

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 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:

ROAD RECONSTRUCTION – PART A

Drawing No.	Drawing Title	File Name	Size
P-3247-1	General Layout	138-2004_Drawing_P-3247-1-R0.pdf	A1
P-3247-2	Pavement Geometrics	138-2004_Drawing_P-3247-2-R0.pdf	A1
P-3247-3	Main St. – STA. 1+00 to STA. 2+00	138-2004_Drawing_P-3247-3-R0.pdf	A1
P-3247-4	Main St. – STA. 2+00 to STA. 3+25	138-2004_Drawing_P-3247-4-R0.pdf	A1
P-3247-5	Main St. – STA. 3+25 to STA. 4+55	138-2004_Drawing_P-3247-5-R0.pdf	A1
P-3247-6	Main St. – STA. 4+55 to STA. 5+90	138-2004_Drawing_P-3247-6-R0.pdf	A1
P-3247-7	Main St. – STA. 5+90 to STA. 7+30	138-2004_Drawing_P-3247-7-R0.pdf	A1
P-3247-8	Main St. STA. 7+30 to Disraeli Freeway	138-2004_Drawing_P-3247-8-R0.pdf	A1
P-3247-9	Joint Details I	138-2004_Drawing_P-3247-9-R0.pdf	A1
P-3247-10	Joint Details II	138-2004_Drawing_P-3247-10-R0.pdf	A1
P-3247-11	Typical Cross Section	138-2004_Drawing_P-3247-11-R0.pdf	A1
P-3247-12	Traffic Diversion Stage 1&2	138-2004_Drawing_P-3247-12-R0.pdf	A1
P-3247-13	Diamond Lane Overhead Sign Structure Site Plans and Sections	138-2004_Drawing_P-3247-13-R0.pdf	A1
P-3247-14	Screw Anchor and Pile Foundation Details	138-2004_Drawing_P-3247-14-R0.pdf	A1
P-3247-15	Diamond Lane Overhead Sign Structure Fabrication Details	138-2004_Drawing_P-3247-15-R0.pdf	A1

STREETSCAPING – PART B

Drawing No.	Drawing Title	File Name	Size
P-3247-16	Layout and Planting Plans	138-2004_Drawing_P-3247-16-R0.pdf	A1
P-3247-17	Layout and Planting Plans	138-2004_Drawing_P-3247-17-R0.pdf	A1
P-3247-18	Layout and Planting Plans	138-2004_Drawing_P-3247-18-R0.pdf	A1

STREETSCAPING – PART B

Drawing No.	Drawing Title	File Name	Size
P-3247-19	Layout and Planting Plans	R0.pdf 138-2004_Drawing_P-3247-19-R0.pdf	A1
P-3247-20	Layout and Planting Plans	138-2004_Drawing_P-3247-20-R0.pdf	A1
P-3247-21	Enlargements	138-2004_Drawing_P-3247-21-R0.pdf	A1
P-3247-22	Enlargements	138-2004_Drawing_P-3247-22-R0.pdf	A1
P-3247-23	Details	138-2004_Drawing_P-3247-23-R0.pdf	A1
P-3247-24	Details	138-2004_Drawing_P-3247-24-R0.pdf	A1
P-3247-25	Details	138-2004_Drawing_P-3247-25-R0.pdf	A1
P-3247-26	Details	138-2004_Drawing_P-3247-26-R0.pdf	A1
P-3247-27	Details	138-2004_Drawing_P-3247-27-R0.pdf	A1

E2. OFFICE FACILITIES

- E2.1 The Contractor shall supply office facilities meeting the following requirements:
- (a) The field office shall be for the exclusive use of the Contract Administrator.
 - (b) The building shall be conveniently located near the Site of the Work.
 - (c) The building shall have a minimum floor area of 25 square metres, a height of 2.4m with two windows for cross ventilation and a door entrance with a suitable lock.
 - (d) The building shall be suitable for all weather use. It shall be equipped with an electric heater and air conditioner so that the room temperature can be maintained between either 16-18°C or 24-25°C.
 - (e) The building shall be adequately lighted with fluorescent fixtures and have a minimum of three wall outlets.
 - (f) The building shall be furnished with two desks, one drafting table, table 3m x 1.2m, one stool, one four drawer legal size filing cabinet, and a minimum of 12 chairs.
 - (g) A portable toilet shall be located near the field office building. The toilet shall have a locking door and be for the exclusive use of the Contract Administrator and other personnel from the City.
 - (h) The field office building and the portable toilet shall be cleaned on a weekly basis immediately prior to each Site meeting. The Contract Administrator may request additional cleaning when he deems it necessary.
- E2.2 The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the office facilities.
- E2.3 The office facilities will be provided from the date of the commencement of the Work to the date of Total Performance.

E3. PROTECTION OF EXISTING TREES

- E3.1 The Contractor shall take the following precautionary steps to prevent damage from construction activities to existing boulevard trees within the limits of the construction area:
- a) The Contractor shall not stockpile materials and soil or park vehicles and equipment on boulevards within 2 metres of trees.
 - b) Trees identified to be at risk by the Contract Administrator are to be strapped with 25 x 100 x 2400mm wood planks, or suitably protected as approved by the Contract Administrator.
 - c) Excavation shall be performed in a manner that minimizes damage to the existing root systems. Where possible, excavation shall be carried out such that the edge of the excavation shall be a minimum of 1.5 times the diameter (measured in inches), with the outcome read in feet, from the closest edge of the trunk. Where roots must be cut to facilitate excavation, they shall be pruned neatly at the face of excavation.
 - d) Operation of equipment within the dripline of the trees shall be kept to the minimum required to perform the Work required. Equipment shall not be parked, repaired, refuelled; construction materials shall not be stored, and earth materials shall not be stockpiled within the driplines of trees. The dripline of a tree shall be considered to be the ground surface directly beneath the tips of its outermost branches. The Contractor shall ensure that the operations do not cause flooding or sediment deposition on areas where trees are located.
 - e) Work on-Site shall be carried out in such a manner so as to minimize damage to existing tree branches. Where damage to branches does occur, they shall be neatly pruned.
- E3.2 All damage to existing trees caused by the Contractor's activities shall be repaired to the requirements and satisfaction of the Contract Administrator and the City Forester or his designate.
- E3.3 No separate measurement or payment will be made for the protection of trees.
- E3.4 Elm trees cannot be trimmed between April 1 and July 31, inclusive.
- E3.5 All trees will have a 2.0 m radius protective zone calculated from the circumference at the base of the truck which will remain free of digging, trenching, grade changes, stock piling of materials and soil compaction, except as minimum to construct pavement and tree wells, throughout the duration of the Contract. Protective fencing around these areas is required.
- E3.6 Where roots are in soil in area of exposure, all roots must be day lighted in the area of exposure through a hydro vac process. This process must be complete by an authorized hydro vac day lighting Contractor (Badger Day Lighting – 885-0592). Once the roots are day lighted they must be properly trimmed with sharp tools to prevent crushing or being pulled up by construction equipment. No paint is required. All exposed roots must be mulched until the excavated area is filled with clean earth to avoid exposure to sunlight and desiccation.
- E3.7 All trees within, and immediately adjacent to, proposed construction areas will require 1" x 6" x 8' wood planks strapped to the tree trunk to completely protect the tree trunk from impact damage. (Smaller trees will be similarly protected using proportionally sized wood planks).
- E3.8 Auguring under existing trees will be the only acceptable method of underground installations. Any other excavations must be approved by the Forestry Branch.

- E3.9 Tree limbs and branches overhanging the construction area shall not be damaged. The responsibility to ensure that the above ground portions of trees are not damaged is that of the agent involved in the actual Work.
- E3.10 Any damage that occurs to any tree, including the root system, must be reported immediately to Ms. Patty Slentz, Forestry Technician, at 986-2008. The Inspection Technician, Landscape Development Services at 986-4730 is to be contacted in order to ensure the necessary inspections by the City's Parks and Recreation Department.
- E3.11 All costs in connection with the protection of existing trees as described herein shall be incidental to the Contract.

E4. TRAFFIC CONTROL

- E4.1 Further to clause 3.7 of CW 1130-R1:
- E4.1.1 Maintain a minimum of two (2) lanes of traffic southbound and two (2) lanes of traffic northbound on Main Street during Phase 1 and Phase 2 construction times.
- E4.1.2 A minimum of one (1) lane for the westbound through lane at Bannatyne Ave intersection plus a right turn lane and a minimum of two (2) lanes of traffic east bound at the McDermot Ave intersection must be maintained during the Phase 1 construction time.
- E4.1.3 A minimum of one (1) lane for westbound will be maintained at the Alexander Ave and Rupert Intersections and a minimum of one lane eastbound at James Ave will be maintained during the Phase 2 construction time.
- E4.1.4 During Phase 1 construction, access to the Crocus Building parking lot (476 Main Street) must be maintained at all times. Should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, he shall review the planned disruption with the business or residence and the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.
- E4.1.5 Pedestrian and ambulance/emergency vehicle access must be maintained at all times.

E5. PEDESTRIAN SAFETY

- E5.1 During the project, a temporary snow fence shall be installed around the excavation area. The Contractor shall be responsible for maintaining the snow fence in a proper Working condition. No measurement for payment shall be made for this Work.

E6. WATER USED BY CONTRACTOR

- E6.1 Further to clause 3.7 of CW 1120, the Contractor shall pay for all costs associated with obtaining water in accordance with the WaterWorks By-law. Sewer charges will not be assessed for water obtained from a hydrant.

E7. INFRASTRUCTURE SIGNS

- E7.1 The Contractor shall obtain infrastructure signs from the traffic Services Sign Shop at 421 Osborne Street. The Contractor shall mount each sign securely to a rigid backing material approved by the Contract Administrator. The Contractor shall fasten each sign to a suitable support and erect and maintain one sign at both ends of each street as directed by the Contract Administrator. When the Contract Administrator considers the Work on the street complete, the

Contractor shall remove and dispose of the signs and supports. No measurement for payment will be made for the performing all operations herein described and all other items incidental to the Work described

E8. TRAFFIC DIVERSIONS

- E8.1 The diversions of south/northbound traffic on Main Street shall be performed as shown on Drawing P-3247-12 and as directed by the Contract Administrator.
- E8.2 Construction of the diversion areas for the Phase 1 Southbound Roadway Reconstruction shall take place on Sunday, May 16, 2004 and for the Phase 2 Southbound Roadway Reconstruction shall take place on Sunday, July 11, 2004.
- E8.3 The Contractor shall be responsible for the removal of existing curbs, safety medians and median areas as indicated on the Drawings. The Contractor shall be responsible for the installation of a minimum of 100mm of asphalt pavement in the median areas for the switching of traffic.
- E8.4 After completion of the diversion, the Contractor shall be responsible for re-installing the curb, safety median and median areas.
- E8.5 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. All costs for the items of Work described including removal and installation of concrete and roadway Works, shall be paid at various unit price items.
- E8.6 All other costs for the diversion including signing and assisting City forces will be paid as "Traffic Diversion" in Form B: Prices.

E9. ARCHAEOLOGICAL INVESTIGATION

- E9.1 The Contractor shall provide the Contract Administrator with a minimum of seventy-two (72) hours notice of the commencement of any excavation to allow the Contract Administrator to notify the Project Archaeological Consultant as required under the Environmental Requirements.
- E9.2 If heritage material is located during the construction and soil removal process, all Work shall cease and the Contractor shall immediately contact the Contract Administrator. The Historic Resources Branch, Manitoba Culture, Heritage and Citizenship, or the Project Archaeologist, shall be contacted by the Contract Administrator to determine the nature and extent of the archaeological material and to arrange for its recovery in accordance with the Environmental Act Licence No. 1412. The archaeological remains shall be recovered by salvage excavation upon authorization by the Contract Administrator, having consulted with the Historic Resources Branch, Manitoba Department of Culture, Heritage and Citizenship.
- E9.3 The Contractor shall be prepared to continue his Work elsewhere on the project while the Archaeologist investigates the finding and determines its heritage value.
- E9.4 The Contractor is advised that he may be denied access to such areas of the project until such time as a thorough archaeological investigation is conducted or the find is deemed to have no heritage value.
- E9.5 Construction and excavation Work shall not resume until the Contract Administrator, having consulted with the Historic Resources Branch, Manitoba Culture, Heritage and Citizenship, or the project archaeologist, authorizes a resumption of Work.

- E9.6 If human remains are uncovered during the construction and soil removal process, all Work shall cease and the Historic Resources Branch, Manitoba Culture, Heritage and Citizenship shall be contacted by the Contract Administrator. The Historic Resources Branch shall contact the City of Winnipeg Police.
- E9.7 If the human remains are not considered forensic, i.e. no foul play suspected, they shall be removed by the Historic Resources Branch, Manitoba Culture, Heritage and Citizenship or the project archaeologist and turned over to the Province.
- E9.8 Of the human remains are considered forensic, the City of Winnipeg Police shall be responsible for their removal.

E10. SUBDRAIN INSULATION

- E10.1 At locations where the proposed west side sub drain is to be installed over the 300 PVC Watermain the bottom of the trench shall have a 450 mm wide (or width of the sub drain trench) section of 50mm Rigid (Polystyrene) Insulation installed.
- E10.2 This item shall be paid on a linear meter basis as "Supply and Install Subdrain Insulation".

E11. INTERSECTION CONSTRUCTION / STAGING

- E11.1 To accommodate one (1) lane of traffic at the various intersections as identified in E4, the intersection shall be constructed in stages.
- E11.2 During this staging, there will be grade differentials between the existing pavement and the new concrete. To ensure a smooth travelling surface, the Contractor shall plane existing asphalt and/or temporarily asphalt over new concrete as directed by the Contract Administrator.
- E11.3 Additional removals of existing sidewalks and medians may be required throughout the project to temporarily widen north-south traffic lanes and improve turning radius's as directed by the Contract Administrator. Any of these traffic flow improvements shall be constructed with 100mm thick asphalt.
- E11.4 All costs in association with these Works shall be paid for at the various unit prices described in Form B: Prices.

E12. JOINT DETAILS

- E12.1 The Contractor shall ensure that the joint spacing for concrete pavement Works under this Contract are in accordance with the latest revision Standard Drawings SD-218A, SD-218B, SD-219, SD-220A, SD-220B and SD-220C. In particular:
- (a) Transverse joint spacing shall be adjusted so that joints fall on centres of manholes and edges of curbs and gutter inlets wherever possible.
- E12.2 At intersections, transverse joints shall be adjusted to line up with longitudinal joints of intersecting streets.

E13. CONNECTION TO EXISTING MANHOLE

- E13.1 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".

E14. MODIFIED BULLNOSE

E14.1 Further to CW 3310-28, all new bullnoses, including those within monolithic median slabs, shall be constructed with an angled face as shown on the applicable Drawings. All costs in connection with this item of Work shall be included in the Unit Price Bid for Construction of Monolithic Concrete Median Slab”, “Construction of Bullnose”.

E15. SAWCUTTING PAVEMENT

E15.1 At the limits of excavation, the Contractor shall sawcut the existing pavement to produce a clean straight edge when excavated.

E15.2 For asphaltic concrete pavements, the cost of sawcutting and disposal of any surplus material shall be included in the unit price bid for “Excavation” for concrete pavements, the cost of sawcutting and disposal of surplus material shall be included in the unit price for the various Works.

E16. REPLACEMENT OF CATCHBASIN HOODS

E16.1 Where directed by the Contract Administrator, the Contractor shall supply all labour, equipment and materials required to remove existing broken catch basin hoods and supply and install new catch basin hoods.

E16.2 All costs associated with this item of Work shall be included in the unit prices bid for “Replacement of Catch Basin Hoods”.

E16.3 Note that this section pertains only to existing Catch Basins, the supply and installation of Catch Basin Hoods for new Catch Basins will be included in the unit price bid for “Catch Basin Installation”.

E17. MANHOLE OR CATCHBASIN STEPS

E17.1 The Contractor shall supply and install new manhole/catch basin steps (ladder rungs) where existing steps are absent or unsafe, as instructed by the Contract Administrator in only those existing manholes or catchbasins, which are being connected to new sewers. The steps installed shall be drilled, grouted and spaced in accordance with the City of Winnipeg Standard Construction Specifications.

E17.2 All costs involved with the supply and installation of the rungs shall be included in the unit price bid for “Installation of Manholes/Catch Basin Steps”.

E18. ABANDONING EXISTING CATCHBASIN LEADS

E18.1 Further to Specification CW 2130 and Specification CW 3210, the Contractor shall abandon all existing catchbasins as indicated on drawings or as directed by the Contract Administrator.

E18.2 The Contractor shall abandon the catchbasin 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 0.5m³ of concrete conforming to Specification CW 2160.

E18.3 The access to the catchbasin lead at the boulevard side shall be by shored vertical shaft. The shaft shall be included in the unit price bid “Abandoning Existing Catchbasin Leads”.

E19. SIGN SUPPORT CLAMPS AND PARKING METER POLES

- E19.1 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.
- E19.2 All costs in connection with the installation of sign support clamps and parking meter poles are incidental.

E20. WINNIPEG TRANSIT BUS STOPS

- E20.1 The Contractor shall construct and maintain a temporary bus stop in the median at both Bannatyne Avenue during Phase 1 and James Avenue during Phase 2 during the project. The bus stop shall be a level, hard surfaced area free of any debris or construction activity. The area shall be connected to an east-west pedestrian crossing both locations. The bus stop shall be constructed in accordance with Drawing P-3247-12.
- E20.2 All costs in connection with this item of Work shall be paid at the various unit prices associated with the respective items.

E21. MANHOLE ISOLATIONS

- E21.1 All catchbasins and manhole isolations shall be constructed in concrete pavement to a depth 50mm below the adjoining roadway pavement. 50mm asphalt overlay and 50mm riser ring shall be placed on top of these isolations to accommodate future maintenance.
- E21.2 All utility manholes shall also be isolated as either partial or full-slabs as determined by the Contract Administrator. All utility manhole isolations shall be constructed in reinforced concrete pavement to the same depth as the adjoining roadway pavement.
- E21.3 All costs in connection with these items of Work including the supplying and installing reinforcing steel and asphalt for manhole isolations are incidental and shall be included in the unit price bid for the construction of the concrete roadway pavement. The Rings will be paid as "Installation of Cast Iron Litter Ring Inserts".

E22. PROPOSED MANITOBA HYDRO WORKS AND ALLSTREAM MANHOLES

- E22.1 In order to accelerate Manitoba Hydro's proposed Works as outlined in D14, the Contractor shall be responsible for assisting Manitoba Hydro with the following:
- (a) Miscellaneous Pipe Conduits – The Contractor shall be responsible for installing plastic pipe conduits at approximately three (3) locations from the sidewalk to the median.
The proposed pipe conduits (supplied by Manitoba Hydro) shall be installed at the bottom of the proposed roadway and sidewalk excavation in sand bedding to ensure that the conduit does not become kinked or crushed during backfilling operations. All costs in connection with this items of Work are incidental and shall be included in the cost of "Manitoba Hydro Works – Conduit Installation".
 - (b) Existing Trolley Pole Bases – The Contractor shall be responsible for the removal and disposal of the existing trolley pole bases located within the limits of the project. Manitoba Hydro will be responsible for the power supply disconnections and removal of the above ground steel pole.
The existing concrete base, approximately 1.5m³, shall be broken down at least 1.2m below the final roadway pavement elevation. The removal of the trolley pole bases shall be performed in conjunction with the roadway pavement removal and/or excavation and

shall be paid for at the unit price for "Removal of Existing Concrete Bases – Greater than 600 mm Diameter".

- (c) Manholes – The Contractor shall be responsible for the abandonment of Manitoba Hydro manholes and five (5) all stream manholes.

The abandonment and removal of these manholes shall be performed during the roadway pavement removal and/or excavation by either removing the entire pit or demolishing the walls and bottom (for drainage purposes) to at least 1.2m below the final roadway pavement elevation.

All costs in connection with this item of Work shall be paid for at the unit price bid for "Abandonment of Existing Allstream and Hydro Manholes".

E23. EXISTING STREET CAR TRACKS

E23.1 Description

This Special Provision shall cover the removal and disposal of the existing steel rails, ties and concrete bedding. It is anticipated that the street car tracks are buried under the existing roadway in the third and fourth lanes.

E23.2 Construction Methods

E23.2.1 Removal of Existing Steel Rails

The Contractor shall remove the existing steel street car rails. The rails shall be cut into transportable sections, then loaded, hauled from the Site and disposed of at a location identified by the Contractor and approved by the Contract Administrator.

E23.2.2 Removal of Concrete Bedding

Removal of concrete bedding shall be understood to mean the required demolition, loading and disposal of the existing concrete bedding, including railway ties and any other materials encountered from the Site. The concrete bedding shall be removed to a depth sufficient to accommodate proposed pavement grades or as directed by the Contract Administrator. Material for disposal shall be disposed of at a dump located by the Contractor and approved by the Contract Administrator.

E23.3 Method of Measurement

E23.3.1 Removal of Existing Steel Rails

Removal of existing street car track (2 rails) will be measured on a linear measure basis. The length to be paid for shall be the total number of metres of track removed in accordance with this Special Provision and accepted by the Contract Administrator.

E23.3.2 Removal of Existing Concrete Bedding

Removal of existing concrete bedding will be measured on a cubic meter basis. The volume to be paid for shall be the total number of cubic meters removed in accordance with this Special Provision and accepted by the Contract Administrator.

E23.4 Basis of Payment

E23.4.1 Removal of Existing Steel Rails

Removal of both existing steel rails will be paid for at the Contract Unit Price per metre for "Removal of Existing Steel Rails", measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Special Provision.

E23.4.2 Removal of Existing Concrete Bedding

Removal of existing concrete bedding will be paid for at the Contract Unit Price per cubic metre for "Removal of Existing Concrete Bedding", measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Special Provision.

E24. CONSTRUCTION FACILITIES AND STAGING

E24.1 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 with the exception of the following locations:

- a. East side of Main Street boulevard area between Pacific Avenue and Disraeli Freeway

E24.2 William Avenue roadway between Main Street and King Street during Phase 2

E25. CONTRACTOR EMPLOYEE PARKING

E25.1 The Contractor shall be responsible for providing employee parking for both his own employees as well as those of any sub-Contractors. The use of existing parking meters for such parking shall not be permitted between Princess and Rorie/Lily Streets.

E26. ALL-WEATHER DUMP SITE

E26.1 The Contractor shall have access to an all-weather dump Site throughout the duration of the project. Prior to the start of construction, the Contractor shall provide the Contract Administrator with details in regards to the location of the all-weather dump Site.

E27. TRANSIT SIGN REMOVAL

E27.1 The Contractor shall be responsible for the removal and disposal of the existing Winnipeg Transit sign concrete base located in front of City Hall (510 Main Street). The existing concrete base shall be broken down at least 1.2m below the final roadway pavement elevation. The removal of the Transit Sign Base shall be performed in conjunction with pavement removal and/or excavation and shall be paid for at the unit price for "Removal of Existing Concrete Bases – Greater than 600 mm Diameter". The removal and replacement of the existing Transit sign will be by others.

E28. BOULEVARD RESTORATION

E28.1 Any excess damage to the boulevard areas caused by the Contractor, his employees and equipment shall be restored by replacing with original material at the Contractor's expense to the satisfaction of the Contract Administrator.

E29. MATCHING EXISTING GRADES

- E29.1 Wherever the proposed sidewalk meets existing pavement, building edge, doorway or property line, the Contactor shall construct the sidewalk to an acceptable grade, as directed by the Contract Administrator, to ensure that proper drainage and accessibility are maintained. Where maintenance of existing grade is not possible, Contractor to adjust grade as specified in E44.
- E29.2 All costs associated with matching existing grades shall be included in the unit price bid for "Supply and Install Concrete Sidewalk Paving".

E30. EXPOSING EXISTING UNDERGROUND SERVICES AND UTILITIES

- E30.1 The exact location and depth of some of the existing underground services and utilities within the project limits are unknown.
- E30.2 Therefore, 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.
- E30.3 Where the existing hydro duct line is adjacent to tree wells and Heritage Light Pole bases, the edge and top of the duct must be daylighted in the area of exposure through a hydro vac process. This process must be completed by an authorized hydro vac daylighting Contractor.
- E30.4 All costs in connection with this item of Work shall be included in the unit price bid for the various bid items.

E31. LAYOUT OF STREETSCAPING WORKS

- E31.1 The Contract Administrator will be responsible for providing the Contractor with sidewalk grades and location and elevation of all Illuminated Transit Sign bases, Manitoba Hydro and Traffic Signals Works. The Contractor will Work from layout information on drawing and provided by the Contract Administrator and 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.
- E31.2 From time to time 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.
- E31.3 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.

E32. PRIVATE SIDEWALKS, SIDE STREET SIDEWALKS

- E32.1 The Contractor shall be responsible for the removal and reinstallation of any concrete paving and/or interlocking paving stones/brick on private sidewalks as a result of vertical grade changes in the proposed pavement. The Contractor shall be responsible for the removal and reinstallation of any concrete and/or interlocking paving stones/ brick on side street sidewalks and City owned Property as a result of vertical grade changes in the proposed pavement.

E32.2 The removal and reinstallation of concrete sidewalk paving and/or interlock paving stones/brick on private sidewalks, side streets and City owned property, to meet new pavement grades shall be paid for under the appropriate items in Form B: Prices.

E33. EXISTING CURB STOP BOXES

E33.1 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.

E33.2 All existing curb stop boxes or valve boxes not in use as determined by the Contract Administrator shall be abandoned by removing existing curb stop boxes or valve boxes. All costs associated with the abandoning of curb stop boxes or valve will be paid

E33.3 Any existing curb boxes requiring final adjustments (horizontal and/or vertical) will be paid for under the appropriate item in Form B: Prices.

E33.4 Any curb stop boxes or valve boxes damaged as a result of the Contractor's operation shall be replaced at his own cost.

E34. AREAWAYS

E34.1 During the excavation, removal and installation of the concrete sidewalk and paving stone sidewalk (including concrete base and base courses) the Contractor shall take all necessary precautions when Working in the vicinity of any existing areaways, coal chutes etc.

E34.2 Known areaways are shown on drawings P-3247-16 to P-3247-20. Areaways to be reconstructed or abandoned were inspected and have been identified by the Contract Administrator. The Contractor shall contact the Contract Administrator regarding information on areaways.

E34.3 Any additional base course, sand, depth of concrete or sawcutting of unit pavers required to adjust the sidewalk grade over an areaway, coal chute etc. paid as material used and shall be included in the unit price bid for "Supply and Installation of Concrete Sidewalk Paving", "Supply and Installation of Interlock Concrete Paving Stone", and "Supply and Installation of Endicott Brick Pavers".

E34.4 The Contractor must advise the Contract Administrator of any areaways, coal chutes, found to be in a deteriorated condition upon exposure during construction operations.

E34.5 Any areaways, coal chutes, damaged as a result of the Contractor's operation shall be repaired at his own cost. If damaged, Contractor to barricade with snow fence and leave open for inspection and repair.

E34.6 A portion of the Areaway located at 460 Main Street is to be abandoned. The owner will be constructing a wall to seal of the proposed abandoned area. The Contractor will be required to break the existing concrete floor and cut down the existing walls approximately 1 metre as directed by the Contract Administrator. The remaining section of abandoned Areaway will then be backfilled with Granular Base Course material. The base course will be paid on a unit cost basis and the abandonment of the Areaway will be paid as a Lump Sum in Form B: Prices as "Partial Abandonment of Areaway at 460 Main Street"

E34.7 The Areaway at 466 Main Street requires a new Areaway cover. The owner of 466 Main Street will provide a new steel cover on Site and the Contractor will be required to install it. This will be paid as a Lump Sum in Form B: Prices as "Installation of Areaway Cover at 466 Main Street".

E35. REMOVAL OF EXISTING INTERLOCK PAVING STONE

E35.1 Description

E35.1.1 This Specification shall supplement Standard Construction Specification CW 3330 – R3 and shall cover all operations related to the removal of existing Interlock Paving Stones.

E35.2 Construction Method

E35.2.1 Removal of existing interlock paving stones shall be understood to include removal and disposal of interlock concrete sidewalk pavement and lean mix, regardless of depth.

E35.2.2 Removal of interlock concrete paving stone for reinstallation shall include removal of paving stones and lean mix as required, disposal of unusable paving stone and base course material and stockpiling of paving stones in approved area for future reinstallation.

E35.2.3 Removal of interlock paving stone for delivery shall include removal of 'I' brick paving stones and base courses as required, disposal of unusable paving stone and base course material, stock piling of one palette of each colour 'I' brick paving stone and delivery of palettes of interlock paving stone to a Site determined by Public Works:
Public Works Street Maintenance Division
Contact: Larry Craig (986-7451)

E35.2.4 Any existing lean mix concrete base found is to be removed and disposed to City of Winnipeg Standards and is incidental to the Unit Price Bid for "Removal of Interlock Paving Stone" and "Removal of Interlock Paving Stone for Reinstallation".

E35.2.5 Any existing lean mix concrete base at the limits of the designated removal area shall be sawcut for the full depth of the pavement prior to the demolition and removal operations. All costs in connection with sawcutting are incidental and shall be included in the unit price bid for "Removal of Interlock Paving Stone" and Removal of Interlock Paving Stone for Reinstallation".

E35.2.6 The Contractor shall exercise due caution during the Interlock paving stone removal Works so as to limit vibration. The Contractor shall take all necessary precautions when Working in the vicinity of any existing areaways, coal chutes, duct lines, trees, hedges, etc.

E35.3 Method of Measurement

E35.4.1 Removal of existing interlock paving stone will be measured on a surface area basis as follows:

- i) Removal of Interlock Paving Stone.
- ii) Removal of Interlock Paving Stone for Reinstallation.
- iii) Removal of Interlock Paving Stone for Delivery.

E35.4 Basis of Payment

E35.5.1 Measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification.

E36. REMOVAL OF TREE WELLS AND GRATES AND MISCELLANEOUS ITEMS

E36.1 Description

E36.1.1 This specification shall cover all operations related to the removal of existing tree wells and grates and miscellaneous items including:

- a) Excavation and removal of existing concrete trees wells and street trees and removal and delivery of metal tree grates
- b) Miscellaneous removals including: (i) Existing benches, garbage receptacles, newspaper boxes, mail boxes, etc. to be temporarily relocated and then replaced by Contractor. (ii) Removal and disposal of MTS booth bases. (iii) Removal and disposal of Transit Shelter bases.

E36.1.2 Construction Method and Basis of Payment

The Contractor shall excavate, remove and dispose of all existing concrete tree wells on this section of Main Street. Any Trees to be removed shall be removed by the Forestry Branch The existing metal tree grates shall be removed and delivered to the Forestry Department (986-3017). Excavation, removal and disposal shall include the tree root system, tree pit hardware, pipes, etc, granular base courses and all associated sawcutting. The Contractor shall backfill with compacted soil or gravel as required for the proposed surface treatment. All costs in connection with this Work shall be included in the unit price bid for "Excavation and Removal of Concrete Tree Well and Street Tree".

All miscellaneous removals are to be included in the unit prices bid under this Contract.

The unit price bid for Asphalt Repair shall include sawcutting, removal and disposal of existing asphalt, subgrade compaction, supply and installation of minimum 200mm compacted granular base course and 75mm asphalt.

E37. TRENCHING AND BACKFILLING

E37.1 Description

E37.1.1 This Specification shall supplement Standard Construction Specification CW 2030-R4 and shall cover all operations related to trenching and backfilling for Manitoba Hydro conduit.

E37.2 Construction Method

E37.2.1 When requested by the Contract Administrator, to facilitate efficient construction of Works under this Contract, the Contractor shall complete all trenching and backfilling operations for the installation of Manitoba Hydro conduit. This Work shall be completed to CW 2030-R4 standards, to the satisfaction of the Contract Administrator and Manitoba Hydro.

E37.3 Method of Measurement

E37.3.1 Trenching and backfilling will be measured on a linear metre basis. 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.

E37.4 Basis of Payment

E37.4.1 Trenching and backfilling will be paid for at the Contract Unit Price per linear metre for "Trenching and Backfilling", measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification.

E38. CONCRETE FORMWORK

E38.1 General

E38.1.1 Related Work

1. E41 Concrete Reinforcement and E42 Cast-in-Place Concrete.

E38.1.2 Reference Standards

1. All concrete formWork is to be done in accordance with CAN/CSA-A23.1 and CAN/CSA-A23.2, except where specified otherwise.E50.1.3.

E38.1.3 Shop Drawings

1. Submit Engineered stamped shop drawings for review and approval by Contract Administrator prior to manufacture.

2. Indicate method and schedule of construction, materials, arrangement of joints, ties, shores, liners, and locations or temporary embedded parts.

E38.2 Materials

E38.2.1 FormWork lumber: plywood and wood formWork materials conform to CAN-086.

E38.2.2 Form ties: removal or snap-off metal ties, fixed of adjustable length, free of devices leaving holes larger than 25mm dia in concrete surface.

E38.2.3 Form liner:

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

E38.2.4 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.

E38.2.5 Stay in place forms shall be Sonotube circular forms for use in the Heritage Pole and Diamond Lane cast-in-place concrete piles.

E38.2.6 Forms for Agilia type cement must have no openings and be completely smooth with no raised wood grains, promotions, notches, etc and be firmly secured.

E38.3 Construction Methods

E38.3.1 Erection

1. Verify lines, levels and dimensions before proceeding with formWork and ensure dimensions agree with drawings.

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

3. Align form joints and make watertight. Keep form joints to minimum.

4. Clean formWork in accordance with CAN/CSA-A23:1. Only permitted if in good condition.

E38.4 Method of Measurement

E38.4.1 No measurement will be made for concrete formWork.

E38.5 Basis of Payment

E38.5.1 No payment shall be made for concrete formWork. Include concrete formWork costs in those items for which cast in place concrete formWork is required.

E39. STEEL SCREW ANCHOR FOUNDATION

E39.1 Description

1. The Work covered under this item shall include fabrication, material supply and installation of steel screw anchor foundations for the Diamond Land Overhead sign structure in accordance with this Specification and as shown on the Drawings.

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 Works as hereinafter specified.

E39.2 Materials

Steel screw anchor shall be Chance Lighting Foundation product number T112-0564 or manufactured as detailed on the drawings or approved equal.

E39.3 General

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

E39.4 Handling and Storage of Materials

All materials shall be handled and stored in a careful and Workmanlike manner, to the satisfaction of the Contract Administrator. Storage of materials shall be in accordance with CSA Standard S-16.1, except as otherwise specified herein.

E39.5 Testing and Approval

1. All materials supplied under this Specification shall be subject to inspection and testing by the Contract Administrator or by the Testing laboratory designated by the Contract Administrator. There shall be no charge to the City for any materials taken by the Contract Administrator for testing purposes.

2. All testing of materials shall conform to CSA Standard CAN3-23.2.

E39.6 Structural Steel

All materials shall conform to:

- a) Steel Sections and Plate: to CSA-G40.21-350W.
- b) Hollow Structural Sections: to CSA-G40.21-350W

E39.7 Bolts, Anchor Bolts, Nuts and Washers

Anchor bolts, nuts and washers shall be in accordance with ASTM A325 Bolts, and shall be hot-dip galvanized in accordance with CSA G164 for a minimum net retention of 600 g/m^2 , for the entire length of the anchor bolts. The threaded portion of the anchor bolts shall extend to the concrete surface.

E39.8 Equipment

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

E39.9 Construction Methods

E39.9.1 Location and Alignment of Foundations

1. Foundations shall be placed in the position shown on the Drawings and as directed by the Contract Administrator in the field.

2. Finished foundations shall not deviate from the vertical by more than 1 percent.

3. The installation of the screw anchor foundations c/w anchor bolts shall be coordinated with the fabricator of the pole superstructure.

E39.9.2 Buried Utilities

1. The Contractor shall exercise extreme caution when constructing the foundations in the vicinity of existing buried utilities. The Contractor shall be responsible for obtaining the exact location of the buried utilities from the appropriate Utility Authority prior to installing the foundations. The Contractor may be required to hand dig to locate street cables, MTS conduits, gas mains, etc., prior to installing the foundations.

2. The proposed locations of the pile foundations may be changed by the Contract Administrator if they interfere with the buried utilities.

3. The Contractor shall be responsible for all costs that may be incurred for repair/rectification of any damage caused to the existing buried utilities as a result of the Contractor's operations in constructing cast-in place concrete foundations, as determined by the Contract Administrator.

E39.9.3 Excavation

Excavation for foundations is not permitted for the installation of the steel screw anchors. If for any reason the proposed location of the screw anchor foundation is located in an excavated area, the Contractor shall stop Work and contact the Engineer immediately.

E39.9.4 Installation of Conduits

1. The supply and installation of plastic conduits will be considered incidental to the Work of this Specification. The Contractor should include the cost of this Work in the construction of concrete foundation Works.

2. The number of plastic conduits to be installed in each base will be stipulated on the Drawings or as directed by the Contract Administrator. The conduits shall enter in the slots on the side of the screw anchor below ground level and shall protrude the centre of the concrete base. All conduits so terminated above ground shall be plugged by means of plastic plugs, which are to fit snugly in the end of the conduit.

E39.10 Installation of Screw Anchor Foundation

Steel screw anchor shall be installed as per manufacture's recommendation.

E39.10.1 Fabrication

The screw anchor shall be fabricated and assembled in a Workmanlike manner in accordance with CAN/CSA-S16.1 Limit States Design of Steel Structures and G40.21 General Requirements for Rolled or Welded Structural Quality Steel.

E39.10.2 Welding

Fabrication Shop Qualifications: The Contractor shall be fully approved by the Canadian Welding Bureau (CWB) as per CSA-W47.1. Welding procedures shall be submitted for each type of weld used in the structure. The procedures shall bear the approval of the Canadian Welding bureau and must also be approved by the Engineer prior to use on the structure.

Welder Qualifications: Only welders, welding operators and tackers approved by the Canadian Welding Bureau in the particular category may be permitted to perform weldments. Their qualifications must be current and be available for examination by the Engineer.

Welding Code: Except as otherwise noted on the drawings, all welding, cutting and preparation shall be in accordance with the CSA-W59.

Cleaning: All weld areas must be clean and free of mill scale, dirt, grease, paint, etc., prior to welding.

Preheat material and enclose heated enclosures as required for all field welding or cutting to maintain the steel at temperatures above 10°C.

Filler Metals: Low hydrogen filler, fluxes and low hydrogen welding practices are to be used throughout. The low hydrogen covering and flux shall be protected and stored as specified by CSA-W59.

Automatic Welding Process: All flanges and web butt joints and all stiffener to web fillet welds shall be made by an approved semi or fully automatic submerged arc process. All webs to flange fillet welds shall be made by an approved fully automatic submerged process. These weld areas must be clean, free of mill scale, dirt, grease, etc., and be preheated as required, just prior to welding.

Tack and Temporary Welds: Tack and temporary welds are not allowed unless they are to be incorporated in the final weld.

Methods of Weld Repair: Repair procedures for unsatisfactory welds must be submitted for approval by the Engineer prior to Work commencing.

Arch Strikes: Arch strikes shall not be permitted. In the event of accidental arc strikes, the Contractor shall submit to the Engineer for approval his/her proposed repair procedure. The repair procedure shall include the complete grinding out of the crater produced by the arc strike. These areas shall be examined by the Engineer to ensure complete removal of the metal in the affected area.

E39.10.3 Grinding of Welds

Web members to chord members shall be ground flush in all locations exposed to view. All other welds ground to CSA-W59.

E39.10.3 Material Splices

Additional splices, other than those shown on the details, will require approval of the Engineer. The Contractor shall bear the cost of inspection of these splices.

E40. HOT DIP GALVANIZING

E40.1 Steel screw anchor shall be hot dip galvanized after fabrication has been completed. Galvanizing shall be to CSA-G164.

E40.2 Handling and Storage

All lifting and handling shall be done using devices that do not mark damage, or distort the assemblies or members in any way. Girders shall be stored upright, supported on sufficient skids and safely shored to maintain the proper section without buckling, twisting or in any damage or misalign the material.

E40.3 Method of Measurement

The construction of cast-in-place concrete light standard foundations will be measured on a unit basis. The number of foundations to be paid for shall be the total number of foundations will be measured on a unit basis. The number of foundations to be paid for shall be the total number of foundations constructed in accordance with this Specification and accepted by the Contract Administrator, as computed from measurements made by the Contract Administrator.

E40.4 Basis of Payment

The supply and installation of steel screw anchors for the Diamond Lane Overhead Sign Structures will be paid for at the Contract Unit Price per unit for "Supply and Install Steel Screw Anchors", measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations described herein and all other items incidental to the Work included in this Specification.

E40.5 Method of Measurement

The supply and installation of steel screw anchors for the Diamond Lane Overhead Sign Structures will be measured on a unit basis. The number of foundations to be paid for shall be the total number of foundations will be measured on a unit basis. The number of foundations to be paid for shall be the total number of foundations fabricated/supplied and installed in accordance with this Specification and accepted by the Contract Administrator, as computed from measurements made by the Contract Administrator.

E41. CONCRETE REINFORCEMENT

E41.1 General

E41.1.1 Related Work

1. E38 Concrete FormWork and E42 Cast in Place Concrete.

E41.1.2 Reference Standards

1. Perform concrete reinforcing Work in accordance with CAN/CSA-A23.3 and welding of reinforcing with CSA W186-M1981, except where specified otherwise.

E41.1.3 Source Quality Control

1. Upon request provide Contract Administrator with certified copy of mill test report of reinforcing steel showing physical and chemical analysis, minimum 5 weeks prior to commencing reinforcing Work.

2. Inform Contract Administrator of proposed source of material to be supplied.

E41.1.4 Shop Drawings

1. Submit engineered stamped shop drawings for review and approval by Contract Administrator prior to manufacture.

2. Shop drawings consist of bar bending details, list and placing drawings.

3. On placing drawings, indicate sizes, spacing, location and quantities of reinforcement and mechanical splices, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacing and location of chairs, spacers and hangers.

4. Design and detail lap lengths and bar development lengths to conform to CAN3-A23.3.

E41.1.5 Substitutions

1. Substitution of different size bars permitted only upon written approval of Contract Administrator. Substitutions must be in writing and shown on shop drawings that have been approved and stamped by Engineer.

E41.2 Materials

E41.2.1 Reinforcing steel: billet steel, grade 400, deformed bars to CSA G30.18 unless indicated otherwise.

E41.2.2 Cold-drawn annealed steel wire ties: to CSA G30.3.

E41.2.3 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.

E41.2.4 Mechanical splices: subject to approval of Contract Administrator. All reinforcing steel in grade beams, piles, slabs and planter walls must be epoxy coated.

E41.3 Fabrication

E41.3.1 Fabricate reinforcing in accordance with CAN/CSA-A23.1.

E41.3.2 Obtain Contract Administrator's approval for locations of reinforcement splices other than shown on placing drawings.

E41.3.3 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

E41.4 Construction Methods

E41.4.1 Field Bending

1. Do not field bend reinforcement except where indicated or authorized by Contract Administrator.

2. When field bending is authorized, bend without heat, apply a slow and steady pressure.
3. Replace bars which develop cracks or splits.

E41.4.2 Placing Reinforcement

1. Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1.
2. Located reinforcing splices not indicated on drawings at points of minimum stress.
3. Ensure clear cover as indicated on drawings.
4. Cover to reinforcing: underside of footings & piles & concrete cast against east 75mm,50mm unless otherwise noted.
5. Prior to placing concrete, obtain Contract Administrator's approval of reinforcing steel and position.

E41.4.3 Cleaning

1. Maintain all reinforcement clean and free from oil and other deleterious materials.

E41.5 Method of Measurement

- E41.5.1 No measurement shall be made for supply and placing of concrete reinforcement.

E41.6 Basis of Payment

- E41.6.1 No payment shall be made for concrete reinforcement. Include costs in items of cast in place concrete Work for which reinforcement is required.

E42. CAST IN PLACE CONCRETE

E42.1 General

- E42.1.1 The "General Conditions and Supplemental Conditions" of this Specification and all documents listed in the tender shall apply to and govern all phases of the Work hereinafter specified and/or shown on the Drawings.

E42.1.2 Scope of Work

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, Viacom and Transit Shelter Base slabs and all foundations (except Heritage Light Pole Concrete Pile, Modified Heritage Light Pole Concrete Pile and Diamond Lane Concrete Illuminated Transit Sign Pile) 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) Subgrade 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 for Viacom and Transit Shelters as shown on the Drawings. Contractor to co-ordinate with Winnipeg Transit (Alex Regeic, 986-6935), Viacom (Phoebe Bosc, 925-9016) and Manitoba Hydro (Gavin Fuerst, 986-3145). Contractor to confirm dimensions of Viacom and Transit Shelters and location of power leg for Viacom Shelter on Site.
- g) Reinforced Concrete foundations for Decorative Median Planters.
- h) Supply, placing and curing of all Decorative Median 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. Supply and Install sleeves for electrical.
- l) Co-ordination with other sub-Contractors as required re: pouring of Transit and Viacom shelter bases and 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.

E42.1.3 Samples

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

E42.1.4 Certificates

1. Minimum 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.

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.

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.

E42.1.5 Construction Quality Control and Placement Procedures.

1. Submit proposed quality control procedures for Contract Administrator's approval.
2. Submit proposed concrete placement procedures for Contract Administrator's approval.

E42.2 Materials

E42.2.1 Portland cement to CAN3-A5-M1983.

E42.2.2 Water to CAN/CSA-A23.1-M90.

E42.2.3 Aggregates to CAN/CSA-A23.1-M90. Coarse aggregates to be normal density.

E42.2.4 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.

E42.2.5 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.

E42.2.6 Premoulded joint fillers:

1. Bituminous impregnated fibre board: to ASTM D1751-83.

E42.2.7 Concrete Mixes

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

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

3. Exterior Concrete for all Foundations including Viacom and Transit Shelter Base Slab

- 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%

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 \pm 30mm
- g) Air Content: 5-8%

5. Concrete for all Decorative 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%

6. Do not change concrete mix without prior approval of Contract Administrator.

E42.3 Construction Methods

E42.3.1 Workmanship

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 days notice prior to placing of concrete.
2. Pumping of concrete is permitted only after approval of equipment and mix.
3. Ensure 20 m bar (for centre median landscape curb) reinforcement and inserts are not disturbed during concrete placement.
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. Contractor to contact LaFarge, David Tesarski (958-6333).
5. Do not place load upon new concrete until authorized by Contract Administrator as per City of Winnipeg Standards.

E42.3.2 Construction Joints

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.

E42.3.3 Finishing of Concrete

1. General

- a) Finish concrete in accordance with CAN/CSA/A23.1. Float surface with metal float and bring surface to true grade.

2. Viacom and Transit Shelter Slab, Planter Walls, Landscape Curb and Exposed Foundations

- 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) The elevation of the finished shelter slab shall not vary more than 4mm +/- from the design elevation.
- d) The shelter slab finish shall match concrete sidewalk finish as per CW 3325-R2.
- e) Finish of all items shall be smooth and clean with no pits, chips, bumps or other surface imperfections.

- f) Agilia concrete for Planter Walls shall be finished as per manufacturer's specifications.

E42.3.4 Cleanup and Damage

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.

2. The Contractor shall be responsible for making good all areas damaged by his operations on the immediate completion of the Phase 1 Streetscaping in connection with this Contract regardless of the limits of the Contract as shown on the Drawings.

E42.4 Method of Measurement

E42.4.1 Cast-in-place Concrete will be measured on a unit basis as follows:

1. Supply and Install CIP Reinforced Concrete Shelter Base
2. Supply and Install CIP Reinforced Concrete Decorative Planter
3. Supply and Install CIP Concrete Tree Well

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.

E42.4.2 Cast-in-place Concrete will be measured on a linear metre basis as follows:

1. Supply and Install Decorative Landscape Curb
 - a) In Centre Median (including 900 mm length 20 m bar, 600 o.c)
 - b) At Exchange District Park

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.

E42.5 Basis of Payment

E42.5.1 Shelter Bases, Decorative Planters and Tree Wells will be paid for at the Contract unit price per unit for "CIP Reinforced Concrete Shelter Base", "CIP Reinforced Concrete Decorative Planter" and "CIP Concrete Tree Well", measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification.

E42.5.2 Decorative Landscape Curb will be paid for at the Contract unit price per linear metre for "Decorative Landscape Curb", measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification.

E43. PROTECTIVE GRAFFITI COATING

E43.1 General

E43.1.1 Scope of Work

1. The Work comprises the furnishings of all labour, equipment, services and materials require to complete the application of graffiti coating on all vertical concrete surfaces including but not limited to Decorative Planters and exposed portion of concrete foundation.

E43.1.2 Related Works

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.

E43.1.3 Submittals for Approved Equal

1. Include sample of material.

2. Provide product data on specified product, describing physical characteristics and maintenance instructions.

E43.2 Materials

E43.2.1 Graffiti Coating: #M74-001/M75 Aliphatic Acrylic Urethane Gloss Clear Finish by Benjamin Moore and Co. Contact Portage Avenue Paints, Brian Kusmack, Phone 788-0303.

E43.2.2 Accessories and Application Equipment: As per manufacturers specifications.

E43.3 Execution

E43.3.1 Surface Preparation and application of graffiti coating to be executed as per manufacturers specification.

E43.3.2 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.

E43.3.3 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.

E43.3.4 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.

E43.3.5 Maintain graffiti coating on all vertical concrete and tile surfaces for a period of five (5) years.

E43.4 Method of Measurement and Basis of Payment

E43.4.1 Graffiti Coating shall be included in the unit prices bid for vertical concrete elements under this Contract.

E44. CONCRETE COLLARS

E44.1 The Contractor shall construct a square or rectangular concrete collar around all poles, valves, hydrants, pits, and other appurtenances within the decorative sidewalk paving as directed by the Contract Administrator and as shown on the drawings.

E44.2 The collar shall be 173 mm thick concrete pavement in accordance with CW-3325. The overall outside dimension of the collar shall generally be 300 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.

E44.3 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.

E45. 100 MM CONCRETE SIDEWALK WITH PAVING STONE, COLOURED CONCRETE, MEDALLION AND BRICK INSET

E45.1 Further to Specification CW 3325-R2 the Contractor shall construct the proposed concrete sidewalk with block-outs (for paving stone, coloured concrete, stepping stone and medallion paving and brick) 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 paving stone, coloured concrete, medallion paving and brick paving to the dimensions and tolerances as shown on the Drawings and as confirmed with paving stone and brick manufacturer.

E45.2 The concrete sidewalk shall be poured such that the block-outs and remaining sidewalk act as a monolithic section.

E45.3 The concrete sidewalk below the existing MTS phone booth and electrical power pedestal installations shall have a minimum depth of 250 mm over the area of the phone booth and pedestal base as shown on the drawings. Contractor to co-ordinate with MTS and Manitoba Hydro for location of conduit, etc. Contractor to supply and install sleeves for electrical in concrete base as required by MTS and Manitoba Hydro. All costs in connection with this Work are included in the unit price bid for "Supply and Install Concrete Sidewalk".

E45.4 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 levelling course shall be included in unit price bid for 'Supply and Install Concrete Sidewalk'.

E45.5 Sidewalk to be poured adjacent to transformer pits, areaways and buildings with approved bond breaker. Cost of bond breaker and shall be included in the unit price bid for "Supply and Install Concrete Sidewalk".

E45.6 All saw cutting required and shall be included in the unit price bid for "Renewal of Concrete Sidewalk" and "100 mm Concrete Sidewalk". All sawcut joints shall be laid out as shown on the drawings, on Site for review and approval by Contract Administrator prior to construction. All sawcutting to City of Winnipeg Specifications.

E45.7 Temporary Street Lights will be installed by others at decorative paving band at back of sidewalk prior to commencement of Contract. The Contractor shall form around these pole bases within the limits of the decorative paving bands. Upon removal of Temporary Street Lights by others, in Winter 2004/Spring 2005, the Contractor shall install concrete sidewalk paving on compacted granular base, brick and paving stone to patch hole. All costs associated with the installation of these small sections of the decorative paving band in Fall 2004 or Spring 2005, shall be included in the unit price bid for concrete sidewalk, brick and paving stone.

E46. PALOMINO YELLOW CONCRETE SIDEWALK INFILL WAVE

E46.1 Further to Specification CW 3325-R2 the Contractor shall construct the proposed coloured concrete sidewalk paving with minimum 75 mm depth as shown on the drawings. The costs of all fibre board and sawcut joints and bond breaker material are included in the unit prices bid for 75 mm concrete sidewalk infill wave.

E46.2 Materials

E46.2.1 Portland cement concrete constituent materials shall conform to the requirements of Section 5.4 and Section 6.2 of the City of Winnipeg CW 3310

E46.2.2 Davis Mix-in colour concrete, #5547 Palomino. Quantity for mix as per manufacturer's specifications.

E46.2.3 Insul-mastic 1-m waterproofing Emulsion-7101 as bond breaker material.

E46.2.4 Supply of Materials

1. Concrete Supply

- a) Unless otherwise specified in the Specifications for the Work, the use of a ready-mixed concrete plant only will be permitted. Concrete shall be proportioned, mixed and delivered in accordance with the requirements of CAN3-A23.1, Section 18, Production of Concrete, except that the transporting of ready-mixed concrete in nonagitating equipment is not permitted without the written permission of the Contract Administrator.
- b) The discharge of ready-mixed concrete from the transit mixer shall be completed as quickly as possible as per manufacturer specified time frame after the introduction of the mixing water to the cement and aggregates, unless an extension of time is authorized by the Contract Administrator.
- c) All delivery tickets shall indicate the time of batching.
- d) The Contractor shall maintain all equipment used for handling and transporting the concrete in clean condition and proper Working order.

E46.3 Construction Methods

E46.3.1 Contractor to verify the exact dimension and layout of Palomino Yellow Concrete Sidewalk Infill Wave prior to installation.

E46.3.2 Coloured concrete mixing as per Davis Colour Manufacturer's mixing guidelines and recommendations.

E46.3.3 The coloured concrete paving to depth of 75 mm is to be installed on top of 100 mm concrete sidewalk with Insul-mastic 1-M Waterproofing Emulsion 7101 as bond breaker, as per the layout shown on the drawings. Supply and Installation of Waterproofing Emulsion is included in the unit price bid for Palomino Yellow Concrete.

E46.3.4 Installation of coloured concrete sidewalk paving as per Davis Colour Manufacturer's guidelines and recommendations and shall conform to Specifications CW 3325- R2.

E46.3.5 Joints

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 15 mm from the horizontal alignment on the drawings.

2. Formed joints for coloured concrete sidewalk paving not greater than 1.5 m in width to match 100 mm concrete sidewalk joints. Joints may be constructed by depressing an approved tool into the plastic concrete or by installing an approved parting strip to be left in place

3. Expansion joints shall be constructed only where new concrete is being placed up against existing non-pavement structures, or where directed by the Contract Administrator. A15 mm thick fibre joint filler shall be installed in the expansion joints. The fibre joint filler shall extend from the base of the concrete slab up to the concrete surface, but no higher.

4. Joints shall be sawcut by approved methods to the dimensions shown on the drawings as soon as the concrete is sufficiently hard so that it will not be raveled or damaged. The time at which all sawcutting is to be undertaken shall be determined by the Contractor. The Contractor shall be wholly responsible for all concrete defects arising from this operation and shall further correct or replace all such defective concrete as may be required in the opinion of the Contract Administrator. The cost of all corrective measures shall be borne entirely by the Contractor clear of the Site off the Work.

5. During sawcutting operations, the Contractor shall take necessary measures to protect adjacent properties and structures from sawcut residue.

6. Where required the Contractor shall prepare the face of the non pavement structure to ensure a vertical joint prior to installing the fibre joint filler. Where voids exist between the fibre joint filler and the non pavement structure after placing the sidewalk, the Contractor shall fill the voids with an approved grout, at the Contractor's expense.

E46.3.6 Concrete Placement

1. Concrete shall be placed in accordance with Section 9.5 of Specification CW 3310.

2. All steps should be made to avoid spilling the yellow concrete on the surrounding concrete surfaces as the concrete will stain the other surfaces. Any stains on the existing stained surfaces will be removed and replaced at the Contractor's expense.

E46.3.7 Coloured Concrete Finishing

1. Concrete Finishing shall be carried out in accordance with both Sections 9.6 of Specification CW 3310 and Davis Colours curing recommendations.

E46.3.8 Quality Control

1. Inspection

- a) 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 and inspection or approval that may have been previously given. The Contract Administrator reserves the right to reject any materials or Works which are not in accordance with the requirements of this Specification. Quality control shall conform to City of Winnipeg Specification CW 3325-R2.

2. Concrete Quality

- a) The Contractor shall provide sample of coloured concrete sidewalk paving to Contract Administrator for approval prior to construction.

E46.4 Method of Measurement

- E46.4.1 Supply and Installation of 75 mm Palomino Yellow Concrete Sidewalk Infill Wave 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, as computed from measurements made by the Contract Administrator.

E46.5 Basis of Payment

- E46.5.1 Supply and Installation of 75 mm Palomino Yellow Concrete Sidewalk Infill Wave will be paid for at the Contract Unit price per square metre for "Supply and Installation of 75 mm Palomino Yellow Concrete Sidewalk Infill Wave" measured as specified herein, which price shall be payment in full for supplying all materials including continuous bond breaker material as required and performing all operations herein described and all other incidental to the Work included in this specification.

E47. INTERLOCKING PAVING STONE AND BRICK PAVERS

E47.1 Description

- E47.1.1 Further to CW 3330, this Specification shall cover the supply and installation of Paving Stones and Brick Pavers.
- a) New Paving Stones and Brick Pavers in block outs in Concrete Sidewalk Paving specified under separate section.
 - b) New Paving Stones and Brick Pavers over Existing Areaways.
 - c) Stockpiled Paving Stones and Brick Pavers on Lean Mix Concrete Base (on side streets and private sidewalks) specified in this section.
 - d) New Paving Stone (Red Unidecor) on Lean Mix Concrete Base specified in this section (on side street bulb outs)
 - e) Detectable Hazard Band.
- E47.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other

things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E47.2 Materials

E47.2.1 Paving Stones and Brick Pavers in Sidewalk, over Areaways and on Concrete Sidewalk Base.

1. Paving stones shall be Barkman Interlocking Concrete Pavers as shown on the Construction Drawings and as follows:

- a) "Holland Stone" Red 105 x 210 x 60 mm
- b) "Holland Stone" Black 105 x 210 x 60mm
- c) "Holland Stone" Natural 105 x 210 x 60mm
- d) "Munic" Tan 105 x 210 x 60mm
- e) "Unidecor" Red (60 mm) to match existing
- f) "Holland Stone" Natural 105 x 210 x 80mm
- g) "Holland Stone" Mahogany 105 x 210 x 80mm
- h) "Holland Stone" Tan 105 x 210 x 80mm
- i) "Munic" Tan (80 mm)

2. Brick Pavers shall be Endicott Brick Pavers, supplied by Alsip's (Contact Jason Alsip 667-3330) as shown on the Construction Drawings and as follows:

- a) Medium Ironspot # 46 Brick Paver- 93 (3 5/8") x 194 (7 5/8") x 57 (2 1/4") mm
- b) Medium Ironspot #46 Brick Paver- 93 x 194 x 32
- c) Medium Ironspot #46 Handicap Detectable Warning Pavers- 93 x 194 x 57 mm
- d) Manganese Ironspot Brick Paver approximately 200 x 200 x 57 mm

3. Brick Pavers shall be Yankee Hill Brick Pavers, supplied by I. XL Clay Brick (Contact: Terry) as shown on the Construction Drawings and as follows:

- a) Maroon 4" x 8" x 2 1/4"

E47.2.2 Cement Grout

1. Grout shall be Type 10 normal Portland conforming to the requirements of CSA Standard A5.

2. Aggregate shall conform to the requirements of Table 1, Grading Limits for Fine Aggregate, of CSA Standard A23.1.

3. Air entraining agent shall conform to the requirements of ASTM Standard C260.

4. Bonding agent Acrl-Stix with defoaming agent or approved equal.

5. Mix Design Statement

The Contractor shall provide a Mix Design Statement and supporting documentation that the mix proportions selected will produce concrete of the specified strength, air content, and Workability. As part of his submission, the Contractor shall supply evidence that the air-void system of the proposed mix design conforms with the requirements of CSA Standard A23.1, Clause 14.3.

The bonding agent shall be mixed with water at a 1:5 ratio of bonding agent/water. This solution shall be mixed with cement, aggregate, and air entraining agent to produce a grout mix with the following properties:

Compressive Strength.....30 Mpa at 28 days
Air Content.....7 to 10%
Consistency.....to suit field condition

E47.2.3 Dry Sand/Cement Mix

1. Dry sand/cement mix shall consist of 1 part Portland dry mix to 3 parts sand.

E47.2.4 Bedding Sand

1. Bedding sand shall be fine aggregate as specified in Section 5.2.3 of Specification CW 3330-R3, with the exception that the sand shall have a minimum of 30% of the particle larger than 3mm.

E47.2.5 Filler Sand

1. Filler sand shall have a maximum aggregate size of 2.5mm.

E47.3 Construction Methods

E47.3.1 Excavation

1. Excavation shall comply with Specification CW 3110.

2. The excavation shall not extend beyond the specified limits of excavation. The limits of excavation shall be taken as a vertical plane not more than 150mm beyond the limits of the proposed paving stone and brick sidewalk, unless otherwise specified on the Drawings or in the Specifications for the Work.

3. The sub-grade shall be excavated to the minimum depth shown on Detail SD-240B, unless otherwise directed by the Contract Administrator.

E47.3.2 Lean Mix Concrete Base

1. The Lean Mix Concrete Base shall be constructed in accordance with Specification CW 3335 on side streets and private sidewalks as shown on the drawings.

E47.3.3 Preparation of Sand Base

1. On top of the concrete sidewalk base, lean mix concrete base and existing areaways a layer of sand shall be placed, depth as indicated on the details.

2. The bedding sand layer shall be spread and levelled so that the brick and paving stones when installed are 5mm higher than the finished grade. No more sand shall be spread than can be covered same day by paving stones and brick. The bedding sand layer shall not be compacted prior to laying the paving stones and brick.

3. The cost of supplying and placing bedding sand shall be included in the installation of the paving stones and brick.

4. No paving stones or brick shall be placed until construction of the underlying layers has been approved by the Contract Administrator.

E47.3.4 Installation of Paving Stones and Brick Pavers

1. New Paving Stones and Brick Pavers shall be installed on the concrete sidewalk block-out areas.
2. New Paving Stones and Brick Pavers to be installed in the area of Temporary Street Lights cannot be installed until Temporary Street Lights are removed and Concrete Sidewalk Base is poured in fall 2004 or spring 2005. All costs associated with the delay in installation of these Paving Stones and Brick Pavers are incidental to the Unit Prices bid under this section. There will be no extra payment for the delay in installing these items.
3. Existing stockpiled Paving Stones shall be installed on new lean mix concrete base in the area indicated on the drawings. New lean mix concrete base is included in the unit price bid for "Install Stockpiled Interlock Paving Stone".
4. New Paving Stones in new bulb out area shall be installed on new lean mix concrete base where indicated on the drawings. New lean mix concrete base is incidental to the unit price bid for "Supply and Install Red Unidecor Paving Stone".
5. Paving stones in the Pacific to Alexander Block shall be installed on the concrete sidewalk block-out areas following installation of the Palomino Yellow Concrete Wave.
6. Brick Pavers on top of the hydro vault in the Rupert to Pacific Block shall be installed on the vault roof. The vault roof shall be sawcut to depth and width required (max 35 mm) and the brick pavers (32 mm) shall be grouted in place. Sawcutting and grout are included in the unit price bid for supply and install Endicott Brick Pavers- Medium Ironspot #46- 25mm
7. Contractor to verify the exact dimensions of Interlocking Paving Stones and Brick Pavers prior to Installation.
 - a) Install sand bed, grout or dry sand/cement mix to depth specified on Drawings.
 - b) Do not compact setting bed prior to installation of pavers or brick.
 - c) Spread only sufficient area which can be covered with pavers and brick same day.
 - d) Lay pavers and brick on sand bed hand tight.
 - e) Where paving pattern is interrupted by vertical structural elements set into underlying concrete base and/or proposed or existing concrete foundation pads - pavers and brick must be sawcut and fit true and hand tight.
 - f) Vertical Structural Elements are to be set into underlying concrete base and/or concrete slab foundations prior to installation of pavers and brick.
 - g) Commence installation of new stones and brick against block-out to obtain straightest possible course for installation.
 - h) Commence installation of existing Munic Paving Stones against base of building paving band to obtain straightest possible course for installation.
 - i) Pavers and brick shall be cut with a saw only, to obtain true even undamaged edges. Chipped pavers are unacceptable.
 - j) Crews shall Work from installed paving stone and brick, not on sand layer.
 - k) Spread and fine grade brick sand over paving surface and sweep into joints, in several directions.
 - l) Compact paving stones and brick with vibratory plate compactor having mass of at least 113 kg.
 - m) Sweep remaining sand over all paving stone and brick areas and remove from Site.
 - n) Replace at no extra cost all whole or cut stones and brick marked as unacceptable.
 - o) Remove cracked, chipped, broken or otherwise damaged paving materials from Site immediately.

- p) Upon completion, clean in accordance with manufacturer's recommendations.
- q) Grout pavers/ brick where they are located at the edge of tree wells and curb inlets. Grout in place all paving stones/ brick smaller than 2" x 4".
- r) In the area of all paraplegic ramps cut paving stones and brick as required so that they lay flush with no edges extending above finished grade of ramp surface. Ensure that all cuts are made in a logically and aesthetically pleasing manner as approved by Contract Administrator on Site.

E47.4 Method of Measurement

E47.4.1 Supply and Installation of Paving Stone and Brick Pavers

1. Supply and installation of Paving Stone and Brick Pavers will be measured on a surface area basis as follows:

- a) Supply and Install Endicott Brick Pavers – Medium Ironspot # 46- 57 mm and 32 mm
- b) Supply and Install Interlock Concrete Paving Stone – Natural Holland Stone (60 mm)
- c) Supply and Install Tan Munic Paving Stone(60 mm)
- d) Supply and Install Red Unidecor Paving Stone (60 mm)
- e) Supply and Install Interlock Concrete Paving Stone – Red and Black Holland Stone (60 mm)
- f) Supply and Install City Hall Entrance Paving- Yankee Hill Brick Pavers- Maroon (57 mm), Endicott Brick Pavers Manganese Ironspot (57 mm)
- g) Supply and Install Crosswalk Holland Stone Interlock Paving – Mahogany (80 mm), Tan (80mm), Natural (80mm)
- h) Supply and Install Crocus Approach Interlock Paving- Mahogany Holland Stone (80 mm), Tan Munic Stone (80 mm), Natural Holland Stone (80 mm)

2. The surface area to be paid for shall be the total number of square metres supplied and installed in accordance with the Drawings and Specifications and accepted by the Contract Administrator, as computed from measurements made by the Contract Administrator.

E47.4.2 Installation of Existing Paving Stone

1. "Install Stockpiled Interlock Paving Stone" will be measured on a surface area basis. The surface area to be paid for shall be total number of square metres installed (including lean mix concrete base) in accordance with the Drawings and Specifications and accepted by the Contract Administrator, as computed from measurements made by the Contract Administrator.

E47.5 Basis of Payment

E47.5.1 Supply and Installation of Paving Stones

1. The supply and installation of Paving Stones will be paid for at the Contract Unit Price per square metre as follows:

- a) Supply and Install Endicott Brick Pavers – Medium Ironspot # 46- 57 mm and 32 mm
- b) Supply and Install Interlock Concrete Paving Stone – Natural Holland Stone (60 mm)
- c) Supply and Install Tan Munic Paving Stone (60 mm)
- d) Supply and Install Red Unidecor Paving Stone (60 mm)

- e) Supply and Install Interlock Concrete Paving Stone – Red and Black Holland Stone (60 mm)
- f) Supply and Install City Hall Entrance Paving- Yankee Hill Brick Pavers- Maroon (57 mm), Endicott Brick Pavers Manganese Ironspot (57 mm)
- g) Supply and Install Crosswalk Holland Stone Interlock Paving – Mahogany (80 mm), Tan (80mm), Natural (80mm)
- h) Supply and Install Crocus Approach Interlock Paving- Mahogany Holland Stone (80 mm), Tan Munic Stone (80 mm), Natural Holland Stone (80 mm)

2. Measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the Work included in this Specification.

E47.5.2 Installation of Existing Paving Stone

1. "Install Stockpiled Interlock Paving Stone" will be paid for at the Contract Unit Price per square metre, measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described (including lean mix concrete base) and all other items incidental to the Work included in this specification.

E48. CULTURAL MEDALLION AND STEPPING STONE PAVING

E48.1 Description

E48.1.1 This Specification shall cover the supply and installation of new Precast Stamped Concrete Stepping Stone medallions, Mortar Bed and Grouted Infill seeded with fine grade aggregate, on concrete sidewalk paving, specified under separate section.

E48.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E48.1.3 The cost of all mortar Work and grouted infill seeded with fine grade aggregate is included in the square metre cost of the Medallion and Stepping Stone Paving.

E48.2 Materials

E48.2.1 Precast Concrete Stepping Stone and Stamped Stepping Stone Medallions in Sidewalk

E48.2.2 Concrete medallions shall be Barkman Precast Concrete Cultural Medallion as shown on the construction drawings and details as follows:

- 1. Precast Unstamped Concrete Stepping Stone Pavers, natural colour, 500mm diameter x 60 mm
- 2. Precast Stamped Concrete Cultural Stepping Stone Medallion – Chinese Cultural Medallion, natural colour, 500 mm diameter x 60 mm

E48.2.3 Mortar Setting Bed

1. Mortar as specified hereinafter shall be used for mortaring precast concrete Stepping Stone Medallions and unstamped stepping stones. The mortar shall have a compressive strength of 21MPa (3000 PSI) and shall consist of normal portland cement, sand, and

water. Adjust water volume depending on water content of sand. Latex additive – Planicrete 50 – to be included in mortar mix.

2. Admixtures to be used in the mortar shall be supplied in accordance with the requirements of the City of Winnipeg Standard CW 3310-R4.

3. The mortar shall be a consistency suitable for the application intended as approved by the Contract Administrator.

4. The Contractor shall provide the Contract Administrator with a mix design statement certifying the constituent materials and mix proportions that will be used in the grout for approval prior to construction.

E48.2.4 Mortar Infill Aggregate

1. Mortar infill seeded full depth with fine grade river washed aggregate suitable to the application.

E48.2.5 Bond Coats

1. Portland Cement Bond and Slurry Bond Coat as indicated on drawings.

E48.3 Construction Method

E48.3.1 Only Unstamped Precast Stepping Stone are to be sawcut. All cuts to be straight, clean and free from uneven edges. Chipped or damaged medallions will not be accepted. All medallions shall be installed at a uniform spacing as shown on drawings.

E48.3.2 Dry lay Precast Concrete Stepping Stone Medallions Stamped and Unstamped. One third of Medallions to be Stamped and well mixed in any one area. Confirm selection with Contract Administrator prior to installation. Concrete sidewalk to be clean, cured, and have required slopes to drain. Block out concrete sidewalk to required depth as indicated on drawings. Apply Slurry Bond Coat to surface of concrete sidewalk. Apply mortar bed with latex additive. Sprinkle on dry cement and spray with water. Press Medallion into position and beat firmly by approved method. Force mortar into joints, filling completely flush. Infill larger joints with mortar seeded full depth with fine grade aggregate. Seeding method to be reviewed and approved by Contract administrator prior to construction. Method by which fine grade aggregate is seeded into mortar must ensure that aggregate firmly adheres to mortar and does not 'pop out'.

E48.4 Basis of Payment

E48.4.1 Supply and Install Cultural Medallion and Stepping Stone Paving will be paid for at the Contract Unit Price per square metre for "Supply and Install of Cultural Medallion and Stepping Stone Paving" measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the Work included in this Specification.

E49. PLANT MATERIAL

E49.1 Description

E49.1.1 The following list generally describes the scope of this section:

1. Supply and installation of trees and shrubs including preparation, digging, transport and planting.
2. Maintenance of Trees and Shrubs during establishment period minimum 30 days until acceptable to start E52 Extended Maintenance of Street Trees and Plant Material for extended street tree and shrub maintenance period.

E49.2 General

E49.2.1 Source Quality Control

1. Obtain approval of plant material at source. All plant material will be field approved by the Contract Administrator. The Contractor shall notify the Contract Administrator to organize the inspection, a minimum of 5 Working days prior to installation.
2. No Work under this Specification to is to proceed without approval.
3. Acceptance of plant material at source does not prevent rejection on Site prior to or after planting operations.
4. Source of all plant material to be Manitoba.

E49.2.2 Shipment and Pre-Planting Care

1. Co-ordinate shipping of plants and excavation of holes to ensure minimum time lapse between digging and planting.
2. Tie branches of trees and shrubs securely and protect plant material against abrasion, exposure and extreme temperature change during transit. Avoid binding of planting stock with rope or wire which would damage bark, break branches or destroy natural shape of plant. Give full support to root ball of large trees during lifting.
3. Cover plant foliage with tarpaulin, and protect bare roots by means of dampened straw, peat moss, sawdust or other acceptable material to prevent loss of moisture during transit and storage.
4. Remove broken and damaged roots with sharp pruning shears. Make clean cut and cover cuts over 50 mm diameter with wound dressing.
5. Keep roots moist and protected from sun and wind. Heel-in trees, which cannot be planted immediately, in shaded areas, and water well.

E49.2.3 Guarantee

1. The Contractor hereby warrants that the plant material as itemized on the plant list will remain free of defects for the duration of the two year maintenance period indicated in E52. End-of-warranty inspection will be conducted.
2. The Contractor agrees and guarantees to replace and replant any nursery stock found dead or in poor condition for the warranty period from date of Certificate of Total Performance, without cost to the City. "Poor Condition" shall be interpreted as meaning nursery stock on which branches are dead or dying, or have not shown satisfactory growth in leaves. Replace nursery stock damaged by accidental causes or vandalism, which stock shall be replaced as directed by Contract Administrator.

3. The Contract Administrator reserves the right to extend Contractor's warranty responsibilities for an additional one year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.

E49.2.4 Replacement

1. During warranty period, remove from Site any plant material that has died or failed to grow satisfactorily as determined by the Contract Administrator.

2. Replace plant material as directed by the Contract Administrator.

3. Extend warranty on replacement plant material for a period equal to the original warranty period.

4. Continue such replacement and warranty until plant material is acceptable.

E49.3 Materials

E49.3.1 Water

1. Water should be potable and free of minerals which may be detrimental to plant growth.

E49.3.2 Root Ball Burlap

1. Root ball burlap should be 150 g Hessian burlap.

E49.3.3 Anti-Desiccant

1. Anti-desiccant should be wax-like emulsion to provide film over plant surface reducing evaporation but permeable enough to permit transpiration.

E49.3.4 Wound Dressing

1. Wound dressing should be horticulturally accepted non-toxic, non-hardening emulsion.

E49.3.5 Plant Material

1. Quality and Source: Comply with Guide Specification for Nursery Stock, 1982 Edition of Canadian Nursery Trades Association, referring to size and development of plant material and root ball.

2. Measure plants when branches are in their natural position. Height and spread dimensions refer to main body of plant and not from branch tip to branch tip. Use trees and shrubs of No. 1 grade.

E49.3.6 Additional plant material qualifications:

1. Use trees and shrubs with strong fibrous root system free of disease, insects, defects or injuries and structurally sound. Use trees with straight trunks, well and characteristically branched for species. Plant must have been root pruned regularly, but not earlier than one growing season prior to arrival on Site.

2. Size of root ball for Trees planted in tree pits with tree covers must be minimum 150 mm wider than the size specified in the Guide Specification for Nursery Stock to increase stability of trees that cannot be staked. Contractor to ensure root ball is of sufficient size to ensure

that the trees will remain straight under worst case wind conditions for this section of Main Street.

E49.3.7 Cold Storage

1. Approval required for plant material which has been held in cold storage.

E49.3.8 Container - Grown Stock

1. Acceptable if containers large enough for root development. Trees must have grown in container for minimum of one growing season but not longer than two.

2. Root system must be able to "hold" soil when removed from container. Plants that have become root bound are not acceptable. Container stock must have been fertilized with slow releasing fertilizer.

E49.3.9 Balled and Burlapped

1. Deciduous trees in excess of 3 m height must have been dug with large firm ball. Root balls must include 75% of fibrous and feeder root system. This excludes use of native trees grown in light sandy or rocky soil. Secure root balls with burlap, heavy twine and rope. For large trees: wrap ball in double layer of burlap and drum lace with minimum 10 mm dia. rope. Protect root balls against sudden changes in temperature and exposure to heavy rainfall.

E49.3.10 Tree Spade Dug Material

1. Dig plant material with mechanized digging equipment of hydraulic spade or clam-shell type. Root balls to satisfy CNTA standards. Lift root ball from hole, place in wire basket designed for purpose and line with burlap. Replace root ball and tie basket to ball with heavy rope. Take care not to injure trunk of tree with wire basket ties or rope.

E49.3.11 Substitutions

1. Substitutions to plant material as indicated on plantings plan are not permitted unless written approval has been obtained as to type, variety and size prior to award of Contract. Plant substitutions must be similar species and of equal size to those originally specified.

E49.4 Construction Methods

E49.4.1 Workmanship

1. Stake out location of trees and shrubs as per the Construction Drawings. Obtain approval prior to excavating.

2. Apply anti-desiccant in accordance with material manufacturer's instructions.

3. Co-ordinate operations. Keep Site clean and planting holes drained. Immediately remove soil or debris spilled onto pavement.

E49.4.2 Planting Time

1. All Street Trees and shrubs south of William Avenue must be planted as sidewalk construction is completed in June 2004 (prior to July 15, 2004, construction schedule permitting). All Street Trees north of William Avenue and all Median Trees must be planted

as sidewalk and centre median construction is complete in September 2004 (prior to September 30, 2004 construction schedule and weather permitting). Should the construction schedule or inclement weather not permit the completion of tree planting in 2004, the tree planting will be completed in 2005 as soon as the weather permits. No extra costs will be paid for a split (2004 and 2005) planting schedule.

2. When permission has been obtained to plant materials after buds have broken, spray plants with anti-desiccant to slow down transpiration prior to transplanting.

3. When permission has been obtained, trees and shrubs growing in containers may be planted throughout growing season.

4. Plant only under conditions that are conducive to health and physical conditions of plants.

5. Provide planting schedule. Extending planting operations over long period using limited crew will not be accepted.

E49.4.3 Excavations

1. Refer to Preparation of Tree Wells and Preparation of Planters and Planting Beds. All excavation for installation of plant material is incidental and shall be included in the unit price bid for supply and installation of Plant Material unless otherwise noted.

2. Protect bottom of excavations against freezing.

3. Remove water which enters excavations prior to planting. Ensure source of water is not ground water.

E49.4.4 Planting

1. Loosen bottom of planting hole to depth of 150 to 200 mm.

2. Plant trees and shrubs vertically with roots placed straight out in hole. Orient plant material to give best appearance in relation to structure, roads and walks.

3. Place plant material to depth equal to depth they were originally growing in nursery.

4. With balled and burlapped roots balls, loosen burlap and cut away minimum top 1/3 without disturbing root ball. Do not pull burlap or rope from under root ball. With container stock, remove entire container without disturbing root ball. Non bio-degradable wrappings must be removed.

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

6. Build 100 mm deep saucer around outer edge of hole to assist with maintenance watering.

7. When planting is completed, give surface of planting saucer dressing of organic 10-6-4 fertilizer at rate of 12 kg/100 m for shrub beds or 40 to 50 g/mm of calliper for trees. Mix fertilizer thoroughly with top layer of planting soil and water in well.

E49.4.5 Pruning

1. Prune trees after planting as noted below. Postpone pruning of those trees where heavy bleeding may occur, until in full leaf. Employ clean sharp tools and make cuts flush with main branch, smooth and sloping as to prevent accumulation of water.
2. Remove projecting stumps on trunks or main branches. Remove dead and injured branches and branches that rub causing damage to bark. Trim trees without changing their natural shape. Do not damage lead branches or remove smaller twigs along main branches.
3. Prune Deciduous Trees to min 2.4 m clear stem height.

E49.4.6 Maintenance

1. Refer to E52 for 2 year Extended Maintenance of all plant material. Extended maintenance to begin when plant material has been accepted to start the warranty. Plant Material shall be accepted to start warranty when installation in accordance with the Drawings and Specifications is complete and there is no sign of wilting, chlorosis, pest infestation, transplant shock or any conditions deleterious to longevity and appearance.
2. After completion of planting operation to the satisfaction of the Contract Administrator, the Contractor shall be responsible for the maintenance of the plant material during establishment period until accepted.
3. Plant material shall be accepted to start warranty when installation in accordance with the Drawings and Specifications, is complete and there is no sign of wilting, chlorosis, pest infestation, transplant shock or any conditions deleterious to longevity and appearance.
4. Replace any dead or damaged plant material during the maintenance period, including replacement of vandalized material.
5. Water sufficiently to maintain optimum growing conditions. Ensure adequate moisture in root zone at freeze-up.

E49.4.7 Maintenance Materials

1. The Contractor shall provide all necessary equipment, including: tractors, mowers, hand mowers, trimmers, fertilizer spreaders, pruning tools, hoses, water meters, and any other items necessary for the maintenance of the plant material indicated in this Specification.

E49.4.8 Personnel

1. The Contractor shall provide all necessary personnel for the ongoing maintenance operations.
2. Personnel should have at least one year of experience in landscape maintenance and should be under the direction of a foreman, in all cases, with not less than five years of experience with similar maintenance operations.

E49.4.9 Maintenance Methods

1. Watering Shrubs and Trees
 - a) All trees and shrubs shall be watered as required.

- c) To determine the need for watering, make a soil test weekly with a one-inch auger. Take a test sample from both the planting soil and from the root area by drilling to a minimum depth of 600 mm. The soil shall contain enough moisture to hold together when compressed in the hand, but not be muddy.
- c) During the hot season soak thoroughly approximately every week to ten days, depending on soil conditions. Take soil sample periodically, using an earth auger, until the maintenance personnel are familiar with soil conditions.
- d) If soil is dry because of insufficient rain in the late fall, water plant material sufficiently to soak the entire root area before the earth freezes.

2. Fertilizing Shrubs and Trees

- a) Fertilizing shrub beds using a 10-6-4 mixture of fertilizer.
- b) Fertilize trees using a 10-6-4 mixture of fertilizer.

3. Cultivation

- a) Cultivate planters and tree pits to keep the top layer of soil loose, friable and free of weeds. Never cultivate soil more than 50 mm. Maintain 100 mm depth of wood chip mulch in planters and planting beds.

4. Spraying

- a) Spray trees, shrubs, perennials and annuals to control insect pests and diseases. Use horticulturally recommended compounds specific for the problem to be contained. Do not use DDT or sprays prohibited by Agriculture Canada.

5. Adjustments

- a) Make adjustments requested by the Contract Administrator including straightening.

E49.5 Method of Measurement

- E49.5.1
 - 1. Supply and Installation of Plant Material will be measured on a unit basis. The number of units to be paid shall be the total number of units supplied and installed in accordance with the Drawings and Specifications and as measured and accepted by the Contract Administrator.
 - 2. Plant Material replaced due to non-Contractor accident clause or vandalism will be paid on a unit basis

E49.6 Basis of Payment

- E49.6.1
 - 1. Supply and Installation of Plant Material will be paid for at the Contract Unit Price per unit for "Supply and Installation of Plant Material", measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification.
 - 2. Plant Material replaced due to a non-Contractor accident or vandalism will be measured on a unit basis

E50. PREPARATION OF TREE WELLS

E50.1 Description

E50.1.1 Scope of Work

1. The following list generally describes the scope of this Section:

- a) Excavate tree pit by hand (soft dig/ daylighting process to be used in area of existing Manitoba Hydro Duct to expose duct) including modifications to existing roadway gravel base course and drainage trench and additional compacted gravel as required. Tree pit dimensions vary (approximately 1220 x 4010 mm to 1220 x 20,450 mm). Grade base of pit to drain to roadway drainage system.
- b) Supply and install 20mm – 50mm drainage gravel to 150mm depth.
- c) Supply and install root barrier along the east side of all tree pits in Sidewalk area.
- d) Supply and install filter cloth
- e) Supply and install planting soil.

E50.1.2 Samples

1. Submit to the Contract Administrator samples of the following materials:
Planting Soil Mixture: 1 kg

E50.2 Materials

- E50.2.1**
- | | |
|---------------|--|
| Gravel: | 20 mm - 50 mm clean crushed granite gravel for bottom of tree pit. |
| Root Barrier: | Nilex Deep root UB 48, 48" x 24" panel. Contact Mike Stang (403) 543-5454. |
| Filter Cloth: | Pro Pex 4530 polypropylene non- woven needle punched fabric- Dark Grey |

E50.2.2 Planting Soil Mixture:

1. Imported topsoil: natural, fertile, agricultural soil typical of locality, capable of sustaining vigorous plant growth, from well drained Site that is free of flooding, not in frozen or muddy condition, not less than 6% organic matter to a maximum 25% organic matter by volume, and Ph value of 5.9 to 7.0. Free from subsoil, slag or clay, stones, lumps, live plants and their roots, sticks, crabgrass, couchgrass, noxious weeds and foreign matter. Topsoil to contain no residual soil incorporated herbicides.

2. Peat moss: horticultural grade Class "A" decomposed plant material, fairly elastic and homogeneous. Free of decomposed colloidal residue, weed, sulphur and iron. To have Ph value of 5.0 to 6.5, 60% organic matter by weight, moisture content not exceeding 15% and water absorption capacity of not less than 300% by weight on oven dry basis.

3. Sand: hard, granular natural beach sand, washed free of impurities, chemical or organic matter.

4. Fertilizer: commercial type with 50% of the elements derived form organic sources.

5. Bonemeal: shall be raw bonemeal, finely ground with a minimum analysis of 3% nitrogen and 20% phosphoric acid.

E50.2.3 Soil Mixture for Planting

1. Planting soil mix shall consist of 5 parts topsoil, 1 part peat moss and 1 part sand. While mixing, adjust Ph by addition of finely ground dolomite limestone to 6.2 - 6.8. Add 3.0 lbs. of 0-20-0 super phosphate 1.8 kg/m³. Add the following as required:

- a) potash
- b) NPK plus minor elements
- c) PAR-EX complete nutrient fertilizer/CIL slow release

E50.3 Construction Methods

E50.3.1 Excavation of Tree Pits

1. The Contractor must ensure that the extent of all buried utilities and services are located and if necessary, protected and exposed prior to any excavation.

2. Excavate the tree pits by hand to the dimensions and depth shown on the Drawings. Soft dig/ daylighting process to be used in area of existing Manitoba Hydro Duct to expose duct. Ensure base of tree pit slopes to drain to roadway drainage system (min 2% slope). A minimum of 3 days shall pass after the concrete tree wells are poured before any digging shall occur.

3. Remove roadway gravel where required to achieve minimum tree pit width as specified on Drawings.

4. All excavated material shall be disposed of off Site.

5. Backfill between roadway base gravel and tree pit edge with compacted granular where required.

6. Backfill excavated pits with 150 mm depth granite drainage gravel.

7. Backfill with soil mix compacting sufficiently to provide good soil consistency for tree planting and to minimize settlement.

8. After tree planting, ensure that the finished soil level is 100 mm below bottom line tree cover and 25mm below bottom line of sidewalk panel.

E50.3.2 Quality Control

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

2. The Contractor shall, at his own expense, correct such Work or replace such materials found to be defective under this Specification in an approved manner to the satisfaction of the Contract Administrator.

E50.4 Method of Measurement

E50.4.1 Preparation of Tree Wells shall be included in the cost Supply and Installation of CIP Concrete Tree Well. There will be no separate measurement or payment for this Work.

E50.5 Basis of Payment

E50.5.1 Preparation of Tree Wells shall be included in the cost the Supply and Installation of CIP Concrete Tree Well. There will be no separate payment for this Work.

E51. PREPARATION OF PLANTERS AND PLANTING BEDS

E51.1 Description

E51.1.1 Scope of Work

1. The following generally describes the scope of this Section:

- a) Supply and install 100mm depth of 20-50 mm clean crushed granite gravel drainage course, filter fabric and planting soil mixture to fill in all planters (Exchange District Precast Planters and Centre Median C.I.P. Planters).
- b) Supply and install minimum 1000mm planting soil mixture, filter cloth and stone mulch in centre median planting beds. Excavate and dispose of existing unsuitable soil as required.
- c) Supply and Install minimum 450 mm planting soil mixture, filter cloth and stone mulch in Exchange District Park planting beds. Excavate and dispose of existing unsuitable soil/ granular base as required.

E51.1.2 Samples

1. Submit to the Contract Administrator samples of the following materials:

- a) Planting Soil Mixture: 1 kg.

E51.1.3 Delivery and Storage

1. Deliver and store fertilizer in waterproof bags showing weight, analysis and name of manufacturer.

E51.2 Materials

E51.2.1 Imported topsoil: natural, fertile, agricultural soil typical of locality, capable of sustaining vigorous plant growth, from well drained Site that is free of flooding, not in frozen or muddy condition, not less than 6% organic matter to a maximum 25% organic matter by volume, and Ph value of 5.9 to 7.0. Free from subsoil, slag or clay, stones, lumps, live plants and their roots, sticks, crabgrass, couchgrass, noxious weeds and foreign matter. Topsoil to contain no residual soil incorporated herbicides.

E51.2.2 Peat moss: horticultural grade Class "A" decomposed plant material, fairly elastic and homogeneous. Free of decomposed colloidal residue, weed, sulphur and iron. To have Ph value of 5.0 to 6.5, 60% organic matter by weight, moisture content not exceeding 15% and water absorption capacity of not less than 300% by weight on oven dry basis.

E51.2.3 Sand: hard, granular natural beach sand, washed free of impurities, chemical or organic matter.

- E51.2.4 Fertilizer: commercial type with 50% of the elements derived from organic sources.
- E51.2.5 Bonemeal: shall be raw bonemeal, finely ground with a minimum analysis of 3% nitrogen and 20% phosphoric acid.
- E51.2.6 Filter Fabric: Pro Pex 4530 polypropylene non- woven needle punched fabric- Dark Grey
- E51.2.7 Soil Mixture for Planting
1. Planting soil mix shall consist of 1/3 topsoil, 1/3 peat moss and 1/3 sand. While mixing, adjust Ph by addition of finely ground dolomite limestone to 6.2 to 6.8. Add 3.0 lbs. of 0-20-0 super phosphate 1.8 kg/m³. Add the following as required:
 - a) potash
 - b) NPK plus minor elements
 - c) PAR-EX complete nutrient fertilizer/CIL slow release
- E51.2.8 Stone Mulch: 15 mm- 25 mm crushed granite mulch- Charcoal Grey
- E51.2.9 Granite Gravel Drainage Course: 20-50 mm Clear Crushed Granite Gravel
- E51.3 Construction Methods
- E51.3.1 Excavation of Planting Beds and Planters
1. The Contractor must ensure that the extent of all buried utilities and services are located and if necessary, protected, prior to any excavation.
 2. Excavate the planting beds by hand to the dimensions and depths shown on the Drawings.
 3. All excavation is incidental and shall be included in the unit price bid for Supply and Installation of Planting Soil Mix.
- E51.3.2 Preparation of Planters
1. Install minimum 100 mm depth granite gravel drainage course in base of CIP and precast planters as per Drawings. Grade base of CIP planters to drain to roadway drainage system.
 2. Install filter fabric over drainage course and extend, as required to secure, up inside walls of planters. Install planting soil mixture in planter. Ensure filter fabric is in correct position when installation is complete.
- E51.3.3 Preparation of Planting Beds in Centre Median and at Exchange District Park
1. Install planting soil mixture, filter cloth and stone mulch to depth shown on the Drawings.
- E51.4 Method of Measurement
- E51.4.1 Planting soil mixture for planters and planting beds will be measured on a cubic metre basis. Filter fabric for planters and planting beds will be measured on a square metre basis. Stone

mulch for planting beds will be measured on a square metre basis. Granite gravel drainage course for planters will be measured on a cubic metre basis.

E51.5 Basis of Payment

- E51.5.1 Payment for Supply and Installation of Planting Soil for Planting Bed and Planters (to fill) will be made at the Contract Unit Price which price shall be payment in full for supply of all materials and performing all operations herein described and for all other items incidental to the Work in this Specification.
- E51.5.2 Payment for Supply and Installation of Filter Cloth for Planters and Planting Beds will be made at the Contract Unit Price which price shall be payment in full for supply of all materials and performing all operations herein described and for all other items incidental to the Work in this Specification.
- E51.5.3 Payment for Supply and Installation of Stone Mulch (100 mm depth) will be made at the Contract Unit Price which price shall be payment in full for supply of all materials and performing all operations herein described and for all other items incidental to the Work in this Specification.
- E51.5.4 Payment for Supply and Installation of Granite Gravel Drainage Course (planter only) will be made at the Contract Unit Price which price shall be payment in full for supply of all materials and performing all operations herein described and for all other items incidental to the Work in this Specification.

E52. EXTENDED MAINTENANCE OF STREET TREES AND PLANT MATERIAL

E52.1 Description

E52.1.1 This Specification shall deal with the maintenance of the trees, shrubs, perennials and annuals from:

1. The date of acceptance to start the Work for 2 years.

E52.2 Scope of the Work

E52.2.1 The following generally describes the scope of this Specification:

1. Maintenance of trees.
2. Maintenance of Shrubs.

E52.3 Materials

E52.3.1 The Contractor shall provide all necessary equipment, including: tractors, trimmers, fertilizer spreaders, pruning tools, water trucks, hoses, water meters, and any other items necessary for the maintenance of the area indicated in this Specification.

E52.3.2 Personnel

1. The Contractor shall provide all necessary personnel for the ongoing maintenance operations.

E52.3.3 Areas

1. The following areas shall be part of the maintenance jurisdiction:

- a) The trees as indicated on the Construction Drawings.
- b) All shrubs as indicated on the Construction Drawings.

E52.4 Work Included

E52.4.1 Water Trees

1. All trees shall be watered bi-weekly, or during the summer, if temperatures are fairly high and there has been no rainfall, water approximately once a week. Where irrigation is not available this should be executed by leaving a hose, with a gentle rate of flow, running into the saucer of the root ball for about one hour.
2. To determine the need for watering, make a soil test weekly with a one-inch auger. Take a test sample from both the planting soil and from the root ball by drilling to a minimum depth of 600 mm. The soil shall contain enough moisture to hold together when compressed in the hand, but shall not be muddy.

E52.4.2 Fertilizing, Pruning and Spraying Deciduous Trees

1. Because of the specialized nature of such operations, this should be done by a qualified local arborist.
2. Fertilize in the fall over the surface of the ground surrounding the plants, then soak the area thoroughly. Use 10-6-4 analysis fertilizer spreading a maximum of 0.13 kg per square meter.
3. Spray trees to control insect pests and diseases. Use horticulturally recommended compounds specific for the problem to be contained.

E52.4.3 Tighten, or remove, turnbuckles or guy wires for trees as required or directed by the Contract Administrator.

E52.4.4 Straighten trees as required or directed by the Contract Administrator.

E52.4.5 General Maintenance

1. Clean up litter and debris in tree cover weekly.
2. Clean up litter and debris in tree well (under tree cover and sidewalk panels) twice yearly (in the spring and fall)

E52.4.6 Maintenance of Trees and Shrubs

1. From time of acceptance by Contract Administrator to start the warrants to end of warranty period, perform following maintenance operations:
 - a) Water to maintain soil moisture conditions for optimum growth and health of plant materials without causing erosion.
 - b) For evergreen plant material, water thoroughly in late fall prior to freeze up to saturate soil around root system.
 - c) Reform damaged watering saucers.
 - d) Remove weeds monthly.

- e) Replace or respread damaged, missing or distributed mulch.
- f) For non-mulched areas, cultivate monthly to keep top layer of soil friable.
- g) Apply pesticides in accordance with Federal, Provincial and Municipal regulations as and when required to control insects, fungus and disease. Obtain product approval from Engineer prior to application.
- h) Apply fertilizer in early spring based on soil test results.
- i) Remove dead, broken, or hazardous branches from plant material.
- j) Keep tree supports in proper repair and adjustment.
- k) Remove tree supports and level watering saucers at end of warranty period.
- l) Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.
- m) Submit monthly written reports to Engineer identifying:
 - i) Maintenance Work carried out.
 - ii) Development and condition of plant material.
 - iii) Preventative or corrective measures required which are outside Contractor's responsibility.
- n) Remove all garbage from tree wells, planting beds and planters.

E52.5 Guarantee of Work

- E52.5.1 The Contractor shall agree and guarantee to replace and replant any nursery stock found dead or in poor condition at the completion of the maintenance period. "Poor Condition" shall be interpreted as meaning nursery stock in which branches are dead or dying, or have not shown satisfactory growth of leaves. All replacements shall be of same size and species, as specified.

E52.6 Method of Measurement

- E52.6.1 Extended Maintenance of Tree and Plant Material will be on a lump sum basis, undertaken in accordance with this Specification and as accepted by the Contract Administrator.

E52.7 Basis of Payment

- E52.7.1 Payment for Extended Maintenance of Tree and Plant Material as specified under this section shall be on a lump sum basis. Payment shall be made in two equal instalments (50% each), payable on satisfactory completion on the first and second anniversary of the recognized date of completion for Two Years Maintenance.

E52.8 Acceptance

- E52.8.1 Upon the second anniversary of the recognized date of completion, or similarly the end of the required maintenance period, a Site inspection shall be held. If at this time, all material and Works is satisfactory the Contract for maintenance and warranty shall be terminated.

E53. CONCRETE TREE COVERS AND SIDEWALK PANELS

E53.1 Description

- E53.1.1 The following list generally describes the scope of this Section. Supply and installation of:

1. Barkman Precast Concrete Tree Cover with Collar – 1370 mm square, plain concrete finish to match sidewalk finish. Two pieces with inset galvanized hardware to attach collar and to facilitate lifting. Hardware to be covered with flush durable cover coloured to match

concrete. Collar to be separate piece with inset galvanized hardware for attachment to cover, sand blasted finish. Collar must be easily removed and replaced by City maintenance staff only (tamper proof).

2. Barkman Precast Concrete Reinforced Sidewalk Panels – 1370 mm square (73 standard, 4 modified) plain concrete finish to match sidewalk finish. With inset galvanized hardware to facilitate lifting. Hardware to be covered with flush durable cover coloured to match concrete.

E53.2 General

E53.2.1 Delivery and Storage

1. Store units in protected location, immediately upon arrival on the Site.
2. Remove from Site any units which have been damaged during transportation and replace.

E53.3 Source

E53.3.1 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

E53.4 Installation

E53.4.1 After planting trees, Concrete Tree Covers and Sidewalk Panels shall be installed by the Contractor in locations and in the manner indicated on the Construction Drawings.

E53.5 Protection after Completion

E53.5.1 Protect and maintain tree covers and sidewalk panel until acceptance of project Work.

E53.5.2 Immediately remove from Site, damaged tree covers and sidewalk panels. Replace, repair, re-finish, or otherwise make good to approval of Contract Administrator.

E53.6 Method of Measurement

E53.6.1 Supply and Installation of Concrete Tree Covers and Concrete Sidewalk Panels as specified in the Schedule of Prices and as shown on the Drawings will be measured on a unit basis. The number of each item to be paid for will be the total number placed in accordance with this Specification and accepted by the Contract Administrator, as computed by the Contract Administrator.

E53.7 Basis of Payment

E53.7.1 Supply and Installation of Concrete Tree Covers and Concrete Sidewalk Panels will be paid for at the Contract Unit Price for each item, which price shall be payment in full for supply of all material and performing all operations herein described and for all other items incidental to the Work included in this Specification.

E54. PROJECT CARRY-OVER IN 2005

- E54.1 It is anticipated that some of the streetscaping project may have to be completed in 2005 because of delay by the roadWorks project.
- E54.2 No additional payment or increase in unit prices will be allowed. All unit prices bid in this Contract will remain valid for any Works performed in 2005.

E55. CAST-IN-PLACE CONCRETE LIGHT STANDARD PILES

E55.1 Description

The Work covered under this item shall include all concreting operations related to construction of cast-in-place concrete pile light standard foundations for the Heritage Light Pole, North Main Decorative Pedestrian Light Pole, Illuminated Transit Sign and Diamond Land Overhead sign structure in accordance with this Specification and as shown on the Drawings.

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

E55.2 Materials

E55.2.1 General

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

E55.2.2 Handling and Storage of Materials

All materials shall be handled and stored in a careful and Workmanlike manner, to the satisfaction of the Contract Administrator. Storage of materials shall be in accordance with CSA Standard CAN3-A23.1, "Storage of Material", except as otherwise specified herein.

E55.2.3 Testing and Approval

All materials supplied under this Specification shall be subject to inspection and testing by the Contract Administrator or by the Testing laboratory designated by the Contract Administrator. There shall be no charge to the City for any materials taken by the Contract Administrator for testing purposes.

All materials shall conform to CSA Standard CAN3-A23.1.

All testing of materials shall conform to CSA Standard CAN3-23.2.

E55.2.4 Cement

Cement shall be Type 50, Sulphate-Resistant Cement, conforming to the requirements of CSA Standard CAN3-A5.

E55.2.5 Supplementary Cementing Materials

Use of Pozzolans, or silica fume will not be permitted for use in structural concrete supplied under this specification. Fly Ash is permitted to maximum of 15% of cement content.

E55.2.6 Water

Water used for mixing concrete shall be clean and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances. It shall be equal to potable water in physical and chemical properties.

E55.2.7 Aggregate

a. Fine Aggregate

Fine aggregate shall consist of sand having clean, hard, strong, durable, uncoated grains, free from injurious amounts of dust, soft or flaking particles, shale, alkali, organic matter, loam, or other deleterious substances.

Fine aggregate shall be well-graded throughout and shall conform to the following grading requirements:

Gradation of Fine Aggregates	
Canadian Metric Sieve Size	Percent of Total Dry Weight Passing Each Sieve
10,000	100%
5,000	95% - 100%
2,500	80% - 100%
1,250	50% - 90%
630	25% - 65%
315	10% - 35%
160	2% - 10%
80	0% - 3%

b. Course Aggregate (20mm Nominal)

Course aggregate shall conform to the requirements of CAN3-A23.1, Section 5, Aggregate. Coarse aggregate shall be clean and free from all alkali, organic, or other deleterious matter, and shall have an absorption not exceeding 3 percent.

E55.2.8 Admixtures

No admixtures other than air-entraining agent shall be used without written authorization of the Contract Administrator, unless otherwise specified in these Specifications. It shall be the Contractor's responsibility to ensure that any admixtures is compatible with all other constituent materials.

E55.2.9 Reinforcing Steel

Reinforcing steel shall be deemed to include all reinforcing bars, tie-bars, and dowels.

All reinforcing steel shall conform to the requirements of CSA Standard G30.18, Grade 400 Mpa Billet-Steel Bars for Concrete Reinforcement.

E55.2.10 Anchor Bolts, Nuts and Washers

Anchor bolts, nuts and washers shall be in accordance with ASTM Grade A325 and shall be hot-dip galvanized in accordance with CSA G164 for a minimum net retention of 600 g/m², for the entire length of the anchor bolts. The treaded portion of the anchor bolts shall extend to the concrete surface.

E55.2.11 Conduit

The conduit shall be 50mm plastic pipe and shall include all incidentals, including watertight splice connections, where applicable.

E55.3 Concrete Mix Design

Proportioning of the aggregate, coarse aggregate, cement, water, and air entraining agent shall be such as yield concrete having the required strength and Workability as follows:

- (i) Minimum Compressive Strength at 28 days = 35 MPa
- (ii) Maximum Water / Cement Ratio = 0.45
- (iii) Minimum Cement Content = 340 kg/m³
- (iv) Slump = 80mm ± 30mm
- (v) Aggregate = 20mm nominal
- (vi) Air Content = 4.0 to 6.0 percent
- (vii) Cement = Type 50

E55.4 Equipment

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

E55.5 Construction Methods

E55.5.1 Location and Alignment of Foundations

Foundations shall be placed in the position shown on the Drawings and as directed by the Contract Administrator in the field.

Finished foundations shall not deviate from the vertical by more than 1 percent.

The construction or cast-in-place concrete foundations c/w anchor bolts shall be coordinated with the fabricator of the pole superstructure.

E55.5.2 Buried Utilities

The Contractor shall exercise extreme caution when constructing the foundations in the vicinity of existing buried utilities. The Contractor shall be responsible for obtaining the exact location of the buried utilities from the appropriate Utility Authority prior to installing the foundations. The Contractor may be required to hand dig to locate street cables, MTS conduits, gas mains, etc., prior to installing the foundations.

The proposed locations of the pile foundations may be changed by the Contract Administrator if they interfere with the buried utilities.

The Contractor shall be responsible for all costs that may be incurred for repair/rectification of any damage caused to the existing buried utilities as a result of the Contractor's operations in constructing cast-in place concrete foundations, as determined by the Contract Administrator.

E55.5.3 Excavation

Excavation for foundations shall be made with equipment designed to remove a core of the diameter shown on the Drawings.

All excavated material from the foundations shall be promptly hauled from the Site to an approved disposal area as located by the Contractor.

Upon completion of the boring, the reinforcement and anchor bolts shall be set in place and the concrete poured immediately. Under no circumstances shall hole be left to stand open after condemned foundations.

If any hole is condemned because of caving, it shall be filled with lean-mix concrete and a new hole bored as near as possible to the location shown on the Drawings. Payment will not be made for condemned foundations.

E55.5.4 Inspection of Bores

Concrete shall not be placed in a place in a bore until a bore has been inspected and approved by the Contract Administrator.

E55.5.5 Placing Reinforcing Steel

The supply and installation of reinforcing steel will be incidental to the Works of this Specification.

Reinforcement shall be:

- (viii) Place in accordance with the details shown on the Drawings.
- (ix) Rigidly fastened together, and
- (x) Lowered in the bore intact before concrete is placed.

E55.5.6 Placing Anchor Bolts

The supply and installation of anchor bolts will be incidental to the Works of this Specification.

The anchor bolts shall be aligned with a steel template supplied by the sign structure fabricator matching the bolt holes in the sign structure base plate. The setting templates shall be held in place by the top and bottom nuts of the anchor bolts, Extreme care shall be used in this operation.

Placement of anchor bolts without the steel template will not be permitted.

The threaded portion of the anchor bolts shall be coated with oil, before the concrete is poured, to minimize the fouling of threads splattered by concrete residue. The portion of anchor bolts projecting from the foundation shall be fully threaded.

E55.5.7. Installation of Conduits

The supply and installation of plastic conduits will be considered incidental to the Work of this Specification. The Contractor should include the cost of this Work in the construction of concrete foundation Works.

The number of plastic conduits to be installed in each base will be stipulated on the Drawings or as directed by the Contract Administrator, The conduits shall enter 600mm minimum below ground level and shall protrude the centre of the concrete base. All conduits so terminated

above ground shall be plugged by means of plastic plugs, which are to fit snugly in the end of the conduit.

E55.5.8 Forms

The top 600mm of the foundations shall be formed with tubular forms (Sonotube).

The forms shall be sufficiently rigid to prevent lateral or vertical distortions.

E55.5.9 Placing Concrete

Care shall be taken to ensure that anchor bolts are vertically aligned and that anchor bolts and conduits are properly positioned prior to placement of concrete

Concrete shall not have a free fall of more than 1.5m and shall be placed so that the aggregates will not separate or segregate. The slump of the concrete shall not exceed 110mm. The concrete shall be vibrated throughout the entire length of the foundation.

Concrete shall be placed to the elevations as shown on the Drawings. The top surface of the foundation shall be finished smooth and even with a hand float.

The shaft shall be free of water prior to placing concrete. Concrete shall not be placed in or through water unless authorized by Contract Administrator.

E55.5.10 Protection of Newly Placed Concrete

Newly laid concrete threatened with damage by rain, snow, fog, or mist shall be protected with tarpaulin or other approved means.

E55.5.11 Curing Concrete

The top of the freshly finished concrete foundations shall be covered and kept moist by means of wet polyester blankets immediately following finishing operations and shall be maintained at above 10°C for at least seven (7) consecutive days thereafter.

After the finishing is completed, the surface shall be promptly covered with a minimum of a single layer of clean, damp polyester blanket.

Concrete shall be protected from the harmful effects of sunshine, drying winds, surface dripping or running water, vibration and mechanical shock. Concrete shall be protected from freezing until at least twenty-four hours after the end of the curing period.

Changes in temperature of the concrete shall be uniform and gradual and shall not exceed 3°C in an hour or 20°C in twenty-four hours.

Immediately after stripping and patching, formed surfaces shall receive an application of the approved concrete cure and protection system in accordance with the manufacturer's instructions.

E55.5.12 Form Removal

Forms shall not be removed for a period of at least 24 hours after the concrete has been placed. Removal of forms shall be done in a manner to avoid damage to, or spalling of, the concrete.

The minimum strength of concrete in place for safe removal of forms shall be 20 Mpa.

Field-cured test specimens representative of the in-place concrete being stripped, will be tested to verify the concrete strength.

E55.5.13 Patching of Formed Surfaces

Immediately after forms around the top of foundation have been removed, but before any repairing or surface finishing is started, the concrete surface shall be inspected by the Contract Administrator. Any repair of surface finishing stated before this inspection may be rejected and required to be removed.

All formed concrete surfaces shall have bolts, ties, struts, and all other timber or metal parts not specifically required for construction purpose cut back fifty (50) mm from the surface before patching.

Minor surface defects caused by honeycomb, air pockets greater than 4mm in diameter, and voids left by strutting, and tie holes shall be repaired by removing the defective concrete to sound concrete, dampening the area to be patched and then applying patching mortar. A slurry grout consisting of water and cement, shall be well-brushed onto the area to be patched. When the slurry grout begins to lose the water sheen, the patching mortar shall be applied. It shall be struck-off slightly higher than the surface and left for one hour before final finishing to permit initial shrinkage of the patching mortar and it shall be touched up until it is satisfactory to the Contract Administrator. The patch shall be cured as specified in this Specification, and the final colour shall match the surrounding concrete.

E55.6 Method of Measurement

1. The construction of cast-in-place concrete light standard foundations will be measured on a unit basis. The number of foundations to be paid for shall be the total number of foundations will be measured on a unit basis. The number of foundations to be paid for shall be the total number of foundations constructed in accordance with this Specification and accepted by the Contract Administrator, as computed from measurements made by the Contract Administrator.

2. Cast in place concrete piles will be measured on a unit basis as follows:

1. Supply and Install Heritage Concrete Pile
2. Supply and Install Modified Heritage Concrete Pile
3. Supply and Install Diamond Lane Concrete Pile

E55.7 Basis of Payment

The construction of the cast in place concrete piles will be paid for at the Contract Unit Price per unit for the "CIP Concrete Heritage Pile", "CIP Concrete Modified Heritage Pile", "CIP Concrete Diamond Lane Overhead Sign Structure Pile" measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations described herein and all other items incidental to the Work included in this Specification.

E56. STRUCTURAL STEEL

E56.1 Description

This section specifies requirements for supply, fabrication and installation of structural steel.

The Work includes design, installation and removal of any bracing or other measures necessary to ensure stability of the steel frameWork during construction.

E56.2 Reference Standards

Steel Structures for Buildings - CSA-S16.1

Welded Steel Construction (Metal Arc Welding) - CSA-W59

Structural Quality Steels - CSA-G40.21

E56.3 Design

Design in accordance with Standards in Article 1.2.

Design all the temporary systems to maintain stability of the Work at all phases of construction.

Design of all members and connections not detailed on the drawings shall be carried out and stamped by a Professional Engineer registered in the Province of Manitoba.

E56.4 Submittals

Submit certificates for the material supplied as requested by the Engineer.

Submit erection diagram and shop details for review by the Engineer 10 days in advance of fabrication.

Complete shop fabrication and erection drawings shall be provided for all Work and items.

Provide separate layout plans and setting details for all bearing and attachment devices supplied under this section.

Shop drawings shall include details of all temporary bracing systems required for stability during construction and shall show the extent of prior Work that is required to be in place for the temporary bracing system.

Bracing and stability systems as shown on drawings are for stability of the completed structure and shall not be assumed as adequate for the various stages of construction.

Before the placing of material orders, the Contractor shall submit for review by the Engineer sketch drawings showing the general description of the proposed fabrication scheme. This shall include the general arrangement of plates or shapes, the location of all shop and field splices and such other information as may be required by the Engineer to permit an assessment of the acceptability of the proposal.

Shop drawings showing all details shall be prepared by the Contractor and submitted for review by the Engineer prior to fabrication.

Fabrication executed before review of the shop drawings shall be at the Contractor's own risk.

- (a) In addition to specific details, the shop drawings must include, the following items:
- (b) Drawings showing details of connections designed by the Contractor.
- (c) All dimensions shall be correct at 20°C unless otherwise shown.
- (d) Weld procedure identification shall be shown on the shop details.
- (e) All material splice locations shall be shown on the drawings.

The Contractor shall submit copies of erection diagrams to the Engineer three weeks in advance of the scheduled start of erection. The proposal shall include all drawings and documents necessary to describe the following:

- (f) Access to Work.
- (g) Sequence of Operation: Position of cranes, trucks with members and traffic accommodations.
- (h) Position of Cranes: Particularly relative to substructure elements such as abutment backwalls, with details of load distribution of wheels and outriggers.
- (i) Lifting Devices and Lifting Points: Devices shall grip girders near web/flange joints, not at outside edges of flange.
- (j) All shop drawings details and erection drawings shall be signed and sealed by a Professional Engineer registered in the Province of Manitoba. Drawings not sealed will be rejected unchecked.

E56.5 Structural Steel Products

Unless noted otherwise, steel to conform to the following.

Steel Sections and Plate: to CSA-G40.21-350W.

Hollow Structural Sections: to CSA-G40.21-350W.

E56.5.1 Bolts

Bolts, nuts and washers: to ASTM-A325.

Anchor bolts, nuts and washers: to ASTM-A325.

E56.5.2 Welding

All welding material to CSA-W59.

E56.5.3 Primer

Shop paint primer to CGSB-1-GP-140 Red Lead, Iron Oxide, Oil Alkyd Type, unless otherwise specified.

E56.5.4 Hot Dip Galvanizing

To CSA-G164.

E56.6 Execution

E56.6.1 Inspection

Notify the Engineer in advance as required to allow inspection of fabrication (including welding) and erection.

Provide access to allow inspection of fit, welding, bolting and other aspects of the Work.

E56.6.2 Surface Preparation, Priming and Painting

Blastcleaning: Unless otherwise noted, all steel components shall be sandblast cleaned after fabrication in accordance with the Steel Structures Painting Council Standard (SSPC) No. SP6. Essentially this is a surface from which all oil, grease, dirt, rust, scale and foreign matter have been completely removed except for slight shadows, streaks, or discolorations caused by rust stain or mill scale oxide binder.

Any damage on galvanized metal shall be given one coat of touch-up coating for galvanized metal.

Shop Primer: Unless otherwise noted, all steel surfaces shall receive one shop coat of primer. Splice areas and areas in contact with concrete shall be blastcleaned but not painted and shall be kept free from overspray.

Application Conditions: Application of primer or paint must be at temperature of not less than 5°C for a period of not less than 12 hours to dry the paint. During primer application and curing, all necessary means shall be provided to assure that the members are protected against the effects of the weather. Primer shall not be applied upon damp or frosted surfaces.

Thickness: Unless otherwise specified, one coat of shop primer shall be applied and shall be 0.040 mm to 0.065 mm thick when dry.

E56.6.3 Fabrication

Take field measurements as necessary to ensure that items fabricated in the shop will fit the structure.

Reinforce hanger holes or openings for pipes or ducts with steel plates sized and welded in place to restore member to original design strength.

Provide holes for attachment of other Work only after obtaining Engineer's approval.

E56.6.4 Welding

Fabrication Shop Qualifications: The Contractor shall be fully approved by the Canadian Welding Bureau (CWB) as per CSA-W47.1. Welding procedures shall be submitted for each type of weld used in the structure. The procedures shall bear the approval of the Canadian Welding bureau and must also be approved by the Engineer prior to use on the structure.

Welder Qualifications: Only welders, welding operators and tackers approved by the Canadian Welding Bureau in the particular category may be permitted to perform weldments. Their qualifications must be current and be available for examination by the Engineer.

Welding Code: Except as otherwise noted on the drawings, all welding, cutting and preparation shall be in accordance with the CSA-W59.

Cleaning: All weld areas must be clean and free of mill scale, dirt, grease, paint, etc., prior to welding.

Preheat material and enclose heated enclosures as required for all field welding or cutting to maintain the steel at temperatures above 10°C.

Filler Metals: Low hydrogen filler, fluxes and low hydrogen welding practices are to be used throughout. The low hydrogen covering and flux shall be protected and stored as specified by CSA-W59.

Automatic Welding Process: All flanges and web butt joints and all stiffener to web fillet welds shall be made by an approved semi or fully automatic submerged arc process. All webs to flange fillet welds shall be made by an approved fully automatic submerged process. These weld areas must be clean, free of mill scale, dirt, grease, etc., and be preheated as required, just prior to welding.

Tack and Temporary Welds: Tack and temporary welds are not allowed unless they are to be incorporated in the final weld.

Methods of Weld Repair: Repair procedures for unsatisfactory welds must be submitted for approval by the Engineer prior to Work commencing.

Arch Strikes: Arch strikes shall not be permitted. In the event of accidental arc strikes, the Contractor shall submit to the Engineer for approval his/her proposed repair procedure. The repair procedure shall include the complete grinding out of the crater produced by the arc strike. These areas shall be examined by the Engineer to ensure complete removal of the metal in the affected area.

E56.6.4.1 Grinding of Welds

Web members to chord members shall be ground flush in all locations exposed to view. All other welds ground to CSA-W59.

E56.6.5 Material Splices

Additional splices, other than those shown on the details, will require approval of the Engineer. The Contractor shall bear the cost of inspection of these splices.

E56.6.6 Handling and Storage

All lifting and handling shall be done using devices that do not mark damage, or distort the assemblies or members in any way. Girders shall be stored upright, supported on sufficient skids and safely shored to maintain the proper section without buckling, twisting or in any damage or misalign the material.

E56.6.7 Approval of Erection Scheme

Before starting the Work of erection, the Contractor shall inform the Engineer fully in writing as to the method of erection he/she proposes to follow and the amount and character of equipment he/she proposes to use which shall be subject to the approval of the Engineer. The Engineer's approval shall not be considered as relieving the Contractor of the responsibility for the safety of his/her methods or equipment, nor from carrying out the Work in full accordance with the plans and specifications. No Work shall be done until such approval by the Engineer has been obtained.

Erect to CSA-S16.1.

Touch up prime painting for complete coverage including all field connections.

Provide details of grouting procedures including design mix and aggregate gradation of grout, or specifications for other materials, proposed for setting anchor bolts and/or constructing grout pads. Non-metallic non-shrink grout shall be used.

Carry out field measurements of the constructed substructure.

E57. REMOVE EXISTING ASPHALT ON NEW CONCRETE

E57.1 The Contractor shall be responsible for removing the existing asphalt pavement, existing granular material and geotextile cloth covering the pavement at the following location, the two southbound high lanes high lanes from Sta 7 +10 to Sta 8 + 20 as directed by the Contract Administrator.

E58. CONSTRUCTION OF 250MM CONCRETE PAVEMENT FOR CROSSWALKS

- E58.1 Further to CW 3310-R8, the Contractor shall be responsible for the installation of 250mm Concrete Pavement – Early Opening, 72 Hour, (Plain Dowelled) for the block outs at the various cross walk locations. This work shall be in accordance with Detail 23L1 – City Drawing Number P-3247-24.