be free from organic or chemical contaminants detrimental to healthy plant growth.

E25.10 Fertilizer – shall be complete synthetic slow release fertilizer with maximum 35% water soluble nitrogen

E25.11 Rootball burlap shall be 150g, Hessian burlap, biodegradable.

E25.12 Tree wrapping material to be new, clean, plain burlap strips minimum 2.5 kg/sq.m. mass and 150mm wide.

E25.13 Anti-dessicant shall be wax-like emulsion to provide film over plant surfaces reducing evaporation but permeable enough to permit transpiration.

E25.14 Wound dressing shall be horticultural accepted non-toxic, non-hardening emulsion.

E25.15 Plant Material

E25.15.1 Trees are to be grown in nurseries under proper cultural practices as recommended by the Canadian Nursery Trade Association.

E25.15.2 Only those trees will be accepted which have been grown for at least the four (4) previous years in local Manitoba nurseries located in an Agricultural Canada Plant Hardiness Zone designation of 2(a or b) or 3(a or b), and within a 250 kilometres radius of Winnipeg. Trees that have grown in plant hardiness zones 1 and 4 or greater will be rejected.

E25.15.3 All nursery stock supplied shall be Canadian Prairie nursery grown, and of species and sizes indicated in the plant list on the drawings. Its quality shall be in accordance with the "Guide Specification for Nursery Stock of the Canadian Nursery Trades Association".

E25.15.4 Any nursery stock dug from native stands, wood lots, orchards, or neglected nurseries and which have not received proper cultural maintenance as advocated by the Canadian Nursery Trades Association shall be designated as "collected plants". The use of "collected plants" will not be permitted unless specified below. Nomenclature of specified nursery stock shall conform to the International Code of Nomenclature for Cultivated Plants and shall be in accordance with the approved scientific names given in the latest edition of Standardized Plant Names. The names of varieties not named therein are generally in conformity with the names accepted in the nursery trade.

E25.15.5 All trees are to be supplied in accordance with the Work of this Contract and shall be inspected by the Contract Administrator at the nursery Site. At the time of inspection, the Contractor shall permanently tag a suitable branch of each tree with a distinct code clearly indicating that the City of Winnipeg will be the intended recipient of that tree. The tag and code must be approved at least two (2) weeks in advance of their use by the Contract Administrator. The tag must be kept on the tree at the time of planting, and removed only when authorized in writing by the Contract Administrator. The Contract Administrator will reject each and every tree that has not been delivered with its tag intact at the planting Site.

E25.15.6 Each tag will identify the species of the tree and its calliper at the time in which the tag is placed permanently on the tree. The use of trees requiring treatments as ordered by Agriculture Canada is prohibited.

E25.15.7 Plants larger than specified may be used if approved by the Contract Administrator. The use of such plants shall not increase the contract price.

E25.15.8 All nursery stock shall be measured when the branches are in their normal position. Height and spread dimensions specified refer to the main body of the plant and not from branch

tip to root base or from branch tip to branch tip. Where trees are measured by calliper (cal), reference is made to the diameter of the trunk measured 300mm (12") above ground as the tree stands in the nursery.

E25.15.9 All nursery stock shall be well branched, densely foliated when in leaf, true to type, structurally sound, possess a well developed, undamaged root system and shall be free of disease, insect infestations, rodent damage, sun scald, frost cracks, and other abrasions or scars to the bark. All parts of the nursery stock shall be moist and show live, green cambium when cut. All trees shall have one (1) sturdy, reasonably straight and vertical trunk and a well-balanced crown with fully developed leader. At least one (1) plant of each variety supplied shall bear a tag showing both the botanical and common name of the plant.

E25.15.10 Trees are to have been root pruned regularly, but not later than one growing season prior to arrival on Site. The Contractor may be required to furnish documentation to the City of Winnipeg on his root-pruning program. Trees in excess of 75 mm calliper are to have been half root pruned during each of two successive growing seasons, the latter at least, one growing season prior to arrival on Site.

E25.16 Plant Lists : The Contractor shall supply plant material as indicated on the Plant Lists below

Plant List

QUANTITY	BOTANICAL NAME / COMMON NAME	SIZE AND REMARKS
DECIDUOUS TREES		
17	<i>Ulmus americana</i> / American Elm	100mm caliper, min. 3500mm ht.,min. 1200mm wide rootball, straight trunk, balanced head.
13	<i>Prunus mackii</i> / Amur Chokecherry	75mm caliper, min. 2500mm ht.,min. 900mm wide rootball, straight trunk, balanced head.
2	<i>Acer ginnala</i> / Amur Maple	50mm caliper, min. 2000mm ht.,min.750mm wide rootball, straight trunk, balanced head.
SHRUBS		
9	<i>Syringa meyeri 'Palibin'</i> / Dwarf "Meyer" Lilac	500mm ht., 5 major basal stems, dense bushy plants, container.
3	<i>Prunus tenella</i> / Flowering Russian Almond	450mm ht., 5 major basal stems, dense bushy plants, container.
13	<i>Spiraea x bumalda 'Dart's Red'</i> / Dart's Red Spirea	450mm ht., 5 major basal stems, dense bushy plants, container.

39	<i>Juniperus sabina</i> 'Calgary Carpet' / Savin Juniper 'Calgary Carpet'	450mm diameter plant, symmetrically branching major basal stems, dense bushy plants, container.
VINES AND PERENNIALS		
60	<i>Parthenocissus quinquefolia</i> / Virginia Creeper	2 yr. plants from division. No. 1 grade, well branched, with not less than 3 runners, 18" and up and vigorous, well developed root system.
120	<i>Hemerocallis x hybrida</i> / Day lily assorted	2 yr. plants, well developed and vigorous, 4 litre pot.
55	<i>Linum perenne</i> / Perennial Blue Flax	1 yr. plants, well developed and vigorous, 3.5" pot.
45	<i>Aster amellus</i> / Italian Aster 'Violet Queen'	1 yr. plants, well developed and vigorous, 3.5" pot.
100	<i>Bergenia cordifolia</i> / Elephant Ears	1 yr. plants, well developed and vigorous, 3.5" pot.

Plant Material Quantity and Size

E25.16.1 Plant material is to be planted at the quantities and callipers listed on the Plant Lists. Any variation from the specified quantity is to be clearly identified on the Schedule of Prices. Any variations to species, size or calliper of specified trees will require a request for approval from the Contract Administrator.

E25.17 Shipment and Pre-Planting Care

E25.17.1 Shipment of trees and the excavation of holes shall be coordinated to ensure minimum time lapse between digging and planting.

E25.17.2 Branches of trees shall be tied securely, and trees shall be protected against abrasion, exposure and extreme temperature change during transit. Avoid binding of trees with rope or wire that would damage bark, break branches or destroy natural shape of tree. Give full support to root ball of trees during lifting.

E25.17.3 Tree foliage shall be covered with a tarpaulin, and bare roots shall be protected by means of dampened straw, peat moss, sawdust or other acceptable material to prevent loss of moisture during transit and storage.

E25.17.4 Broken and damaged roots shall be removed with sharp pruning shears. Make clean cuts, and cover cuts over 10 mm diameter with a tree wound dressing.

E25.17.5 Roots shall be kept moist and protected from sun and wind. Heel-in trees, which cannot be planted immediately in shaded areas, and water well.

CONSTRUCTION METHODS

E25.18 Workmanship

- E25.18.1 Planting locations shall be staked out or painted on Site by Contractor and approved on-Site by the Contract Administrator prior to installation.
- E25.18.2 Anti-desiccant shall be applied in accordance with material manufacturer's instructions with prior approval of the Contract Administrator.
- E25.18.3 Coordinate operations. Keep Site clean and planting holes drained. Immediately remove soil or debris spilled onto pavement, grass or sidewalk.

E25.19 Planting Time

- E25.19.1 Deciduous trees shall be planted during dormant period. Trees noted for spring planting only, must be planted in dormant period before buds have broken.
- E25.19.2 When permission has been obtained from the Contract Administrator to plant deciduous trees after buds have broken, plants shall be sprayed with anti-desiccant to slow down transpiration prior to transplanting.
- E25.19.3 Plant only under conditions that are conducive to health and physical conditions of trees.
- E25.19.4 Provide planting schedule to Contract Administrator. Extending planting operations over long period using limited crew will not be accepted.
- E25.19.5 The Contractor must obtain all above and belowground clearances from all the utilities as well as the appropriate District Operations Branch in a timely manner so as not to jeopardize the schedule of the complete tree-planting Contract.

E25.20 Excavation of Tree Pits

- E25.20.1 Excavation of tree pits within planting beds to be located as indicated by stakes or paint marks.
- E25.20.2 The Contractor must not commence excavation of any tree pits until the full extent of all buried utilities and services are located and protected.
- E25.20.3 The Contractor shall hand excavate all tree pits located over underground utility lines. Tree Pits not located over underground utilities may be machine excavated. Tree Pits shall be excavated with vertical sides to the full width of the surface area. as shown on the drawings. All excavated material shall be disposed of off Site.

E25.21 Planting Procedure

- E25.21.1 With balled and burlapped root balls and root balls in wire baskets, burlap shall be loosened and cut away from the top 1/3 without disturbing root ball. Each balled specimen shall be handled with great care so that the root balls shall not be broken. Burlap or rope shall not be pulled from under root ball. Non-biodegradable wrapping shall be removed. Broken root balls or balls consisting of loose soil shall not be accepted and shall be replaced. Broken roots of deciduous stock shall be pruned back prior to planting.
- E25.21.2 Where the root ball of plant material is enclosed in wire baskets, the wire baskets shall be removed from the root ball once the tree has been located properly in the pit. Removal shall be by a min. of 4 vertical cuts equally spaced around the baskets without damaging the root ball. Cutting of the 2 lowest horizontal strands of the wire basket before placing the tree in the pit is acceptable provided that the bottom of the root ball will remain intact.
- E25.21.3 After inserting the tree and tamping the root system with topsoil in layer of 150 mm, water shall be poured in until the pit is thoroughly soaked. Filling of the hole shall then be completed and the fill-in soil shall be packed firmly around the roots, leaving a concave

surface for convenient watering as shown in drawings. After filling, the planting shall be watered at frequent intervals. No tree pit shall be left open at the end of the Contractor's Work Day.

E25.21.4 Planting shall be done during periods suitable to weather conditions and locally accepted practice. All nursery stock shall be set plumb in the centre of pits and at levels as shown on the planting details after settlement has taken place.

E25.21.5 Nursery stock shall be faced to give the best appearance or relationship to adjacent structure and to the approval of the Owner or his representative. Trees shall be placed equal to depth they were originally growing in nursery.

E25.22 Fertilizing

E25.22.1 When planting is completed, surface of planting saucer shall be fertilized, meeting the requirements of Specification. Fertilizer shall be mixed thoroughly with top layer of planting soil and watered in well.

E25.23 Pruning

E25.23.1 All deciduous trees shall be pruned immediately after planting by a Manitoba licensed Arborist. The amount of pruning shall be limited to the minimum necessary to remove dead or injured branches and to compensate for the loss of roots as a result of transplanting operations. Pruning shall be done in such a manner as to preserve the natural character of the plants. Leaders shall not be removed. Only clean, sharp tools shall be used. All cuts shall be clean and flush, leaving no stubs. Cuts, bruises or scars on the bark shall be traced back to living tissue and removed. The affected areas shall be shaped so as not to retain water and all cuts of more than 25 mm (1") in diameter shall be painted within approved tree paint.

E25.24 Watering

E25.24.1 Trees shall be watered during the planting procedure as described above, and once a week thereafter, or more frequently if required, during construction and prior to beginning of the Maintenance Period. The Contractor shall be responsible to properly maintain all plant material installed prior to review and acceptance by the Contract Administrator until the Date of Total Performance.

E25.25 Protection of all Plants

E25.25.1 All nursery stock shall be well protected from damage and drying out from time of digging until planted on Site. All roots shall be cleanly cut; split roots are not acceptable.

E25.25.2 Nursery stock shall be transplanted with care taken to prevent damage. Branches shall be carefully tied in such a manner so as not to break or damage trunks. Points of contact with equipment shall be padded.

E25.25.3 Nursery stock, which cannot be planted immediately upon arrival at the Site, shall be well protected to prevent drying out and shall be kept moist until commencement of planting.

MEASUREMENT AND PAYMENT

E25.26 The supplying and installation of Plant Material will be measured on a unit price basis and shall be paid for at the Contract Unit Price, installed in accordance with this Specification, accepted by the Contract Administrator, as computed in the field by the Contract Administrator.

E26. LANDSCAPE MAINTENANCE

GENERAL

- E26.1 This specification shall cover the maintenance of trees, shrubs and groundcovers from the time of installation and for a period of two years from the date of Total Performance. The Contractor shall furnish all labour, materials, equipment and services necessary to perform the Work according to the drawings and specifications. In general, Work shall include:
- (a) Spring-cleaning
 - (b) Fertilizing
 - (c) Watering
 - (d) Weed Control
 - (e) Pest and disease control
 - (f) Tree support repair and adjustment
 - (g) Tree pruning
 - (h) Removal of annuals
 - (i) Winter preparation
- E26.2 Protection of all Plants
- E26.2.1 In the course of carrying out the responsibilities within this contract, the Contractor shall undertake such maintenance that will prevent damage to other elements of the Site, including but not limited to: other trees, landscaping, Site furniture, buildings, pavement surfaces and underground utility facilities.
- E26.3 Maintenance Schedule
- E26.3.1 The Contractor shall provide a complete written Maintenance schedule, for the two-year period, to the Contract Administrator prior to the issuing of the Certificate of Substantial Performance.
- E26.3.2 All maintenance of trees and shrubs to be supervised by a Manitoba Certified Arborist.
- E26.4 Documentation and Reporting
- E26.4.1 All maintenance personnel shall record in a logbook the operations carried out and any conditions that require attention or monitoring. The arborist shall submit a summary of the information as a Quarterly Report to the Contract Administrator. Conditions requiring attention should be brought to the Contract Administrator's attention immediately.
- E26.4.2 The Contractor should review the Site regularly and adjust maintenance operations to suit observed conditions. A Site Maintenance Inspection Form (supplied by the Contract Administrator) should be used to record each Site visit. Copies of these forms shall be sent to the Contract Administrator quarterly.
- E26.4.3 Report in writing any major maintenance procedures intended, minimum one week in advance.
- E26.4.4 If any damage, dangerous or potentially dangerous situations are observed the Contractor shall notify the Contract Administrator immediately.

E26.5 Failure to Document and Document

E26.5.1 If the Contractor fails to submit a quarterly report it shall be assumed the Work was not performed for that time period. Payment for Landscape Maintenance shall be reduced by 1/4 for every quarter a report is not submitted.

E26.6 Qualifications

E26.6.1 All landscape maintenance personnel shall be skilled in the tasks assigned to them.

E26.7 Certificate of Acceptance

E26.7.1 The Certificate of Acceptance will be issued upon completion of the two (2) year Maintenance Period, provided that:

- (a) Trees are well-established and rooted, properly pruned and showing vigorous growth satisfactory to the Contract Administrator.
- (b) Unacceptable trees or shrubs shall be removed and replaced according to the required specifications. Maintenance of replacement items shall be extended for a period equal to the original Maintenance Period as specified herein. The Contract Administrator shall make further inspection after the additional Maintenance Period.
- (c) Replacement and maintenance requirements shall continue until the material is accepted.

MATERIALS

E26.8 General

E26.8.1 Materials are to conform to the requirements of related Specification sections.

E26.9 Fertilizer

E26.9.1 Fertilizer shall be complete synthetic slow release fertilizer with maximum 35% water-soluble nitrogen.

E26.10 Water

E26.10.1 Water is to be potable and free of minerals that may be detrimental to plant growth.

CONSTRUCTION METHODS

E26.11 General

E26.11.1 Program timing of operations to growth, weather conditions and use of Site.

E26.11.2 Each operation shall be done continuously and complete within reasonable time period.

E26.11.3 Store equipment and materials off Site.

E26.11.4 Collect and dispose of debris or excess material on daily basis.

E26.12 Spring Cleaning

E26.12.1 Any dead vegetation, leaves and debris shall be removed.

E26.13 Fertilizing

E26.13.1 Soil testing shall be carried out by a recognized testing facility prior to fertilizer application to ensure a properly formulated program.

E26.13.2 Fertilizer shall be spread evenly at frequency, ratio and rates as recommended by Manufacturer. Use approved mechanical spreading equipment. Check calibration to ensure specified rate is spread evenly. Water immediately after fertilizing. Rectify uneven spreading as soon as it becomes apparent.

E26.14 Watering - General

E26.14.1 Water shall be applied as required to all landscaped areas to supplement rainfall and to maintain optimum growing conditions. In general, water once a week to achieve rates as indicated. Allow soil to adequately dry between watering to prevent over saturation without creating water stress.

E26.14.2 Water shall be applied in a soft spray to avoid packing of soil.

E26.14.3 Do not impede use of sidewalk and other paved areas.

E26.15 Watering of Trees, Shrubs, and Groundcover

E26.15.1 Water every third day for first and second month after planting. Thereafter, water once per week between May 1 and October 15.

E26.15.2 A complete record is to be kept of each series of watering for all planted trees noting: 1) location, and 2) date of watering. This record is to be given to the Contract Administrator when requested.

E26.15.3 Apply 40 litres of water per 25mm calliper per application using deep root feeder or low-pressure open flow nozzle and hose. The water stream must not gouge out a hole in the soil and mulch.

E26.16 Weed Control of Trees and Shrubs

E26.16.1 Surface of planting beds and any area associated with concrete planter shall be maintained free of weeds. Do not allow weeds to establish for a period longer than one (1 week).

E26.16.2 Obtain written approval of Contract Administrator prior to using any herbicides.

E26.16.3 Do not use dicamba and picloram solutions near trees.

E26.17 Pests and Disease Control

E26.17.1 Obtain written approval of Contract Administrator prior to using any pesticide.

E26.17.2 Control pests and disease through pruning or application of pesticides. Use species-specific pesticides where possible. Use only pesticides of low mammalian toxicity. Strictly follow manufacturer's written instructions.

E26.18 Cultivating Shrub Beds

E26.18.1 Cultivate whenever required to keep top layer of soil, loose, friable and free from weeds.

E26.18.2 Cultivate surface of shrub bed, and soil areas around trees and shrubs.

E26.18.3 Remove weeds including their roots.

E26.18.4 Take care not to damage roots of shrubs or flowers. Use small hand tools for areas of closely planted shrubs.

E26.18.5 Collect and dispose of paper and refuse. Remove dead plants, leaves, branches, dead flowers and seedpods.

- E26.18.6 Clean, by hand, areas that are covered with mulch. Loosen top layer of mulch without mixing it with soil underneath.
- E26.18.7 Add mulch annually as required to maintain specified thickness.
- E26.19 Tree and Shrub Pruning
- E26.19.1 The Contractor shall provide a person with a valid Manitoba Arborist's License for each Work crew or Work Site.
- E26.19.2 Prune trees as required to remove dead, broken or damaged limbs. Prune back to healthy growth while maintaining balanced crown shape.
- E26.19.3 Employ clean sharp tools. Make cuts co-incident with the branch collar near the main stem or branch. Cuts must be smooth and sloping to prevent accumulation of water on cut. Do not leave little stumps ("horns") on trunks or main branches.
- E26.20 Winter Preparation
- E26.20.1 Rake and assemble leaves after they have been shed by trees. Remove from Site.
- E26.20.2 Remove dead annuals from planting beds.
- E26.20.3 Ensure adequate moisture in root zones of trees material prior to freeze-up.

MEASUREMENT AND PAYMENT

- E26.21 No measurement or separate payment will be made for this Work during the construction period, up to the recognition of Total Performance. A separate price for Landscape Maintenance for the extended two year period shall be paid for at the Contract Unit Price for Landscape Maintenance, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work included in this specification.

E27. SITE FURNITURE

DESCRIPTION

- E27.1.1 This specification shall cover the supply and installation of Site furnishings. The Contractor shall furnish all labour, materials, equipment and services necessary to complete the Work as shown on the drawings and specified herein. These items shall include the supply and installation of:
- (a) Waste Receptacles
 - (b) Free Standing Benches
 - (c) Benches on Concrete Walls/Planters
 - (d) Bicycle Racks
 - (e) Rolling/Locking Steel Gate and Fence

MATERIAL

- E27.1.2 Shop Drawings
- E27.1.3 Shop drawings are required for all custom made furnishings including benches, bicycle racks, gate and fence.
- E27.1.4 Drawings showing all sizes and dimensions, position and spacing of reinforcing, openings, connection details, layout plan, finishes, all inserts, and all other relevant information showing immediate adjacent materials for proper coordination shall be submitted to the Contract Administrator for review prior to fabrication. Five copies of all shall be provided.
- E27.1.5 Waste Receptacles
- E27.1.6 Waste receptacles shall be Victor Stanley, Inc. ES-242 -136 liter capacity Waste Receptacle, complete with ribbed and moulded plastic liner lifting bag, standard tapered form lid, (colour - VS Gloss Black), as distributed by Victor Stanley, Inc. P.O. Drawer 330 – Dunkirk, MD 20754 USA, Tel. (301)855-8300, Fax. (410)257-7579.
<http://www.victorstanley.com> As this is a test Site for the product, no substitutions or alternatives will be recognized.
- E27.1.7 The Contractor will also be responsible for providing three locally produced comparable durability plastic liners which have 100 mm spacing between the inside edge of the steel container and where the liner must be grabbed and removed.
- E27.1.8 Benches
- E27.1.9 Timber for benches shall be Angelim Pedra, and shall be as dimensioned on the drawings.
- a) Laminated wood bench seating from “Pedra” wood shall be vertical. Minimum width of laminations to be 20mm.
 - b) Adhesive to be exterior grade 100% waterproof glue
 - c) Finish to be 3-coat system of Sikkens Cetol 1 translucent basecoat and Cetol 23 Plus topcoat. Sample of finish to be provided to Contract Administrator for approval prior to completion of bench finishes.
- E27.1.10 Metal for bench supports to be as dimensioned on the drawings. All metal to be galvanized and powder coated. Colour to be black.
- E27.1.11 Recycled timbers to be used on the freestanding benches are available at the Provincial Government Services Storage Facility. Contact Gord Kraushaar phone 797-8011 to arrange access to the storage facility for pick up of timber pieces. Timbers shall be selected from the stockpile of material at the storage Site and transported for the fabrication of benches. Coordinate selection of timbers with the Contract Administrator. Select timbers that best accommodate the support needs without unnecessary cutting and waste. Pressure wash timbers prior to final fabrication to produce clean product and ensure removal of unnecessary debris.
- E27.2 Rolling/Locking Steel Gate and Fence
- E27.2.1 Rolling/Locking Steel Gate shall be as per drawings. Field measure prior to preparation of shop drawings. All welding, fabrication and finishing shall be shop produced prior to final Site installation. All fabricated joint welds shall be ground and finished smooth. All necessary hardware, wheels, rollers, stops and guides to be noted on shop drawings.

CONSTRUCTION METHODS

- E27.2.2 Waste Receptacle
- E27.2.3 Waste receptacle shall be set onto sidewalk in locations as noted on the plan or as directed by Contract Administrator and in accordance with manufacturer's instructions. The waste receptacle units shall be secure and level.
- E27.2.4 Benches
- E27.2.5 Contractor to submit shop drawings for all benches for review and approval prior to any fabrication.
- E27.2.6 Drawings to show layout, dimensions and finishing details.
- E27.2.7 Benches shall be installed as per the drawings, and shall be set plumb and level. Galvanized washers and/or neoprene spacers to be used as required to set benches level along their length.
- E27.2.8 Bicycle Racks
- E27.2.9 Bicycle racks shall be installed using hilti bolts onto concrete surface, as per drawings. Refer to layout drawing for locations. Galvanized washers and/or neoprene spacers to be used as required to set bicycle racks plumb.
- E27.2.10 Rolling/Locking Steel Gate and Fence
- E27.2.11 Gate and Fence to be installed as per drawings. Steel uprights to be secured to footings and set plumb. Installation into the building walls shall be carried out in such a manner as to cause the least amount of disruption, while ensuring that the integrity of the structure is Integral with the building.

MEASUREMENT AND PAYMENT

- E27.3 Waste Receptacles
- E27.3.1 The supplying and installation of Waste Receptacles will be measured on a unit basis and shall be paid for at the Contract Unit Price for Waste Receptacles, supplied and installed in accordance with this Specification, accepted by the Contract Administrator, as computed in the field by the Contract Administrator. The supply of three (3) additional locally produced liners will be included in the cost of the three (3) installed waste receptacles.
- E27.4 Benches
- E27.4.1 The supplying and installation of Benches will be measured on a unit basis and shall be paid for at the Contract Unit Price for Benches, supplied and installed in accordance with this Specification, accepted by the Contract Administrator, as computed in the field by the Contract Administrator.
- E27.5 Bicycle Racks
- E27.5.1 The supplying and installation of Bicycle Racks will be measured on a unit basis and shall be paid for at the Contract Unit Price for Bicycle Racks, supplied and installed in accordance with this Specification, accepted by the Contract Administrator, as computed in the field by the Contract Administrator.
- E27.6 Rolling/Locking Steel Gate and Fence
- E27.6.1 The supplying and installation of Rolling/Locking Steel Gate and Fence will be measured on a unit basis and shall be paid for at the Contract Unit Price supplied and installed in accordance with this Specification, accepted by the Contract Administrator, as computed in the field by the Contract Administrator.

E28. STEEL GATE, FENCE AND MISCELLANEOUS METAL

DESCRIPTION

- E28.1 This Specification shall cover supply, fabrication, galvanizing, transportation, handling and installation of miscellaneous metal, including all miscellaneous metal elements and incidental component/fasteners, as specified herein.
- E28.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

MATERIALS

- E28.3 General
- E28.3.1 The Contractor shall be responsible for the supply, safe storage and handling of all miscellaneous metal materials as set forth in this Specification.
- E28.3.2 All materials supplied under this Specification shall be of a type approved by the Contract Administrator, and shall be subjected to inspection and testing by the Contract Administrator.
- E28.4 Hot-Dip Galvanizing
- E28.4.1 All items supplied under this Specification shall be hot-dip galvanized in accordance with CSA Standard G164-M1981 to a retention of 600 gm/m².
- E28.5 Standard Angles and Plates
- E28.5.1 Unless otherwise specified, all steel for new members shall conform to the requirements of CSA Standard CAN/CSA-G40.21-M87, Grade 300W.
- E28.6 Galvanizing Touch-up
- E28.6.1 Field-applied galvanizing, to touch-up damaged hot-dip galvanizing on-Site and to galvanize field welds, shall be done with self-fluxing, low temperature, zinc-based alloy rods in accordance with ASTM A780-80 for "Repair of Damaged Hot Dip Galvanizing Coatings". Approved products are Galvalloy as manufactured by Metalloy Products Company, P.O. Box No. 3093, Terminal Annex, Los Angeles, California and Welco Galvanizing Alloy, as manufactured by Thermocote Welco, Highway 161 York Road, Kings Mountain, North Carolina. Locally, both products are available from Welder Supplies Limited, 25 McPhillips Street, Winnipeg, Manitoba.
- E28.7 Welding Consumables
- E28.7.1 Welding consumables for all processes shall be certified by the manufacturer as complying with the requirements of the following specifications:
- E28.7.2 Manual, shielded metal arc-welding (SMAW):
- (a) All electrodes for manual, shielded metal arc welding shall conform to CSA Standard CSA W48.1-M1991 classification number E7018 for single pass tack welds and CSA W48.3-M1982, classification numbers E8016-B1, E8016-C3, E8018-B1 or E8018-C3 for final welds.
- E28.7.3 Gas metal arc-welding (GMAW):

- (a) All electrodes used in the gas metal arc-welding process shall be composite electrodes conforming to CSA Standard CSA W48.4-M1990, classification E70-T5.

E28.7.4 Shielding gas shall be welding grade carbon dioxide with a guaranteed dew point of -46°C .

E28.7.5 Submerged arc-welding (SAW):

- (a) All electrodes and fluxes used for the submerged arc welding process shall conform to CSA Standard CSA W48.6M1980, classification F72-EM12K.
- (b) All electrodes, wires and fluxes used shall be of a classification requiring a minimum impact of 27 joules at -18°C as outlined in the various codes mentioned above.
- (c) The proposed welding procedures and welding consumable certificates shall be submitted to the Contractor Administrator for his approval at least twenty-one (21) days prior to the scheduled commencement of any fabrication.

E28.8 Hardware

E28.8.1 All bolts, nuts, washers, inserts, etc., as required for a complete installation shall be stainless steel, Type 316 unless noted otherwise.

E28.9 Equipment

E28.9.1 All equipment shall be of a type approved by the Contract Administrator and shall be kept in good working order

CONSTRUCTION METHODS

E28.10 Scope of Work

E28.10.1 It is intended that this Specification cover the supply and installation of the following miscellaneous metal elements, including all components and related fasteners as shown on the Drawings:

- (a) Rolling/Locking Steel Gate and Fence
- (b) Bicycle Racks
- (c) Bench Support Brackets

E28.11 General

E28.11.1 Except as otherwise specified herein, steelwork should be fabricated in accordance with the latest A.W.S. Specification D1. A and subsequent revisions. Fabrication shall be in accordance with the latest AASHTO specification and all subsequent revisions.

E28.11.2 At least ten (10) Calendar Days prior to the scheduled commencement of any fabrication, the operators' qualifications, the shop drawings, welding procedures, mill certificates and welding consumable certificates shall be submitted to the Contractor Administrator for his approval. The shop drawings shall consist of four (4) sets of prints and one (1) reproducible (or electronic digital) set.

E28.11.3 No fabrication or welding of steelwork shall commence until permission to do so has been received from the Contract Administrator.

E28.11.4 The repair of any members damaged during fabrication shall be approved by the Contract Administrator.

E28.12 Butt Joints

- E28.12.1 Minimize the number of butt joints by maximizing the length of plates. Details of all butt joints shall be submitted to the Contract Administrator for his review. The fabricator may submit an alternative butt joint design provided that such design has been pre-qualified by A.W.S.

E28.13 Assembly and Welding Sequences

- E28.13.1 If requested by the Contract Administrator, the fabricator shall supply full details of the proposed assembly and welding sequence of any particular product weld.

E28.14 Marking

- E28.14.1 Prior to fabrication, all steel shall be marked for identification by heat number and specification by a marking system approved by the Contract Administrator.

E28.15 Assembly

- E28.15.1 The shop assembly of the various components of the weldments shall be executed in accordance with A.W.S.D1.1 Subsections 3.3 and 3.4.
- E28.15.2 Tack welding shall be done by qualified operators, using the smallest size weld required to hold the components of the assembly together. Tack welds shall not be less than 50 mm in length and shall be incorporated in the final weld.
- E28.15.3 Tack welds shall be made with 4 mm maximum size electrodes.

E28.16 Bent Plates

- E28.16.1 When bending plates, the plates shall be so taken from the stock plates that the bend line will be at right angles to the direction of rolling. The radius of the bend measured inside, shall be not less than the thickness of the plate.
- E28.16.2 Before bending, the corners of the plate shall be rounded to a radius of 2 mm throughout that portion of the plate at which bending is to occur.

E28.17 Shop Assembly

- E28.17.1 Holes shall be sub-punched and, unless otherwise specified, reamed while assembled in the shop. The assembly, including camber, alignment, and accuracy of holes shall be approved by the Contract Administrator before reaming is recommended.

E28.18 Shipping

- E28.18.1 Structural members shall be loaded in such a manner that they can be transported and unloaded at their destination without being excessively stressed, deformed or otherwise damaged.

E28.19 Hop-Dip Galvanizing

- E28.19.1 All items under this specification, except stainless steel fasteners shall be hot-dip galvanized. Hot-dip galvanizing of complete items shall be done after fabrication in accordance with CSA Standard G164-M1981 to a retention of 600 gm/m² unless noted otherwise. All metal surfaces to be galvanized shall be thoroughly cleaned of rust, rust scale, mill scale, dirt and other contaminants by commercial sand, grit or shot blasting and/or pickling prior to galvanizing. Heavy deposits of oil and grease shall be removed with solvents prior to blasting or pickling.

E28.20 Handling and Storing Materials

E28.20.1 Material to be stored shall be placed on skids above the ground. It shall be kept clean and properly drained. Long members shall be supported on skids placed near enough to prevent injury from deflection.

E28.21 Straightening Bent Material

E28.21.1 The straightening of plates and angles or other shapes shall be done by methods that will not produce a fracture or other injury. The metal shall not be heated unless permitted by the Contract Administrator, in which case the heating shall not be to a higher temperature than that produces a "dark cherry red" colour. After heating, the metal shall be cooled as slowly as possible.

E28.21.2 Following the straightening of a bend or buckle, the surface of the metal shall be carefully inspected for evidence of fracture, and if necessary, replaced or repaired to the satisfaction of the Contract Administrator.

E28.22 Welding to Galvanized Metal

E28.22.1 All field welding to galvanized metal shall be touched up by the Galvalloy process as described in E28.23.2. All Galvalloy repairs shall be made flush with adjacent metal.

E28.23 Galvanizing Touch-up Procedure

E28.23.1 Any areas of damaged galvanizing, and all field welds, are to receive field-applied galvanizing as specified herein.

E28.23.2 Surfaces to receive field-applied galvanizing shall be cleaned using a wire brush, a light grinding action, or mild blasting to remove loose scale, rust, paint, grease, dirt, or other contaminants. Preheat the surface to 315 °C and wire brush the surface during preheating. Rub the cleaned preheated area with the repair stick to deposit an evenly distributed layer of zinc alloy. Spread the alloy with a wire brush, spatula, or similar tool. Field-applied galvanizing shall be blended into existing galvanizing of surrounding surfaces and shall be buffed and polished if required to match the surrounding surfaces. Care shall be taken to not overheat surfaces beyond 400 °C and to not apply direct flame to the alloy rods.

QUALITY CONTROL

E28.24 Inspection

E28.24.1 All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the specified Work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given. The Contract Administrator reserves the right to reject any materials or Works that are not in accordance with the requirements of this Specification.

E28.25 Qualifications of Contractor

E28.25.1 The Contractor shall produce evidence that his plant is recently fully approved by the C.W.B. to the requirements of CSA Standard W47.1-1983, Division 2.

E28.25.2 The Contractor shall produce evidence that all welding operators to be employed on the Work are currently qualified by the C.W.B. at the time of fabrication and in the processes in which they are to be employed on the Work. Such qualifications shall have been issued within two years of the commencement of fabrication.

E28.25.3 The Contractor shall also produce evidence relative to each operator, that he has been executing satisfactory welding in the required processes within the six-month period previous to the award of this Contract.

E28.26 Welding Procedures

E28.26.1 The Contractor shall submit copies of the welding procedures that he intends to use, for examination and approval by the Contract Administrator.

E28.26.2 Such procedures shall be accompanied by documentary proof that they have been qualified previously by the Canadian Welding Bureau plant where the Work is to be carried out.

E28.26.3 The procedures shall include the following information: joint type, welding process, welding position, base metal specification, welding consumable specification and size, preheat requirements, amperage and voltage requirements, speed, polarity, and welding equipment, including a description of travel for automatic welding.

E28.26.4 The use of gas welding will be limited to light structural elements.

E28.27 Quality and Details of Welds

E28.27.1 The quality and details of welds shall be in accordance with A.W.S. D1.1, Subsection 9.25.

E28.27.2 Welds shall have no cracks, inadequate penetration or lack of fusion, and shall have no other defects exceeding the A.W.S. D1.1, Subsection 9.25. Fusion type defects referred to in Subsection 9.25 shall be interpreted as slag inclusions and similar generally elongated defects.

E28.28 Material Storage and Care

E28.28.1 Steel

(a) Miscellaneous metal items, either plain or fabricated, shall be stored above the ground upon platforms, skids or other supports. It shall be kept free from dirt and other foreign matter, and shall be protected, as far as practical, from corrosion. Long members shall be supported on skids placed near enough together to prevent injury from deflection.

(b) Prior to fabrication, all steel shall be marked for identification by heat number and specification by a marking system approved by the Contract Administrator.

E28.29 Welding Consumables

E28.29.1 All electrodes having low hydrogen covering shall be dried for at least two (2) hours between 230°C and 260°C before they are used. Electrodes shall be stored immediately after drying in storage ovens held at temperature of at least 120°C. Electrodes that are not used within four (4) hours after removal from a drying or storage oven shall be re-dried before use. Electrodes that have been wet shall not be used.

E28.29.2 Electrode wire used in submerged arc welding and gas metal arc welding shall be stored in the original container at room temperature and kept free of moisture, oil, and direct or other contaminants.

E28.29.3 Flux used for submerged arc welding shall be dry and free of contamination from dirt, mill scale, oil or other foreign material. Fused flux shall be used on the Work.

E28.29.4 Gas for gas metal arc-welding shall be stored in marked steel bottles and shall not be subjected to temperatures in excess of 50°C nor temperatures of less than 0°C.

E28.30 Testing

E28.30.1 All materials, welding procedures, shop drawings and steel Work fabrication will be inspected by the Contract Administrator to ascertain compliance with the Specifications and Drawings.

E28.30.2 All welds will be visually inspected.

E28.30.3 The Contract Administrator shall have access to all the fabricator's normal quality control records for this Contract.

E28.30.4 Weld inspection will be carried out in accordance with the requirements of A.W.S. D1.1.

E28.30.5 Welds that are found by any of the inspection methods to be inadequate and unsatisfactory shall be repaired in accordance with A.W.S. D1.1 and then re-tested. The cost of the repairs, and of the tests that reveal inadequate and unsatisfactory welds shall be paid for by the Contractor. All other testing specified herein will be paid for by the City.

E28.30.6 No repair shall be made until agreed to by the Contract Administrator.

E28.31 Unacceptable Work

E28.31.1 Any Work found to be unacceptable shall be immediately brought to the attention of the Contract Administrator and shall be corrected in accordance with A.W.S. D1.1, Subsection 3.7.

E28.31.2 No repair shall be made until agreed to by the Contract Administrator.

MEASUREMENT AND PAYMENT

E28.32 No separate allowance will be made for metal fabrication, supply, finish and installation