



THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 409-2012

ST. JAMES CENTENNIAL POOL PARKING LOT EXPANSION

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 ST. JAMES CENTENNIAL POOL PARKING LOT EXPANSION

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 4:00 pm Winnipeg time, June 15, 2012.

B2.2 Bids determined by the Manager of Materials to have been received later than the Submission Deadline will not be accepted and will be returned upon request.

B2.3 The Contract Administrator or the Manager of Materials may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. SITE INVESTIGATION

B3.1 The Bidder may view the Site without making an appointment.

B4. ENQUIRIES

B4.1 All enquiries shall be directed to the Contract Administrator identified in D3.1.

B4.2 If the Bidder finds errors, discrepancies or omissions in the Bid Opportunity, or is unsure of the meaning or intent of any provision therein, the Bidder shall notify the Contract Administrator of the error, discrepancy or omission, or request a clarification as to the meaning or intent of the provision at least five (5) Business Days prior to the Submission Deadline.

B4.3 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator to all Bidders by issuing an addendum.

B4.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator only to the Bidder who made the enquiry.

B4.5 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B4 unless that response or interpretation is provided by the Contract Administrator in writing.

B5. ADDENDA

B5.1 The Contract Administrator may, at any time prior to the Submission Deadline, issue addenda correcting errors, discrepancies or omissions in the Bid Opportunity, or clarifying the meaning or intent of any provision therein.

B5.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.

B5.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/>

B5.2.2 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the Materials Management Division website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.

B5.2.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 8 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B6. SUBSTITUTES

- B6.1 The Work is based on the Plant, Materials and methods specified in the Bid Opportunity.
- B6.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.
- B6.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least five (5) Business Days prior to the Submission Deadline.
- B6.4 The Bidder shall ensure that any and all requests for approval of a substitute:
- (a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the Plant, Material or method as either an approved equal or alternative;
 - (b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;
 - (c) identify any anticipated cost or time savings that may be associated with the substitute;
 - (d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance;
 - (e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance.
- B6.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his/her sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.
- B6.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, only to the Bidder who requested approval of the substitute.
- B6.6.1 The Bidder requesting and obtaining the approval of a substitute shall be entirely responsible for disseminating information regarding the approval to any person or persons he/she wishes to inform.
- B6.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.
- B6.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his/her Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B14.
- B6.9 No later claim by the Contractor for an addition to the Total Bid Price because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.
- B6.10 Notwithstanding B6.2 to B6.9, and in accordance with B7.7, deviations inconsistent with the Bid Opportunity document shall be evaluated in accordance with B14.1(a).

B7. BID COMPONENTS

B7.1 The Bid shall consist of the following components:

- (a) Form A: Bid;
- (b) Form B: Prices;

B7.2 Further to B7.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B6.

B7.3 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely, to constitute a responsive Bid.

B7.4 The Bid Submission may be submitted by mail, courier or personal delivery, or by facsimile transmission.

B7.5 If the Bid Submission is submitted by mail, courier or personal delivery, it shall be enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address, and shall be submitted to:

The City of Winnipeg
Corporate Finance Department
Materials Management Division
185 King Street, Main Floor
Winnipeg, MB R3B 1J1

B7.5.1 Samples or other components of the Bid Submission which cannot reasonably be enclosed in the envelope may be packaged separately, but shall be clearly marked with the Bid Opportunity number, the Bidder's name and address, and an indication that the contents are part of the Bidder's Bid Submission.

B7.6 Bidders are advised not to include any information/literature except as requested in accordance with B7.1.

B7.7 Bidders are advised that inclusion of terms and conditions inconsistent with the Bid Opportunity document, including the General Conditions, will be evaluated in accordance with B14.1(a).

B7.8 If the Bid Submission is submitted by facsimile transmission, it shall be submitted to 204 949-1178.

B7.8.1 The Bidder is advised that the City cannot take responsibility for the availability of the facsimile machine at any time.

B7.8.2 Bids submitted by internet electronic mail (e-mail) will not be accepted.

B8. BID

B8.1 The Bidder shall complete Form A: Bid, making all required entries.

B8.2 Paragraph 2 of Form A: Bid shall be completed in accordance with the following requirements:

- (a) if the Bidder is a sole proprietor carrying on business in his/her own name, his/her name shall be inserted;
- (b) if the Bidder is a partnership, the full name of the partnership shall be inserted;
- (c) if the Bidder is a corporation, the full name of the corporation shall be inserted;
- (d) if the Bidder is carrying on business under a name other than his/her own, the business name and the name of every partner or corporation who is The City of such business name shall be inserted.

B8.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B8.2.

- B8.3 In Paragraph 3 of Form A: Bid, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.
- B8.4 Paragraph 10 of Form A: Bid shall be signed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his/her own name, it shall be signed by the Bidder;
 - (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
 - (c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers;
 - (d) if the Bidder is carrying on business under a name other than his/her own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if The City is a partnership or a corporation.
- B8.4.1 The name and official capacity of all individuals signing Form A: Bid should be printed below such signatures.
- B8.4.2 All signatures shall be original.
- B8.5 If a Bid is submitted jointly by two or more persons, the word "Bidder" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Bidders in the Bid and the Contract, when awarded, shall be both joint and several.

B9. PRICES

- B9.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.
- B9.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.
- B9.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.
- B9.4 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

B10. QUALIFICATION

- B10.1 The Bidder shall:
- (a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba; and
 - (b) be financially capable of carrying out the terms of the Contract; and
 - (c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract.
- B10.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:
- (a) be responsible and not be suspended, debarred or in default of any obligations to the City. A list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/debar.stm>
- B10.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

- (a) have successfully carried out work similar in nature, scope and value to the Work; and
 - (b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and
- have a written workplace safety and health program if required pursuant to The Workplace Safety and Health Act (Manitoba);

B10.4 Further to 0, the Bidder shall, within five (5) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator that the Bidder/Subcontractors has a workplace safety and health program meeting the requirements of The Workplace Safety and Health Act (Manitoba), by providing:

- (a) a valid COR certification number under the Certificate of Recognition (COR) Program administered by the Manitoba Construction Safety Association or by the Manitoba Heavy Construction Association's Safety, Health and Environment Program; or
- (b) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/> .

B10.5 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.

B10.6 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B11. OPENING OF BIDS AND RELEASE OF INFORMATION

B11.1 Bids will not be opened publicly.

B11.2 Following the submission deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/bidopp.asp>

B11.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/>

B11.4 The Bidder is advised that any information contained in any Bid may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

B12. IRREVOCABLE BID

B12.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 9 of Form A: Bid.

B12.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work for the time period specified in Paragraph 9 of Form A: Bid.

B13. WITHDRAWAL OF BIDS

B13.1 A Bidder may withdraw his/her Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.

- B13.1.1 Notwithstanding C23.3, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.
- B13.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 10 of Form A: Bid, and only such person, has authority to give notice of withdrawal.
- B13.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:
- (a) retain the Bid until after the Submission Deadline has elapsed;
 - (b) open the Bid to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 10 of Form A: Bid; and
 - (c) if the notice has been given by any one of the persons specified in B13.1.3(b), declare the Bid withdrawn.
- B13.2 A Bidder who withdraws his/her Bid after the Submission Deadline but before his/her Bid has been released or has lapsed as provided for in B12.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law.

B14. EVALUATION OF BIDS

- B14.1 Award of the Contract shall be based on the following bid evaluation criteria:
- (a) compliance by the Bidder with the requirements of the Bid Opportunity or acceptable deviation there from (pass/fail);
 - (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B10 (pass/fail);
 - (c) Total Bid Price;
 - (d) economic analysis of any approved alternative pursuant to B6.
- B14.2 Further to B14.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities, if the interests of the City so require.
- B14.3 Further to B14.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is responsible and qualified.
- B14.4 Further to B14.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.
- B14.4.1 If there is any discrepancy between the Total Bid Price written in figures, the Total Bid Price written in words and the sum of the quantities multiplied by the unit prices for each item, the sum of the quantities multiplied by the unit prices for each item shall take precedence.
- B14.4.2 Further to B14.1(a), in the event that a unit price is not provided on Form B: Prices, the City will determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.

B15. AWARD OF CONTRACT

- B15.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

- B15.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.
- B15.2.1 Without limiting the generality of B15.2, the City will have no obligation to award a Contract where:
- (a) the prices exceed the available City funds for the Work;
 - (b) the prices are materially in excess of the prices received for similar work in the past;
 - (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;
 - (d) only one Bid is received; or
 - (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.
- B15.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B14.
- B15.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.
- B15.4 Notwithstanding C4, the City will issue a Purchase Order to the successful Bidder in lieu of the execution of a Contract.
- B15.5 The Contract, as defined in C1.1, in its entirety shall be deemed to be incorporated in and to form a part of the Purchase Order notwithstanding that it is not necessarily attached to or accompany said Purchase Order.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

- C0.1 The *General Conditions for Construction* (Revision 2006 12 15) are applicable to the Work of the Contract.
- C0.1.1 The *General Conditions for Construction* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm
- C0.2 A reference in the Bid Opportunity to a section, clause or subclause with the prefix “**C**” designates a section, clause or subclause in the *General Conditions for Construction*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

D1.1 In addition to the *General Conditions for Construction*, these Supplemental Conditions are applicable to the Work of the Contract.

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of the expansion of an existing parking lot at the St. James Centennial Pool.

D2.2 The major components of the Work are as follows:

- (a) Demolition of existing trees, pavement, concrete curb, sidewalk, unit pavers, and clearing and grubbing;
- (b) Supply and installation of light fixtures, concrete bases and electrical;
- (c) Supply and installation of catch basin and sewer line;
- (d) Installation of concrete curb, concrete retaining wall, concrete stairs with railing, concrete box culvert, and asphalt paving with line painting;
- (e) Supply and installation of chain link fencing;
- (f) Supply and Installation of planting beds, and plant material;
- (g) Landscape maintenance.

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is Hilderman Thomas Frank Cram, represented by:

James Hudson
Project Manager
500-115 Bannatyne Avenue East
Winnipeg, MB R3B 0R3
Telephone No. 204 944-9907
Facsimile No. 204 957-1467

D3.2 At the pre-construction meeting, James Hudson will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D4. CONTRACTOR'S SUPERVISOR

D4.1 At the pre-construction meeting, the Contractor shall identify his/her designated supervisor and any additional personnel representing the Contractor and their respective roles and responsibilities for the Work.

D5. NOTICES

D5.1 Except as provided for in C23.2.2, all notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the Contractor shall be sent to the address or facsimile number identified by the Contractor in Paragraph 2 of Form A: Bid.

D5.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D5.3,

D5.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the facsimile number identified in D3.1.

D5.3 Notwithstanding C21., all notices of appeal to the Chief Administrative Officer shall be sent to the attention of the Chief Financial Officer at the following facsimile number:

The City of Winnipeg
Chief Financial Officer

Facsimile No.: 204 949-1174

D5.4 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following facsimile number:

The City of Winnipeg
Legal Services Department
Attn: Director of Legal Services

Facsimile No.: 204 947-9155

SUBMISSIONS

D6. AUTHORITY TO CARRY ON BUSINESS

D6.1 The Contractor shall be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Contractor does not carry on business in Manitoba, in the jurisdiction where the Contractor does carry on business, throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

D7. SAFE WORK PLAN

D7.1 The Contractor shall provide the Contract Administrator with a Safe Work Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.

D7.2 The Safe Work Plan should be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/Safety/default.stm>

D8. INSURANCE

D8.1 The Contractor shall provide and maintain the following insurance coverage:

- (a) commercial general liability insurance, in the amount of at least two million dollars (\$2,000,000.00) inclusive, with The City of Winnipeg added as an additional insured, with a cross-liability clause, such liability policy to also contain contractual liability, unlicensed motor vehicle liability, non-owned automobile liability and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period;
- (b) if applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The Limit of Liability shall not be less than \$2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence;
- (c) all risks installation floater, carrying adequate limits to cover all machinery, equipment, supplies and/or materials intended to enter into and form part of any installation.

- D8.2 Deductibles shall be borne by the Contractor.
- D8.3 The Contractor shall provide the Contract Administrator with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work but in no event later than seven (7) Calendar Days from notification of the award of Contract by Purchase Order.
- D8.4 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the Contract Administrator.

D9. PERFORMANCE SECURITY

- D9.1 If the Contract Price exceeds twenty-five thousand dollars (\$25,000.00), the Contractor shall provide and maintain performance security until the expiration of the warranty period in the form of:
- (a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of fifty percent (50%) of the Contract Price; or
 - (b) an irrevocable standby letter of credit issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form attached to these Supplemental Conditions (Form H2: Irrevocable Standby Letter of Credit), in the amount of fifty percent (50%) of the Contract Price; or
 - (c) a certified cheque or draft payable to "The City of Winnipeg", drawn on a bank or other financial institution registered to conduct business in Manitoba, in the amount of fifty percent (50%) of the Contract Price.
- D9.1.1 Where the performance security is in the form of a certified cheque or draft, it will be deposited by the City. The City will not pay any interest on certified cheques or drafts furnished as performance security.
- D9.2 The Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of Purchase Order and prior to the commencement of any Work on the Site.

D10. SUBCONTRACTOR LIST

- D10.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than seven (7) Calendar Days from notification of the award of Contract.

SCHEDULE OF WORK

D11. COMMENCEMENT

- D11.1 The Contractor shall not commence any Work until he/she is in receipt of a Purchase Order from the Award Authority authorizing the commencement of the Work.
- D11.2 The Contractor shall not commence any Work on the Site until:
- (a) the Contract Administrator has confirmed receipt and approval of:
 - (i) evidence of authority to carry on business specified in D6;
 - (ii) evidence of the workers compensation coverage specified in C6.15;
 - (iii) the Safe Work Plan specified in D7;
 - (iv) evidence of the insurance specified in D8;
 - (v) the performance security specified in D9; and
 - (vi) the Subcontractor list specified in D10.

- (b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.

D11.3 The Contractor shall not commence the work on the Site before August 6, 2012.

D12. WORK BY OTHERS

D12.1 Work by others on or near the Site will include but not necessarily be limited to the following:

- (a) Contractor engaged by the City of Winnipeg constructing the Spray Pad at the St. James Centennial Pool.
- (b) Contractor engaged by the City of Winnipeg to adjust the location of the fiber optic cable.

D13. SUBSTANTIAL PERFORMANCE

D13.1 The Contractor shall achieve Substantial Performance within forty-five (45) consecutive Working Days of the commencement of the Work as specified in D11.

D13.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

D13.3 The date on which the Work has been certified by the Contract Administrator as being substantially performed to the requirements of the Contract through the issue of a certificate of Substantial Performance is the date on which Substantial Performance has been achieved.

D14. TOTAL PERFORMANCE

D14.1 The Contractor shall achieve Total Performance within sixty (60) consecutive Working Days of the commencement of the Work as specified in D11.

D14.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

D14.3 The date on which the Work has been certified by the Contract Administrator as being totally performed to the requirements of the Contract through the issue of a certificate of Total Performance is the date on which Total Performance has been achieved.

D15. LIQUIDATED DAMAGES

D15.1 If the Contractor fails to achieve Substantial Performance in accordance with the Contract by the day fixed herein for Substantial Performance, the Contractor shall pay the City one thousand dollars \$1000 per Working Day for each and every Working Day following the day fixed herein for Substantial Performance during which such failure continues.

D15.2 The amount specified for liquidated damages in D15.1 is based on a genuine pre-estimate of the City's damages in the event that the Contractor does not achieve Substantial Performance by the day fixed herein for same.

D15.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D16. SCHEDULED MAINTENANCE

D16.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

(a) Maintenance of trees as specified in E30 – Landscape Maintenance.

D16.2 Determination of Substantial Performance and Total Performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such period of time as it takes the Contractor to complete the scheduled maintenance.

CONTROL OF WORK

D17. JOB MEETINGS

D17.1 Regular bi-weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.

D17.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

D18. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D18.1 Further to C6.24, the Contractor shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

MEASUREMENT AND PAYMENT

D19. INVOICES

D19.1 Further to C12, the Contractor shall submit an invoice for each portion of Work performed. to:

The City of Winnipeg
Corporate Finance - Accounts Payable
4th Floor, Administration Building, 510 Main Street
Winnipeg MB R3B 1B9

Facsimile No.: 204-949-0864
Email: CityWpgAP@winnipeg.ca

D19.2 Invoices must clearly indicate, as a minimum:

- (a) the City's purchase order number;
- (b) date of delivery;
- (c) delivery address;
- (d) type and quantity of work performed;
- (e) the amount payable with GST and MRST shown as separate amounts; and
- (f) the Contractor's GST registration number.

D19.3 The City will bear no responsibility for delays in approval of invoices which are improperly submitted.

D19.4 Bids Submissions must be submitted to the address in B7.5.

D20. PAYMENT

D20.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

D21. WARRANTY

D21.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire two (2) years thereafter unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.

D21.2 Notwithstanding C13.2 or D21.1, the Contract Administrator may permit the warranty period for a portion or portions of the Work to begin prior to the date of Total Performance if:

- (a) a portion of the Work cannot be completed because of unseasonable weather or other conditions reasonably beyond the control of the Contractor but that portion does not prevent the balance of the Work from being put to its intended use.

D21.2.1 In such case, the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C13.2 for the warranty period to begin.

FORM H1: PERFORMANCE BOND
(See D9)

KNOW ALL MEN BY THESE PRESENTS THAT

_____ ,
(hereinafter called the "Principal"), and

_____ ,
(hereinafter called the "Surety"), are held and firmly bound unto **THE CITY OF WINNIPEG** (hereinafter called the "Obligee"), in the sum of

_____ dollars (\$_____)

of lawful money of Canada to be paid to the Obligee, or its successors or assigns, for the payment of which sum the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Principal has entered into a written contract with the Obligee for

BID OPPORTUNITY NO. 409-2012

ST JAMES CENTENNIAL POOL PARKING LOT EXPANSION

which is by reference made part hereof and is hereinafter referred to as the "Contract".

NOW THEREFORE the condition of the above obligation is such that if the Principal shall:

- (a) carry out and perform the Contract and every part thereof in the manner and within the times set forth in the Contract and in accordance with the terms and conditions specified in the Contract;
- (b) perform the Work in a good, proper, workmanlike manner;
- (c) make all the payments whether to the Obligee or to others as therein provided;
- (d) in every other respect comply with the conditions and perform the covenants contained in the Contract; and
- (e) indemnify and save harmless the Obligee against and from all loss, costs, damages, claims, and demands of every description as set forth in the Contract, and from all penalties, assessments, claims, actions for loss, damages or compensation whether arising under "The Workers Compensation Act", or any other Act or otherwise arising out of or in any way connected with the performance or non-performance of the Contract or any part thereof during the term of the Contract and the warranty period provided for therein;

THEN THIS OBLIGATION SHALL BE VOID, but otherwise shall remain in full force and effect. The Surety shall not, however, be liable for a greater sum than the sum specified above.

AND IT IS HEREBY DECLARED AND AGREED that the Surety shall be liable as Principal, and that nothing of any kind or matter whatsoever that will not discharge the Principal shall operate as a discharge or release of liability of the Surety, any law or usage relating to the liability of Sureties to the contrary notwithstanding.

IN WITNESS WHEREOF the Principal and Surety have signed and sealed this bond the

_____ day of _____, 20____ .

SIGNED AND SEALED
in the presence of:

(Witness as to Principal if no seal)

(Name of Principal)

Per: _____ (Seal)

Per: _____

(Name of Surety)

By: _____ (Seal)
(Attorney-in-Fact)

**FORM H2: IRREVOCABLE STANDBY LETTER OF CREDIT
(PERFORMANCE SECURITY)
(See D9)**

(Date)

The City of Winnipeg
Legal Services Department
185 King Street, 3rd Floor
Winnipeg MB R3B 1J1

RE: PERFORMANCE SECURITY - BID OPPORTUNITY NO. 409-2012

ST. JAMES CENTENNIAL POOL PARKING LOT EXPANSION

Pursuant to the request of and for the account of our customer,

(Name of Contractor)

(Address of Contractor)

WE HEREBY ESTABLISH in your favour our irrevocable Standby Letter of Credit for a sum not exceeding
in the aggregate

_____ Canadian dollars.

This Standby Letter of Credit may be drawn on by you at any time and from time to time upon written demand for payment made upon us by you. It is understood that we are obligated under this Standby Letter of Credit for the payment of monies only and we hereby agree that we shall honour your demand for payment without inquiring whether you have a right as between yourself and our customer to make such demand and without recognizing any claim of our customer or objection by the customer to payment by us.

The amount of this Standby Letter of Credit may be reduced from time to time only by amounts drawn upon it by you or by formal notice in writing given to us by you if you desire such reduction or are willing that it be made.

Partial drawings are permitted.

We engage with you that all demands for payment made within the terms and currency of this Standby Letter of Credit will be duly honoured if presented to us at:

(Address)

and we confirm and hereby undertake to ensure that all demands for payment will be duly honoured by us.

All demands for payment shall specifically state that they are drawn under this Standby Letter of Credit.

Subject to the condition hereinafter set forth, this Standby Letter of Credit will expire on

(Date)

It is a condition of this Standby Letter of Credit that it shall be deemed to be automatically extended from year to year without amendment from the present or any future expiry date, unless at least 30 days prior to the present or any future expiry date, we notify you in writing that we elect not to consider this Standby Letter of Credit to be renewable for any additional period.

This Standby Letter of Credit may not be revoked or amended without your prior written approval.

This credit is subject to the Uniform Customs and Practice for Documentary Credit (1993 Revision), International Chamber of Commerce Publication Number 500.

(Name of bank or financial institution)

Per: _____
(Authorized Signing Officer)

Per: _____
(Authorized Signing Officer)

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

- E1.1 These Specifications shall apply to the Work.
- E1.2 *The City of Winnipeg Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.
- E1.2.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/Spec/Default.stm>
- E1.2.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.
- E1.2.3 Further to C2.4(d), Specifications included in the Bid Opportunity shall govern over *The City of Winnipeg Standard Construction Specifications*.
- E1.3 The following Drawings are applicable to the Work:

<u>Drawing No.</u>	<u>Drawing Name/Title</u>
	Cover Sheet
L-1.1	Demolition Plan
L-1.2	Layout Plan
L-1.3	Materials & Planting Plan
L-1.4	Grading Plan
L-2.0	Parking Lot Fence – Demolition, Layout & Planting Plan
L-3.0	Details
M-1	Parking Lot Grading With Runoff Calculations
E-1	Site Plan - Electrical

E2. LOCATION OF WORK

- E2.1 Work is located at 644 Parkdale Street at an existing parking lot directly south of the St. James Centennial Pool.

E3. LAYOUT OF WORK

- E3.1 Further to CW 1130, paragraph 3.15 – Stakes and Marks, the Contractor shall set all necessary control lines, benchmarks, survey elevation stakes and layout in consultation with the Contract Administrator as required.

E4. PEDESTRIAN AND TRAFFIC CONTROL

- E4.1 General Description
- E4.1.1 This Specification shall supplement Specification CW 1130 and shall cover the supply, installation, maintenance, and removal of temporary traffic and pedestrian control.
- E4.1.2 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 things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.
- E4.2 Materials
- E4.2.1 General

- .1 All barricades, signs, flashers, and other equipment shall be in accordance with the "Manual of Temporary Control in Work Areas on City Streets."

E4.2.2 Snow Fence

- .1 Plastic netting, UV stabilized, high density polyethylene, international orange colour, 1.22 m height, complete with steel stakes to suit size.

E4.3 Construction Methods

E4.3.1 General

- .1 Traffic control shall be provided and staged in accordance with the "Manual of Temporary Traffic control and Work Areas on City Streets" and this Specification. No more than two (2) blocks are to be under construction at one time, unless otherwise approved by the Contract Administrator.
- .2 The Contractor shall maintain safe pedestrian access to buildings within the area under construction at all times.
- .3 The Contractor will be responsible for the placement of all required signing and barricades, for traffic control in the construction area.

E4.3.2 Snow Fencing

- .1 Erect snow fencing surrounding the areas under construction and any excavations deeper than 500 mm.
- .2 Snow fencing shall be placed so as to present no hazard to vehicles or pedestrians and shall be kept securely fastened and neat in appearance at all times.

E4.3.3 Temporary Ramps

- .1 Where any aspect of the Work impedes access to buildings, temporary plywood or asphalt ramps shall be erected and the Work shall be staged in such a manner that access is maintained. Notify the affected building owner of the estimated duration of temporary ramping prior to commencing this Work.

E4.4 Quality Control

E4.4.1 All workmanship and all materials furnished 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 acceptance of the 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. The Contractor shall maintain all traffic control as specified herein.

E4.4.2 If, in the opinion of the Contract Administrator, the traffic control is not in accordance with this Specification, the Work in the affected area shall be stopped and shall not resume until such time as the traffic control deficiencies are corrected to the satisfaction of the Contract Administrator. No contract time extensions will be granted as a result of lost time due to work stoppages because of inadequate traffic control by Contractor.

E4.5 Measurement and Payment

E4.6 The supply, erection and maintenance of all pedestrian and traffic control, including ramps, snow fencing, and signs, shall be included in the cost of the Work. No measurement or payment will be made for this Work.

E5. VERIFICATION OF WEIGHT

E5.1 All material which is paid for on a weight basis shall be weighed on a scale certified by Consumer and Corporate Affairs, Canada.

- E5.2 All weight tickets shall have the gross weight and the time and date of weighting printed by an approved electro/mechanical printer coupled to the scale.
- E5.3 The tare weight and net weight may either be hand written or machine printed. All weights, scales and procedures shall be subject to inspection and verification by the Contract Administrator. Such inspection and verification may include, but shall not be limited to:
- (a) Checking contractors scales for Consumer & Corporate Affairs certification seals;
 - (b) Observing weighing procedures;
 - (c) Random checking of either gross or tare weights by having such trucks or truck/trailer(s) combinations as the Contract Administrator shall select weighted at the nearest available certified scale;
 - (d) Checking tare weights shown on delivery tickets against a current tare.
- E5.4 The contractor shall ensure that each truck or truck/trailer(s) combination delivering material which is paid for on a weight basis carries a tare not more than on (1) month old.
- E5.5 The tare shall obtain by weighing the truck/trailer(s) combination on a certified scale as shown:
- (a) Upon which scale the truck or truck/trailer(s) combination was weighted;
 - (b) The mechanically printed tare weight;
 - (c) The license number(s) of the truck trailer(s);
 - (d) The time and date of weighing.

E6. TRUCK WEIGHT LIMITS

- E6.1 The City shall not pay for any portion of material which results in the vehicle exceeding the maximum gross vehicle weight allowed under *The City of Winnipeg Traffic By-Law*, unless such vehicle is operating under special permit.

E7. SITEWORK DEMOLITION AND REMOVALS

E7.1 General Description

- E7.1.1 This Specification shall supplement CW 3010, CW 3110, and CW 3235 and shall cover the requirements for demolition, salvage, removal and disposal wholly or in part of various items designated to be removed or partially removed and for backfilling resulting trenches, holes and pits.

- E7.1.2 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 things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E7.2 Equipment

- E7.2.1 All equipment shall be of a type approved by the Contract Administrator and shall be kept in good working order.

- E7.2.2 The size, weight, and destructive capabilities of the equipment shall be matched to the type of removal to be done.

E7.3 Construction Methods

E7.3.1 Scope of Work

- .1 The Work under this Specification shall include the following items as shown within the limit of Work on the Drawings or otherwise directed by the Contract Administrator:
- (a) Removal and disposal of trees;
 - (b) Removal and disposal of bollards and chain;

- (c) Removal and disposal of chain (bollards to remain);
- (d) Removal of existing pavement and concrete curb, base to remain;
- (e) Removal of existing pavement, concrete curb, and base;
- (f) Removal of existing sidewalk, base to remain;
- (g) Removal of existing unit pavers, base to remain;
- (h) Clearing and grubbing.

E7.3.2 Fees and Permits

- .1 The Contractor shall obtain and pay for all licenses and permits necessary for the demolition work.
- .2 The Contractor shall comply with all Municipal, Provincial, and Federal Government regulations relating to the demolition of structures.

E7.3.3 Safety Precautions

- .1 The Contractor shall provide flagmen, barricades, railings, and whenever necessary, warning signs at excavation holes, plywood access ramps and /or other construction necessary to secure the safety of workers, the public, and personnel alike and shall comply with all Provincial Statutes applicable to the Work of this nature. The Contractor shall provide all other protective measures as may be required by any law in force in Manitoba.

E7.3.4 Protection of Existing Structures

- .1 Protect existing items designated to remain. In event of damage to such items, immediately replace or make repairs to approval of the City and at no cost to the City.

E7.3.5 Preparation of Site

- .1 Inspect Site and verify with Contract Administrator items designated for removal, disposal, and items to remain.
- .2 Locate and protect all utility lines. Preserve in operating condition active utilities traversing Site.
- .3 **Notify utility companies before starting demolition. Utilities to provide clearance before any excavation is done.**
- .4 **Notify Geomatics Service Branch at 986-4826 to obtain clearance and mark survey infrastructure minimum of 72 hours before any excavation.**

E7.3.6 Removals

- .1 Remove items as indicated on the Drawings and as directed by the Contract Administrator. Do not disturb adjacent items designated to remain in place.
- .2 Remove sidewalk pavement in accordance with CW 3235. In removal of pavements:
 - (a) sidewalk designated for replacement shall be removed to the nearest control or construction joint;
 - (b) square up adjacent surface to remain in place by saw-cutting or other method approved by Contract Administrator;
 - (c) protect adjacent joints and load transfer devices; and
 - (d) protect underlying granular materials.
- .3 Removal of Bollards: Install compacted fill in holes.

E7.3.7 Disposal of Materials

- .1 The Contractor shall promptly dispose of materials not designated for salvage or re-use in Work, off-site.
- .2 Trim disposal areas to approval of Contract Administrator.

E7.3.8 Backfill

- .1 Backfill in areas as indicated in accordance with Excavation Bedding and Backfill - CW 2030.

E7.3.9 Restoration
.1 Restore areas and existing works outside areas of demolition to match condition of adjacent undisturbed areas.

E7.3.10 Site Clean-Up
.1 Upon completion of Work, remove debris, trim surfaces and leave Work Site clean.

E7.4 Measurement and Payment

E7.4.1 The removal and disposal of trees shall be paid on a lump sum basis. Price shall be payment in full for supplying materials and for performing the Work.

E7.4.2 The removal and disposal of existing bollards and chain and the restoration of subgrade in holes shall be paid for on a lump sum basis. No measurement will be made for this Work. Price shall be payment in full for supplying materials and for performing the Work.

E7.4.3 The removal and disposal of existing chain (bollards to remain) shall be paid for on a lump sum basis. No measurement will be made for this Work. Price shall be payment in full for supplying materials and for performing the Work.

E7.4.4 The removal and disposal of existing roadway pavement and concrete curb, base to remain, shall be measured on a square metre basis. Price shall be payment in full for supplying materials and for performing the Work.

E7.4.5 The removal and disposal of existing roadway pavement, concrete curb and base shall be measured on a square metre basis. Price shall be payment in full for supplying materials and for performing the Work.

E7.4.6 The removal and disposal of existing concrete sidewalk, base to remain, shall be measured on a square metre basis. Price shall be payment in full for supplying materials and for performing the Work.

E7.4.7 The removal of unit pavers, base to remain, shall be measured on a square metre basis. Price shall be payment in full for supplying materials and for performing the Work.

E7.4.8 The Clearing and Grubbing of material within the limit of work shall be measured on a square metre basis. Price shall be payment in full for supplying materials and for performing the Work.

E8. COMMON WORK RESULTS – ELECTRICAL

E8.1 Summary

E8.1.1 Section Includes: General requirements that are common the Electrical Subcontractor.

E8.1.2 This Section covers items common to the Electrical Subcontractor.

E8.1.3 All drawings and all sections of the specifications shall apply to and form an integral part of this section.

E8.1.4 Carefully examine all plans and specifications pertaining to this Contract and become familiar with all details. Visit the Site and determine all factors affecting this section of the work and include all costs for same in Bid.

E8.2 References

E8.2.1 Canadian Standards Association (CSA International)

.1 CSA C22.1, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.

E8.2.2 The electrical installation shall comply with the requirements of the Electrical Supply Authority, the latest edition of the Canadian Electrical Code, with all Provincial and Municipal Laws, Rules and Ordinances, and to the satisfaction of those persons having jurisdiction over same.

- E8.2.3 In no instance shall the standard established by these specifications and drawings be reduced by any of the codes, rules or ordinances.
- E8.2.4 Health Canada / Workplace Hazardous Materials Information System (WHMIS).
- E8.3 Design Requirements
- E8.3.1 Operating voltages: to CAN3-C235.
- E8.3.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
- E8.3.3 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- E8.4 Submittals
- E8.4.1 Submit shop drawings, produce detailed data and samples in accordance with previous sections, as specified herein, and to Contract Administrator's satisfaction.
- E8.4.2 Shop drawings submitted electronically (e.g. by email) shall comply with the following:
- .1 Shop drawings larger than 11 x 17 shall include a hard copy delivered separately by messenger the same day as the email copies.
 - .2 All necessary transmittals shall be included with the email submission.
 - .3 Emailed shop drawings shall comply in all respects with this section of the specifications.
- E8.4.3 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.
- E8.4.4 Where applicable, include actual wiring, single line and schematic diagrams. Include all technical data and full details of each component.
- E8.4.5 Include wiring drawings or diagrams showing interconnection with work of other sections.
- E8.4.6 Shop drawings of all equipment must be submitted to the Contract Administrator for review in sufficient time to enable him to retain them for at least ten (10) working days.
- E8.4.7 Each applicable device to be highlighted or identified with an arrow.
- E8.4.8 Each applicable device to be tagged (e.g. light fixture type, motor tag, etc.).
- E8.4.9 Electrical Subcontractor shall check all shop drawings and make necessary changes, or cause the supplier to make necessary changes, prior to submission to the Contract Administrator. Shop drawings will be reviewed by the Contract Administrator and if re-submission is required, Electrical Subcontractor shall ensure that the supplier's drawings have been changed to comply before returning them to the Contract Administrator for review again.
- E8.4.10 Review of the shop drawings by the Contract Administrator shall not relieve the Contractor from responsibility for errors and omissions therein.
- E8.4.11 Each drawing submission to bear the following signed stamp, and shall include name of project, equipment supplier, and clause number equipment is specified under.

CONTRACTORS CERTIFICATION

This drawing has been reviewed by
(firm name)

All dimensions have been checked and found compatible with the contract drawings and all capacities, quantities, sizes, and other data contained in the contract

documents have been listed by the supplier on this drawing and have been checked by the undersigned and found correct.

Date: Per:

- E8.4.12 Clearly show division of responsibility. No item, equipment or description of work shall be indicated to be supplied or work to be done "By Others" or "By Purchaser". Any item, equipment or description of work shown on shop drawings shall form part of Contract, unless specifically noted to the contrary.
- E8.4.13 Provide field dimensions required by electrical suppliers and sub-subcontractors. In cases where fabrication is required prior to field dimensions being available, check all related drawings and obtain clarification from Contract Administrator if necessary.
- E8.4.14 Main distribution and utility metering shop drawings must be approved by local utility prior to submission to Contract Administrator.
- E8.4.15 Incomplete submissions will be returned for updating and re-submittal without Contract Administrator's review.
- E8.4.16 Quality Control:
- .1 Provide CSA or equivalent certified equipment and material.
 - .2 Where CSA or equivalent certified equipment and material is not available, submit such equipment and material to authority having jurisdiction for special approval before delivery to Site.
 - .3 Submit test results of installed electrical systems and instrumentation.
 - .4 Permits and fees: in accordance with General Conditions of contract.
 - .5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work.
- E8.5 Quality Assurance
- E8.5.1 Quality Assurance:
- E8.5.2 Qualifications: electrical Work to be carried out by qualified, licensed electricians or apprentices in accordance with authorities having jurisdiction and as per the conditions of Provincial or Territorial Act respecting manpower vocational training and qualification.
- E8.6 Delivery, Storage and Handling
- E8.6.1 Material Delivery Schedule: provide Contract Administrator with schedule within 2 weeks after award of Contract.
- E8.6.2 Separate metal, plastic, wood and corrugated cardboard packing and place in designated areas for disposal or recycling.
- E8.7 System Startup
- E8.7.1 Upon completion of the project, demonstrate the operation, care and maintenance of all system equipment and components in the presence of The City, or his representative, and the Contract Administrator. Obtain signed certification from The City that such equipment was shown to be fully operational and that all necessary operating instructions have been provided.
- E8.8 Drawings
- E8.8.1 Carefully examine all drawings and specifications relating to all work, and all electrical work indicated thereon shall be considered as a part of the work by this section unless indicated otherwise. Prior to the date of the last addendum report at once to the Contract

Administrator, any defect, discrepancy, omission or interference affecting the work of this section, or the guarantee of same.

- E8.8.2 Install all equipment as shown or as specified and in accordance with manufacturer's approved shop drawings.
- E8.8.3 The drawings accompanying these specifications are intended to show the general arrangement and extent of the work to be carried out, but the exact location and arrangement of all parts shall be determined as the work progresses. The location of equipment, outlets, etc., as given on the drawings are approximately correct, but it shall be understood that they are subject to such modifications as may be found necessary or desirable at the time of installation to meet any structural or architectural requirements. Such changes shall be implemented as directed by the Contract Administrator, without additional charge.
- E8.8.4 Electrical drawings do not show all structural and other details. Architectural and structural conditions shall govern, and this Section shall make without charge, changes or additions to accommodate these conditions. Check all architectural plans, elevations and details for location of electrical devices, equipment and equipment to be connected.
- E8.8.5 Where drawings indicate the general location and route to be followed by conduit, cable, etc., these locations must be governed by job conditions. Where the required conduit, cable, and boxes are not shown on drawings or only shown diagrammatically, they shall be installed to conserve maximum head room and interfere as little as possible with free use of space through which they pass. Maximum clearance above floor shall be maintained under all suspended conduit and equipment, unless otherwise shown on the drawings, or approved by the Contract Administrator.
- E8.8.6 Submit a complete set of drawings for the proposed installation to the Inspection Department having jurisdiction and receive written approval before installation or fabrication of any equipment. No extra compensation will be allowed for any changes or rearrangement of any electrical apparatus or materials necessary due to failure to receive this approval.
- E8.9 Operation and Maintenance Data
- E8.9.1 Provide operation and maintenance data for incorporation into operation and maintenance manuals specified.
- E8.9.2 Provide one copy of Operation and Maintenance manuals to Contract Administrator for review. Operation and Maintenance manuals will be reviewed by the Contract Administrator and if re-submission is required, ensure that the manuals have been changed to comply before returning them to the Contract Administrator for review again.
- E8.9.3 Include in operations and maintenance data:
- .1 Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension, and expansion of any portion or feature of the electrical installation.
 - .2 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature alone is not acceptable.
 - .3 Wiring and schematic diagrams and performance curves.
 - .4 Names and addresses of local suppliers.
 - .5 Copy of reviewed shop drawings.
- E8.9.4 Provide four (4) complete, hard-backed, D-ring loose leaf Maintenance Manuals. These shall consist of typewritten or printed instructions for operating and maintaining all systems and equipment provided under this section of the specification. Manuals shall also contain shop drawings, wiring diagrams, test results and manufacturer's brochures on all

equipment, together with typed index tab sheets. Manuals shall also contain a DVD with PDF files of the contents of the manuals.

- E8.9.5 As work progresses, record on one (1) set of contract drawings, installed conduit layout as well as any approved changes and deviations from the original contract and/or working drawings, including outlets, equipment and panel locations. Have these drawings available for reference and inspection at all times. At completion of work, submit to the Contract Administrator, at the Contractor's Costs, Digital Record Drawings and one hardcopy set of Record Drawings. The contract shall not be considered complete and no final payment shall be made until these drawings are accepted by the Contract Administrator. Provide separate drawings for each system in order not to "crowd" drawings.
- E8.10 Temporary Lighting Power
- E8.10.1 All temporary and construction lighting and power work and costs for same are not included as part of the scope of the work of this section. Refer to such clauses in other sections of the specification.
- E8.11 Examination of Documents and Site
- E8.11.1 Carefully examine all Drawings and Specifications pertaining to this contract and become familiar with all details. Visit the Site and determine all factors affecting this section of the work; include all costs for same in Bid.
- E8.12 Materials and Equipment
- E8.12.1 All materials, equipment and articles incorporated in the Work are to be exactly as specified, or as approved by the Contract Administrator.
- E8.12.2 In every case the responsibility of sustaining that the proposed substitute Material is equivalent to the Material specified rests with the person or persons making application for approval and not with the Contract Administrator.
- E8.12.3 If there is a question as to whether any product or system is in conformance with applicable standards, the Contract Administrator reserves the right to have such products or systems tested to prove or disprove conformance.
- E8.12.4 The cost for such testing shall be borne by The City in the event of conformance with the Contract Documents or by the Contractor in the event of non-conformance.
- E8.12.5 Equipment and material to be CSA certified or certified by an equivalent recognized certifying agency to meet Canadian Standards. Electrical equipment consisting of individual certified components must also have a CSA or equivalent certification for the entire assembly. Where there is no alternative to supplying equipment which is certified, obtain special approval from local Electrical Inspection Department or authority having jurisdiction.
- E8.12.6 Factory assemble control panels and component assemblies.
- E8.12.7 Submit for Contract Administrator's approval, a duplicate list of makes and types of all equipment and materials for this project, prior to placing of orders for same. This shall be done within fourteen (14) days of the award of the project contract to the General Contractor in order to avoid delays in delivery and completion.
- E8.12.8 Any material or equipment ordered or installed without the Contract Administrator's prior approval shall, if so directed by the Contract Administrator, be removed and replaced with approved material or equipment without a change in the contract price.
- E8.13 Warning Signs
- E8.13.1 Warning Signs: in accordance with requirements of authority having jurisdiction and Contract Administrator.
- E8.13.2 Decal signs, minimum size 175 x 250 mm.

E8.13.3 Provide "Danger High Voltage" labelling on main electrical room door.

E8.14 Wiring Terminations

E8.14.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for type of conductors used.

E8.15 Equipment Identification

E8.15.1 Identify electrical equipment with nameplates and labels as follows, and as indicated in other specification sections:

.1 Nameplates: lamicoid 3mm thick plastic engraving sheet, white face with black core (white with black letters) lettering accurately aligned and engraved into core mechanically attached with self tapping screws.

.2 Sizes as follows:

NAMEPLATE SIZES

Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

E8.15.2 Labels: embossed plastic labels with 6mm high letters unless specified otherwise

E8.15.3 Wording on nameplates and labels to be approved by Contract Administrator prior to manufacture.

E8.15.4 Allow for minimum of twenty-five (25) letters per nameplate and label.

E8.15.5 Nameplates for terminal cabinets, pullboxes and junction boxes to indicate system and/or voltage characteristics.

E8.15.6 Disconnects, starters and contactors: indicate equipment being controlled and voltage

E8.15.7 Transformers: indicate capacity, primary and secondary voltages.

E8.15.8 Room names and numbers used shall be actual room names and numbers that will be used on the project. Co-ordinate and confirm with trades involved.

E8.15.9 Nameplates for control devices: indicate equipment controlled.

E8.15.10 To match existing where applicable.

E8.16 Wiring Identification

E8.16.1 Identify wiring with permanent indelible identifying markings on both ends of phase conductors of feeders (coloured plastic tapes) and branch circuit wiring (numbered wire markers). Conductor marker identification shall correspond with panel or terminal board directory information.

E8.16.2 Maintain phase sequence and colour coding throughout.

E8.16.3 Colour coding: to CSA C22.1.

E8.16.4 Use colour coded wires in communication cables, matched throughout system. Colour coding used shall be documented by individual systems in Maintenance Manuals.

E8.16.5 Insulated grounding conductors shall have a green finish and shall be used only as a grounding conductor.

E8.17 Conduit and Cable Identification

- E8.17.1 Colour code conduits, boxes and metallic sheathed cable.
- E8.17.2 Colour coding to match existing where applicable.
- E8.17.3 Confirm colour coding with The City and Contract Administrator prior to start of work.
- E8.17.4 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15m intervals.
- E8.17.5 Colours: 25mm wide prime colour and 20mm wide auxiliary colour.
- | | <u>Prime</u> | <u>Auxiliary</u> |
|---------------------------|--------------|------------------|
| Up to 250V (normal power) | Yellow | |
| Up to 600V (normal power) | Yellow | Green |
- E8.17.6 Other conduit systems as directed on Site; all conduit systems shall be identified.
- E8.17.7 Colour outlet box covers to color designated and show circuit numbers in black felt marker on inside of covers.
- E8.18 Finishes
- E8.18.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
- .1 Paint outdoor electrical equipment "equipment green".
 - .2 Paint indoor switchgear and distribution enclosures light gray.
- E8.19 Workmanship and Materials
- E8.19.1 The installation shall consist of material and equipment specified unless as provided herein. Electrical equipment provided under this Contract shall be built in accordance with EEMAC standards and shall be C.S.A. certified (or certified by an equivalent recognized certifying agency to meet Canadian Standards) and/or locally approved. All equipment supplied under this contract shall be new and the best of its respective kind and of uniform pattern throughout.
- E8.19.2 Any material or equipment ordered or installed without the Contract Administrator's prior approval shall, if so directed by the Contract Administrator, be removed and replaced with approved material or equipment without a change to the contract.
- E8.19.3 Replace inferior work if so ordered by Contract Administrator without a change to the contract.
- E8.19.4 Retain same foreman or superintendent on the job until completed, unless otherwise directed by the Contract Administrator.
- E8.20 Wiring Terminations
- E8.20.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.
- E8.21 Installation
- E8.21.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- E8.22 Nameplates and Labels
- E8.22.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.
- E8.23 Conduit and Cable Installation
- E8.23.1 Install conduit and sleeves prior to pouring of concrete.

- E8.23.2 Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm.
- E8.23.3 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- E8.23.4 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.
- E8.23.5 Arrange for holes through exterior wall and roof to be flashed and made weatherproof.
- E8.23.6 All conduits to be hidden in all locations except mechanical and electrical rooms.
- E8.24 Location of Outlets
- E8.24.1 Location outlets in accordance with Section E15 - Outlet Boxes, Conduit Boxes and Fittings.
- E8.24.2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000mm, and information is given before installation.
- E8.25 Field Quality Control
- E8.25.1 Load Balance:
- .1 Measure phase current to panelboards with normal loads operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
 - .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
- E8.25.2 Conduct following tests:
- .1 Circuits originating from branch distribution panels.
 - .2 Lighting and its control.
 - .3 All other electrical systems.
 - .4 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
- E8.25.3 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
- E8.25.4 All circuits shall be tested to ensure that the circuit numbers are correct and that the proper neutral conductors have been provided and installed.
- E8.25.5 Carry out tests in presence of Contract Administrator and The City.
- E8.25.6 Advise Contract Administrator of dates and times for all testing with sufficient advance notice to allow Contract Administrator to make arrangements to attend.
- E8.25.7 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- E8.25.8 Insert test results and supplier's certifications in Maintenance Manuals.
- E8.26 Cleaning
- E8.26.1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

- E8.26.2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.
- E8.27 Permits, Fees and Inspection
- E8.27.1 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.
- E8.27.2 Pay all associated fees for inspection of the work by authorities having jurisdiction.
- E8.27.3 Notify Contract Administrator of changes required by Electrical Inspection Department prior to making changes.
- E8.27.4 Furnish Certificates of Acceptance from authorities having jurisdiction on completion of work to Contract Administrator. Copies to be included in Maintenance Manuals.
- E8.28 Responsibility
- E8.28.1 Be responsible for any damage caused The City's, or their Contractors due to improperly carrying out this work.
- E8.28.2 Install all components of this work promptly and where applicable, in advance of concrete pouring, or similar construction. Provide and set in the proper sequence of construction, all sleeves, hangers, inserts, etc. and arrange for all necessary openings, where required to accommodate the electrical installation.
- E8.28.3 Work shall be arranged in co-operation with other sections of this specification in such a manner that it doesn't interfere with the progress of the Project. In areas where ducts or pipes must be installed along with conduit or cable, co-operate with other sections so that the finished job will represent the most efficient use of the space.
- E8.28.4 In no case proceed with any work in uncertainty. Obtain, from the Contract Administrator, any clarification necessary and thoroughly understand all portions of the work to be performed.
- E8.29 Cleanliness and Cleaning
- E8.29.1 This section shall maintain a clean tidy job Site. All boxes, crates, and construction debris due to this portion of the work shall be neatly piled outside the construction area and shall be removed at least weekly during the construction period. All construction areas shall be kept clear of debris.
- E8.29.2 Before the project will be accepted by The City, all lighting fixtures, lamps, lens, panelboards, switches, receptacles, cover plates, and other electrical equipment shall be clean and free of dust, plaster, paint, etc. Any equipment which is scratched or damaged shall be refinished or replaced if so designated by the Contract Administrator.
- E8.30 Modifications
- E8.30.1 Locations of all light fixtures, convenience receptacles, outlets, switches, voice/data or similar outlets, fire alarm stations, bells, etc. are subject to modification by the Contract Administrator, who reserves the right to move these up to 3000 mm from the position shown, without change to the contract price, provided notice is given before the related work has commenced.
- E8.31 Engineering Observations
- E8.31.1 The term "Contract Administrator" in all electrical sections of specification shall mean:
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Winnipeg, MB R3H 0N3

- E8.31.2 Electrical Subcontractor's work will be observed periodically by Owner / Contract Administrator or their representatives, solely for purpose of determining general quality of work, and not for any other purpose. Guidance will be offered to Electrical Subcontractor in interpretation of plans and specifications to assist him to carry out work. Observation and directives given to Electrical Subcontractor does not relieve Electrical Subcontractor and their agents, servants and employees of their responsibility to erect and install work in all its parts in a safe and workmanlike manner, and in accordance with plans and specifications, nor impose upon The City / Contract Administrator, any responsibility to supervise or oversee erection or installation of any work.
- E8.31.3 Electrical Subcontractor shall notify Contract Administrator for a final distribution inspection prior to energizing distribution system. All distribution equipment shall be left with covers removed to allow a thorough inspection.
- E8.32 Guarantee
- E8.32.1 Guarantee the satisfactory operation of all work and equipment supplied and installed as a part of this section of the specifications.
- E8.32.2 Replace forthwith, at no additional material or labour cost, any part which may fail, or prove defective within a period of twelve (12) calendar months after the final acceptance of the complete installation, provided that such failure is not due to improper usage, or ordinary wear and tear.
- E8.32.3 No certificate given, payment made, partial or entire use of the equipment by The City or their representative shall be construed as acceptance of defective workmanship or materials.
- E8.32.4 This general guarantee shall not act as a waiver of any specified guarantee or special equipment guarantees covering a greater length of time.
- E8.33 Cutting and Patching
- E8.33.1 Cutting, patching and repairs to existing surfaces required as a result of the removal and/or relocation of existing equipment and piping, and/or installation of new equipment and piping in existing building(s) to be included by Electrical Subcontractor in Bid price. Electrical Subcontractor to employ and pay appropriate sub-trade whose work is involved, for carrying out work described above.
- E8.34 Excavation and Backfilling
- E8.34.1 In accordance with CW2030 - Excavation Bedding and Backfill.
- E8.34.2 Excavate and backfill as required for underground electrical services as indicated. Provide protective materials around and over services and be present at all times during excavation and backfilling to supervise work. Backfilling shall restore the excavated area to the original condition and shall include sodding or asphalt repair where required.
- E8.34.3 Work to be in accordance with the current CSA Bulletin.
- E8.34.4 Include all costs for excavation and backfilling, for any underground electrical installation unless otherwise indicated.
- E8.35 Fireproofing
- E8.35.1 Where cables or conduits pass through floors, block or concrete walls and fire rated walls, seal openings with 3 M Brand Fire Barrier Products or equivalent, to maintain fire rating.
- E8.35.2 Seal all holes resulting from removal of cables, conduits and equipment.
- E8.35.3 Refer to following table for 3M brand products:

Penetrating Item	3M Brand Fire Barrier Product Options	Range of Applications			Concrete Walls and Assemblies		Gypsum Wall Assemblies	
		Penetrating Items	Annular Space	Maximum Opening Size	F Rating s (Hrs)	T Rating s (Hrs)	F Rating s (Hrs)	T Rating s (Hrs)
1. Plastic Pipe/ Conduit & Cast-in Coupling	FS-195+ Wrap Strip, CP 25WB+ Caulk or MP Moldable Putty+	PVC: 8 in. Nominal Diameter 4 Wraps/Application	0.2 in.	9 in. Diameter	2	2	2	1-1/2
		PVC: 4 in. Nominal Diameter 3 Wraps/Application	0.75 in.	6 in. Diameter	3	2	2	2
		ABS: 4 in. Nominal Diameter 3 Wraps/Application	0.75 in.	6 in. Diameter	2	2	1-1/2	1-1/2
	PSS 7904 Penetration Sealing System with CP 25 WB+ Caulk	PVC: 4 in. Nominal Diameter	3.0 in.	10 in. Diameter	3	1/2	--	--
		ABS: 4 in. Nominal Diameter	3.0 in.	10 in. Diameter	3 (in wall) 1 (in floor)	3 (in wall) 0 (in floor)	--	--
		PB: 2 in. Nominal Diameter	3.0 in.	8 in. Diameter	1/2	--	--	--
2. Metal Pipe and Conduit	CP 25WB+ Caulk	1 in. Depth of Caulk: 20 in. Diameter	2.5 in.	22.5 in. Diameter	3	0	2	0
	FS-195+ Wrap Strip, CP 25WB+ Caulk or MP Moldable Putty+	4 in. Nominal Metal Pipe	1.75 in.	8 in. Diameter	2	0	2	2
	CS-195+ Composite Sheet with FS-195+ Wrap Strip and CP 25WB+ Caulk or MP Moldable Putty+	4 in. Nominal Metal Pipe (Multiple Pipes)	45.0 in.*	30 x 50 in.	4 (both sides) 3 (one side)	3/4 0	--	--

	PSS 7902 Penetration Sealing System CP 25 WB+ Caulk or MP Moldable Putty+	10 in. Nominal Diameter Pipe and 8x16 in Rectangular Cover Plate if fill is less than 10%	9.0 in.	10 x 20 in.	3	0	--	--
	CP 25WB+ Caulk	1/2 in. Diameter Depth of CP-25WB 12 in. Nominal Diameter Pipe	1.2 in.	14 in. Diameter	3	0	--	--
	FD 150 FireDam Caulk	2 in. Depth of FireDam 150 Chaulk 6 in. Nominal Diameter Pipe	2.0 in.	8-1/4 in. Diameter	3	0	--	--
	MP Moldable Putty+	1 in. Depth of Putty: 10 in. Nominal Diameter Pipe	0.75 in.*	12-1/4 in. Diameter	2 (1/2 in. Depth) 3 (1 in. Depth)	0	--	--
3. Insulated Electrical and Communications Cable	CP 25WB+ Caulk	1 in. Depth of Caulk; 43% of Area Filled, 350 MCM Cable and 100 Pair Telephone Cable	0.75 in.	6 in. Diameter	3	0	2	1-1/2
		1 in. Depth of Caulk; 37% of Area Filled, 3/0 350MCM Cable and 100 Pair Telephone Cable	0.75 in.					
		2-12 in. Depth of Caulk; 59% of Area Filled, 7C/12 AWG Cable, 100 Pair Telephone Cable	0.75 in.					
	FS-195+ Wrap Strip with CP 25WB+ Caulk or MP Moldable Putty+	4 in. Depth of Caulk with FS-195 Wrap; 59% Area Filled, 350 MCM Cable	0.75 in.	6 in. Diameter	2	0	--	--
CS-195+ Composite Sheet	Multiconductor 12 AWG Cable, 100 Pair PVC	47.0 in.*	30 x 50 in.	4	1	--	--	

	with FS-195+ Wrap Strip and CP 25WB+ Caulk or MP Moldable Putty+	Telephone Cable, Cable Bundle 3 in. Diameter						
	PSS 7904 Penetration Sealing System with CP 25 WB+ Caulk	350 MCM Cable; 30% of Area Filled. Cover Plate required if Fill is less than 10%	11.0 in.	8 x 16 in.	3	1/2	--	--
	MP Moldable Putty+	Telephone Cable; 100 Pair, 40% or Area Filled	0.75 in.	6-1/4 in. Diameter	2	0	--	--
4. Cable Tray	CS-195+ Composite Sheet with CP 25WB+ Caulk	Nominal Size Cable Tray 4 x 24 in.; 39% Area Filled in Tray; Cable Size: 300 MCM 4 in. Depth of Chalk	14.64 in.	12 x 24 in.	3	0	--	--
	PSS 7904-R Penetration Sealing System with CP 25 WB+ Caulk	Nominal Size Cable Tray 4 x 18 in.; 52% Area Filled in Tray; 25 Pair No. 22 AWG Telephone Cable	9.0 in.	10 x 20 in.	3	3/4	--	--
5. Blank Openings and Construction Joints and Expansion Trenches		1/2 to 1 in. Depth	--	Joint Width	3	3	--	--
	CP 25WB+ Caulk	2 in. Depth Cover Plate required when joint width exceeds 2 in.	--	4 in. Diameter Opening 4 in. Joint Width	3	2	--	--
	MP Moldable Putty+	1 in. Depth	--	1 in. Joint Width	2	2	--	--
	PSS 7904 Penetration Sealing System with CP 25 WB+ Caulk	4 in. Depth of Kit. Cover Plate Required.	--	8 x 16 in.	3	1	--	--

* Distance Measured from the outer edge of the pentrant to the furthest edge of the opening

- E8.35.4 Fireproofing of electrical cables, conduits, trays, etc. passing through fire barriers shall conform to local codes and inspection authorities.
- E8.36 Access Doors
- E8.36.1 Provide and install access doors where electrical equipment requiring access is built-in. Access doors to be 2.5mm (12 ga.) steel, approximately 300mm x 300mm (12" x 12") minimum or as approved, finished prime coat only, with concealed hinges, anchor straps, plaster lock and without screws, all equal to Milcor manufacturer. All locks to be flush type, screwdriver operated. Where it is necessary for persons to enter through door, doors to be at least 600mm x 600mm.
- E8.36.2 Access doors located in fire rated ceilings or walls shall be approved fire rated doors and frames.
- E8.36.3 Co-ordinate access door types, locations, etc. with Contract Administrator.
- E8.37 Security Fasteners and Hardware
- E8.37.1 Electrical Subcontractor to install security fasteners required for Electrical Work.
- E8.37.2 This shall also include security tamperproof screws that are exposed such as in light fixtures, coverplates, system devices, outlet covers, etc.
- E8.37.3 Refer to other sections of the specifications for security hardware.
- E8.38 Protection
- E8.38.1 Protect exposed live equipment during construction for personnel safety.
- E8.38.2 Shield and mark live parts "LIVE 120 VOLTS", or with an appropriate voltage in English.
- E8.38.3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of electrician.
- E8.39 Scheduling of Work
- E8.39.1 Existing buildings will remain in use during construction. Arrange work so that interruption of services is kept to a minimum. Obtain permission from The City prior to cutting into electrical services. Where deemed necessary by Contract Administrator, temporary electrical shall be installed and/or work shall be carried out at night and on weekends.
- E8.39.2 Electrical Subcontractor to maintain continuous and adequate all existing electrical systems and other services during entire time of this contract. Provide temporary conduit, wire, equipment, etc. where necessary to meet this requirement.
- E8.40 Demolition of Existing Electrical
- E8.40.1 Remove all unnecessary existing electrical equipment, wiring, fixtures, in those portions of the existing building which are being remodelled or demolished. All devices/fixtures, etc. are not necessarily shown on the plans. The City shall select from the materials and/or equipment remaining that which he wishes to retain, and the remainder shall be removed from the Site. Any electrical equipment in remodelled sections or in structures removed or altered, adjacent to new work, necessary for the operation of existing building, shall be relocated as necessary. All existing equipment re-used shall be made good and guaranteed. Power interruptions to be kept to a minimum and shall be at a time suitable to the building occupant.
- E8.40.2 Drawings do not show all electrical requiring removal to accommodate renovations such as receptacles, switches, lights, starters, motors, nurse call systems, components, heaters, etc. Electrical Subcontractor shall visit Site, refer to landscape and electrical drawings and include all costs for demolition.
- E8.40.3 Refer to Specification Section E9 - Work in Existing Building.

E9. WORK IN EXISTING BUILDING

E9.1 Related Sections

- E9.1.1 E8 - Common Work Results - For Electrical.
- E9.1.2 E11 - Wires and Cables.
- E9.1.3 E15 - Outlet Boxes, Conduit Boxes and Fittings.
- E9.1.4 E16 - Conduits, Conduit Fastenings and Conduit Fittings.

E9.2 Waste Management and Disposal

- E9.2.1 Separate metal, plastic, wood and corrugated cardboard packing and place in designated areas for disposal or recycling.
- E9.2.2 Place materials defined as hazardous or toxic waste in designated containers.
- E9.2.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

E9.3 Coordination

- E9.3.1 The building shall remain open and in normal operation during the construction period.
- E9.3.2 Where existing services such as electrical power, fire alarm system, sound system, etc. are required to be disrupted and/or shut down, coordinate the shut-downs with The City and carry out the work at a time and in a manner acceptable to them. Carefully schedule all disruption and/or shut-downs and ensure that the duration of same is kept to the absolute minimum. Submit for approval a written, concise schedule of each disruption at least 120 hours in advance of performing work and obtain The City's written consent prior to implementing.
- E9.3.3 Should any temporary connections be required to maintain services during work in the existing building, supply and install all necessary material and equipment and provide all labour at no extra cost. Should any existing system be damaged, make full repairs without extra cost, and to the satisfaction of The City and Contract Administrator.
- E9.3.4 If existing equipment shown on drawings is defective it shall be brought to the Contract Administrator's and The City's attention prior to work completion.
- E9.3.5 Refer to General Conditions for phasing and staging of work and adhere to that schedule. Comply with instructions regarding working hours necessary to maintain the building in operation.

E9.4 Existing Devices in New Construction

- E9.4.1 Where existing devices (receptacles, switches, etc.) presently mounted on a wall which will be covered with a new finish, provide an extension ring, coverplate, etc. or relocate as required to mount the device to the new wall.
- E9.4.2 Where existing conduits pass vertically through a floor area, relocate those conduits to be installed concealed in a new wall or surface mounted in a service area. Extend conduit, wiring, etc. as required.
- E9.4.3 Existing junction boxes in walls and ceiling spaces required to maintain existing circuits shall remain accessible.
- E9.4.4 Where services are concealed within walls, floors or ceilings and cannot be visually identified, Electrical Subcontractor shall provide electronic scanning devices or other approved means to locate and identify concealed services prior to drilling.

E9.5 Schedule of Work

- E9.5.1 Carefully note and refer to the Contract Administrator's general schedule of work and include for all requirements to conform to it.

E9.6 Materials

- E9.6.1 Provide all materials required for the complete interface and reconnection installation as herein described and as indicated on the drawings.
- E9.6.2 New fire alarm devices, speakers, starters, panelboards, etc. required to be tied in to existing systems shall match the existing devices.
- E9.6.3 New wiring required to interconnect new devices to existing systems shall be provided to suit the manufacturers requirements and instructions.

E9.7 Installation

- E9.7.1 Install boxes, conduit and wiring through existing areas as required for the new installation.
- E9.7.2 Add modules, switches, etc. in existing control panels, as required, to extend existing systems to new or renovated areas.
- E9.7.3 Patch and repair walls and ceilings in existing areas that have been damaged or cut open due to the new electrical installation.
- E9.7.4 Where new cables or conduits have been installed through existing fire rated walls, seal opening around cables and conduit to maintain fire rating.

E10. WIRE AND BOX CONNECTORS 0-1000V

E10.1 Related Sections

- E10.1.1 E8 – Common Work Results – For Electrical.

E10.2 References

- E10.2.1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-C22.2No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
 - .2 CSA C22.2No.65, Wire Connectors.
- E10.2.2 National Electrical Manufacturers Association (NEMA).

E10.3 Materials

- E10.3.1 Pressure type wire connectors to: CSA C22.2No.65, with current carrying parts of copper sized to fit copper conductors as required.
- E10.3.2 Fixture type splicing connectors to: CSA C22.2No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- E10.3.3 Clamps or connectors for armoured cable, aluminum sheathed cable, mineral insulated cable, flexible conduit, non-metallic sheathed cable as required to: CAN/CSA-C22.2No.18.

E10.4 Installation

- E10.4.1 Remove insulation carefully from ends of conductors and:
 - .1 Install pressure type wire connectors and tighten according to manufacturers recommendations.
 - .2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2No.65.
 - .3 Install fixture type connectors and tighten. Replace insulating cap.

E11. WIRES AND CABLES (0-1000 V)

E11.1 Related Sections

- E11.1.1 E8 - Common Work Results - For Electrical.
- E11.1.2 E10 - Wire and Box Connectors - 0 - 1000 V.

E11.2 References

- E11.2.1 CSA C22.2 No .0.3, Test Methods for Electrical Wires and Cables.
- E11.2.2 CAN/CSA-C22.2 No. 131, Type TECK 90 Cable.

E11.3 Submittals

- E11.3.1 Submit product data in accordance with Section E8 - Common Work Results - For Electrical.

E11.4 Building Wires

- E11.4.1 Conductors: stranded for 10 AWG and larger. Size as indicated. Minimum size: 12 AWG.
- E11.4.2 Copper conductors: size as indicated, with minimum 600 V insulation of chemically cross-linked thermosetting polyethylene material rated RW90 and RWU90.

E11.5 Teck Cable

- E11.5.1 Cable: : to CAN/CSA-C22.2 No. 131.
- E11.5.2 Conductors:
 - .1 Grounding conductor: copper. (FT4 insulation where exposed).
 - .2 Circuit conductors: copper, size as indicated. Minimum size 12 AWG and larger.
- E11.5.3 Insulation:
 - .1 Chemically cross-linked thermosetting polyethylene rated type RW90, minimum 1000 V.
 - .2 Colour code: Black, red, blue and white in 4C cable.
- E11.5.4 Inner jacket: polyvinyl chloride material.
- E11.5.5 Armour: interlocking aluminum.
- E11.5.6 Overall covering: thermoplastic polyvinyl chloride material meeting requirements of vertical tray test to CSA C22.2 No. 0.3 with maximum flame travel of 1.2M.
- E11.5.7 Fastenings:
 - .1 One hole straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
 - .2 Channel type supports for two or more cables.
 - .3 Threaded rods: Minimum 6 mm dia. to support suspended channels
- E11.5.8 Connectors: To be approved for TECK cable.
- E11.6 General
 - E11.6.1 To Minimize Voltage Drop:
 - .1 All branch circuits including lighting circuits shall be minimum #10 AWG for all circuits longer than 21 metres and shall be minimum #8 for all circuits longer than 35 metres.

- .2 All branch circuit wiring and conduit shall be installed to minimize voltage drop. Install additional conduit runs as required to take the most direct and shortest route to outlets, light fixtures, etc.

E11.7 Installation of Building Wires

Install wiring as follows:

- .1 In conduit systems.
- .2 In underground ducts.
- .3 In wireways and auxiliary gutters.

E11.8 Installation of Teck Cables 0-1000 V

E11.8.1 Group cables wherever possible on channels.

E11.8.2 Single conductor cables shall be installed one cable diam. apart on suspended cable tray or channel supports and shall be clamped with aluminum cable clamps. Cables shall be terminated using non-magnetic connectors. Cable armor shall be grounded via an aluminum plate at the supply end and isolated via an insulating plate, at the load end of the cable. A #3/0 AWG bare (unless otherwise noted) copper ground wire shall be installed with each feeder. Cable bending radius shall be at least twelve times the overall cable diam. and bends shall not damage or distort the outer sheath.

E11.8.3 Do not install PVC jacketed cables in circulating air plenums.

E11.9 Installation in Equipment

E11.9.1 Group and lace-in neatly wire and cable installed in switchboards, panelboards, cabinets, wireways and other such enclosures.

E11.10 Terminations

E11.10.1 Terminate wires and cables with appropriate connectors in an approved manner.

E11.10.2 Compression adapters intended to terminate larger feeders on small lugs are not acceptable. All lugs, including breaker lugs, are to be sized to accommodate the cable being terminated.

E11.11 Identification

E11.11.1 Wire in conduit #2 AWG and smaller shall have solid coloured insulation, color coded as listed below.

E11.11.2 Wire in conduit 1/0 AWG and larger and single conductor cables for normal power feeders shall be identified at each outlet box and termination with a 150 mm band of coloured vinyl tape of the appropriate colour. Emergency power feeders shall be provided with an additional 75 mm band of red vinyl tape installed adjacent to the 150 mm band of the coloured phase identification tape, as listed below. Neutral and ground conductors shall be identified. Paint or other means of colouring the insulation shall not be used.

E11.11.3 Colour code wire in conduit and single conductor cables as follows:

Phase A – red

Phase B – black

Phase C – blue

Neutral – white

Ground - green

E11.11.4 Maintain phase sequence and colour coding throughout project.

E11.11.5 Use colour coded wires in communication cables, matched throughout system.

- E11.11.6 Identify control conductors in motor control equipment, contactors, fire alarm panels, etc. with mylar/cloth wire markers.
- E11.11.7 Refer to E6 for additional requirements.

E12. GROUNDING

E12.1 Related Sections

- E12.1.1 E8 - Common Work Results – For Electrical
- E12.1.2 E9 - Work In Existing Building

E12.2 References

- E12.2.1 Ground equipment to: CSA C22.2 No. 41.
- E12.2.2 Copper grounding conductors to: CSA G7.1.
- E12.2.3 ANSI/IEEE 837, Qualifying Permanent Connections Used in Substation Grounding.
- E12.2.4 CSA C22.2No.0.4, Bonding and Grounding of Electrical Equipment (Protective Grounding).

E12.3 Equipment

- E12.3.1 Grounding conductors: system, circuit and equipment, grounding conductors to be bare (or green insulated if indicated/required) stranded copper sized in accordance with the Canadian Electrical Code.
- E12.3.2 Insulated grounding conductors: green, type RW-90.
- E12.3.3 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
 - .1 Grounding and bonding bushings.
 - .2 Grounding or bonding clamps. All grounding and bonding clamps shall be brass where attached to copper pipes. Clamps for other applications shall be of a type and material that will minimize deterioration from galvanic action due to dissimilar metals.
 - .3 Bolted type conductor connectors.
 - .4 Cadweld welded type conductor connectors.
 - .5 Bonding jumpers, straps.
 - .6 Pressure wire connectors.

E12.4 Installation General

- E12.4.1 Install complete permanent, continuous, system and circuit, equipment, grounding systems including, electrodes, conductors, connectors, accessories, as indicated, to conform to requirements of local authority having jurisdiction over installation.
- E12.4.2 Install connectors in accordance with manufacturer's instructions.
- E12.4.3 Protect exposed grounding conductors from mechanical injury.
- E12.4.4 All ground/bonding cables, bus, etc., in locations where subject to mechanical damage, shall be protected by rigid metal conduit, steel guards, or other suitable shields. In all cases where rigid metal conduit or other metallic encasement of ground/bonding conductors is required, the conductor shall be permanently and effectively bonded to the conduit/enclosure at both ends of its length. Use solderless lug, clamp or ground bushing at each end. This requirement applies to all such enclosures regardless of length.
- E12.4.5 Make buried connections, by cadweld process.

- E12.4.6 Use mechanical connectors for grounding connections to equipment. All compression connectors, lugs, etc., used in grounding circuits in any location, shall have bolts, nuts, etc., of silicon bronze alloy.
- E12.4.7 All bonding jumpers shall be sized at least equal to their corresponding grounding conductors unless noted otherwise. Where attached to equipment, conduits, cabinets, etc., suitable approved two hole, long barrel, copper compression lugs shall be used.
- E12.4.8 No soldered connections shall be used on grounding circuits at any point.
- E12.4.9 Install separate ground conductor to outdoor lighting standards.
- E12.4.10 In wet or damp areas and near tanks containing liquids, all equipment frames, tanks, boxes, outlets, etc., shall be securely bonded together and grounded.
- E12.4.11 All surfaces to which grounding bus or cable is to be bolted shall be cleaned of all paint, rust, etc., and worked to a bright flat surface. Immediately before bolting to steel member, the contact surface of both shall be lightly coated with an oxide-preventing agent.
- E12.4.12 All connections to be buried and subsequently made inaccessible must be Cadwelded.
- E12.4.13 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.
- E12.4.14 Bond single conductor, metallic armoured cables to cabinet at supply end, and provide non-metallic entry plate at load end.
- E12.4.15 Where ground conductors pass through fire rated floor, or wall, etc., provide rigid metal conduit of the required size. Connect each conduit end to the grounding/bonding conductor with solderless lug, clamp or grounding bushing. Firestop penetration through fire rated walls and floors. Refer to Section E8.
- E12.4.16 Where ground connections will be inaccessible after construction, connections shall be made by the cadweld process (Erico Products 'Cadweld' or Burndy 'Thermoweld'). Accessible connections shall be Cadweld, welded, brazed, bolted, or compression type.
- E12.4.17 All conduit runs containing feeders and branch circuits shall be complete with an insulated green ground wire bonded to all outlet boxes, junction boxes, pull boxes, equipment enclosures, etc. The conduit system shall be continuous but shall not be relied on to serve as the equipment grounding means. Ground conductors shall be sized according to the Canadian Electrical Code, but shall be minimum #12 AWG.
- E12.4.18 A separate ground conductor shall be installed in all fibre, PVC or plastic duct runs and shall be connected to maintain the grounding of the system.
- E12.4.19 Conduit expansion joints and telescoping sections of metal raceways and cable trays not thoroughly bonded otherwise, shall be provided with approved bonding jumpers.

E13. HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

E13.1 Related Sections

- E13.1.1 E8 - Common Work Results - For Electrical.

E13.2 Support Channels

- E13.2.1 U shape shape, size and thickness as required, surface mounted, suspended, or set in poured concrete walls and ceilings.

E13.3 Installation

- E13.3.1 Secure equipment to masonry, tile and plaster surfaces with lead anchors or nylon shields.
- E13.3.2 Secure equipment to poured concrete with expandable inserts.
- E13.3.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

- E13.3.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.
- E13.3.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- E13.3.6 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
 - .2 Two-hole steel straps for conduits and cables larger than 50 mm.
 - .3 Beam clamps to secure conduit to exposed steel work.
- E13.3.7 Suspended support systems:
 - .1 Support individual cable or conduit runs with 6 mm dia. threaded rods and spring clips.
 - .2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.
- E13.3.8 For surface mounting of two or more conduits use channels
- E13.3.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- E13.3.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- E13.3.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- E13.3.12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Contract Administrator.
- E13.3.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

E14. JUNCTION AND PULL BOXES

- E14.1 Related Sections
 - E14.1.1 Section E8 – Common Work Results - For Electrical.
- E14.2 Submittals
 - E14.2.1 Submit shop drawings and product data for cabinets in accordance with Section E8 - Common Work Results - For Electrical.
- E14.3 Junction and Pull Boxes
 - E14.3.1 Welded steel construction with screw-on flat covers for surface mounting.
 - E14.3.2 Covers with 25 mm minimum extension all around, for flush-mounted pull and junction boxes.
 - E14.3.3 Cast type with gasketed covers where exposed to moisture or weather or where specified.
 - E14.3.4 Explosion proof in hazardous areas to suit the hazardous classification.
- E14.4 Junction, Pull Boxes, Cabinets and Enclosure Installation
 - E14.4.1 Install pull boxes in inconspicuous but accessible locations.
 - E14.4.2 Install pull boxes so as not to exceed 30 m of conduit run between pull boxes.
 - E14.4.3 Install junction and pull boxes clear of all mechanical ductwork and piping.

E14.5 Identification

E14.5.1 Provide equipment identification in accordance with Section E8 - Common Work Results - For Electrical.

E14.5.2 Install size 2 identification labels indicating system name, voltage and phase.

E15. OUTLET BOXES, CONDUIT BOXES, AND FITTINGS

E15.1 Related Sections

E15.1.1 Section E8 - Common Work Results - For Electrical.

E15.1.2 Section E16 – Conduits, Conduit Fastenings, and Conduit Fittings.

E15.2 References

E15.2.1 CSA C22.1, Canadian Electrical Code, Part 1.

E15.3 Outlet and Conduit Boxes General

E15.3.1 Size boxes in accordance with CSA C22.1.

E15.3.2 102 mm square or larger outlet boxes as required for special devices.

E15.3.3 Gang boxes where wiring devices are grouped.

E15.3.4 Blank cover plates for boxes without wiring devices.

E15.3.5 347 V outlet boxes for 347 V switching devices.

E15.3.6 Combination boxes with barriers where outlets for more than one system are grouped.

E15.3.7 Sectional boxes shall not be used without specific approval of the Contract Administrator.

E15.3.8 In finished areas switch, convenience receptacle, voice/data and blank cover plates shall be stainless steel. In finished area ceilings, junction and pull box covers shall be solid covers, painted to match the finish of the adjacent surface.

E15.3.9 In moist or dusty areas, gasketed watertight or dust tight boxes and covers shall be provided.

E15.3.10 Explosion proof in hazardous areas to suit requirements of authorities having jurisdiction.

E15.4 Sheet Steel Outlet Boxes

E15.4.1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 102 mm square outlet boxes with extension and plaster rings as required.

E15.4.2 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

E15.4.3 102 mm square or octagonal outlet boxes for lighting fixture outlets.

E15.4.4 102 mm square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster or tile walls.

E15.5 Masonry Boxes

E15.5.1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

E15.6 Concrete Boxes

E15.6.1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

E15.7 Conduit Boxes

- E15.7.1 Cast FS or FD feraloy boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacle where exposed to moisture.
- E15.8 Fittings – General
- E15.8.1 Bushing and connectors with nylon insulated throats.
- E15.8.2 Knock-out fillers to prevent entry of debris.
- E15.8.3 Conduit outlet bodies for conduit up to 32 mm and pull boxes for larger conduits.
- E15.8.4 Double locknuts and insulated bushings on sheet metal boxes.
- E15.9 Installation
- E15.9.1 Support boxes independently of connecting conduits.
- E15.9.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- E15.9.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- E15.9.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.
- E15.9.5 Wires in outlet, junction and switch boxes, not having a connection within box shall not be spliced, but shall continue unbroken through the box.
- E15.9.6 Maintain continuity of vapor barrier where boxes are installed in exterior walls and ceilings. Use air/vapor barrier boxes for outlets installed in walls or ceilings with a vapor barrier.
- E15.9.7 Boxes to be mounted plumb and square with building lines.
- E15.9.8 Where outlet boxes are shown on the drawings as being "back-to-back" shall have a minimum offset of 200 mm (8") between boxes to reduce sound transmission. In no case shall "thru-wall" boxes be used.
- E15.9.9 Install pull boxes, or fittings, in conduit runs where more than four bends are necessary.
- E15.9.10 Install pull boxes where run exceeds 23.0 (75 feet) in length.
- E15.9.11 All junction, outlets and pull boxes shall be so installed that they are always readily accessible.
- E15.9.12 No power driven pins (Ramset) shall be utilized to secure boxes without specific approval from Contract Administrator.
- E15.9.13 Check opening provided for each recessed outlet box and if it is not completely covered by cover plate, report discrepancy to the division responsible and ensure that it is rectified.
- E15.9.14 All concealed junction boxes, conduit fittings, etc. to be c/w galv. steel covers, secured with two bolts.
- E15.9.15 Co-ordinate boxes in masonry with brick or block configuration, boxes to be saw cut in bottom of appropriate brick or block. They shall be of sufficient depth to allow conduit to pass through center of block.
- E15.9.16 Apply acoustic sealant to seal wires penetrating moulded vapour barrier boxes.
- E15.9.17 No more than two extension rings shall be used in sequence.
- E15.9.18 For installations in hazardous areas, moist areas, dusty areas, etc., meet all requirements of authorities having jurisdiction.

E16. CONDUITS, CONDUIT FASTENINGS, AND CONDUIT FITTINGS

- E16.1 Related Sections

E16.1.1 E8 - Common Work Results - For Electrical.

E16.1.2 E15 - Outlet Boxes, Conduit Boxes and Fittings.

E16.2 References

E16.2.1 CW2030 - Excavation Bedding and Backfill.

E16.2.2 Canadian Standards Association (CSA)

- .1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware.
- .2 CSA C22.2 No. 45, Rigid Metal Conduit.
- .3 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .4 CSA C22.2 No. 83, Electrical Metallic Tubing.
- .5 CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit.
- .6 CAN/CSA C22.2 No. 227.3, Flexible Nonmetallic Tubing

E16.3 Conduits

E16.3.1 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.

E16.3.2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

E16.3.3 Rigid pvc conduit: to CSA C22.2 No. 211.2.

E16.3.4 Flexible metal conduit: to CSA C22.2 No. 56, and liquid tight flexible metal conduit.

E16.3.5 Minimum size of conduit shall be 19mm.

E16.4 Conduit Fastenings

E16.4.1 One hole steel straps to secure surface conduits 50 mm and smaller. Two hole steel straps for conduits larger than 50 mm.

E16.4.2 Beam clamps to secure conduits to exposed steel work.

E16.4.3 Channel clamps to secure conduits to exposed steel work.

E16.4.4 Threaded rods to support suspended channels, sized for the load.

E16.5 Conduit Fittings

E16.5.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.

E16.5.2 Factory"ells" where 90E bends are required for 25 mm and larger conduits.

E16.5.3 Steel set screw connectors and couplings. Insulated throat liners on connectors.

E16.5.4 Raintight connectors and fittings c/w O-rings for use on weatherproof or sprinklerproof enclosures. Raintight couplings to be used for surface conduit installations exposed to moisture or sprinkler head.

E16.5.5 Explosion proof in hazardous areas to meet requirements of authorities having jurisdiction.

E16.6 Expansion Fittings for Rigid PVC Conduit

E16.6.1 Weatherproof expansion fittings suitable for 200 mm linear expansion.

E16.7 Fish Cord

E16.7.1 Polypropylene with 3M spare length at each conduit end.

E16.8 Installation

- E16.8.1 Drawings do not indicate all conduit runs. Those indicated are in diagrammatic form only.
- E16.8.2 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- E16.8.3 Conceal conduits except in mechanical and electrical service rooms.
- E16.8.4 Use epoxy coated conduit in corrosive areas.
- E16.8.5 Use electrical metallic tubing (EMT) within building (Centennial Pool).
- E16.8.6 Use rigid pvc conduit underground unless otherwise specified.
- E16.8.7 Use flexible metal conduit for connection to motors in dry areas, connection to recessed incandescent fixtures without a prewired outlet box, connection to surface or recessed fluorescent fixtures, transformers and equipment subject to vibration or movement. Provide a separate insulated grounding conductor within flexible conduit.
- E16.8.8 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.
- E16.8.9 Install conduit sealing fittings in hazardous areas. Fill with compound.
- E16.8.10 Minimum conduit size for lighting and power circuits: 19 mm.
- E16.8.11 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- E16.8.12 Mechanically bend steel conduit over 19 mm dia.
- E16.8.13 Install fish cord in empty conduits.
- E16.8.14 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
- E16.8.15 Dry conduits out before installing wire.
- E16.8.16 Conduit stubs from floor slabs where exposed to damage to be rigid galv. Steel.
- E16.8.17 The conduit sizes as shown or indicated are the minimum acceptable and shall not be reduced without the approval of the Contract Administrator.
- E16.8.18 Conduit to be sized as per Canadian Electrical Code or as shown on drawings and specifications. Note that the sizes of branch circuit conductors scheduled and/or specified on the drawings are minimum sizes and must be increased as required to suit length of run and voltage drop in accordance with Canadian Electrical Code. Where conductor sizes are increased to suit voltage drop requirements, increase the conduit size to suit.
- E16.8.19 Running threads will not be permitted; proper couplings shall be used.
- E16.8.20 Provide separate conduit system for emergency distribution.
- E16.8.21 All conduit runs passing across expansion joints of the building shall be installed utilizing approved expansion fittings, and bonding devices.
- E16.8.22 Refer to E8 for identification requirements.
- E16.8.23 All conduit systems in hazardous areas to be rigid galvanized steel to meet the requirements of the authorities having jurisdiction.
- E16.8.24 No power driven pins (Ramset) shall be utilized to secure any portion of the conduit.
- E16.9 Surface Conduits
 - E16.9.1 Run parallel or perpendicular to building lines.
 - E16.9.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.
 - E16.9.3 Run conduits in flanged portion of structural steel.
 - E16.9.4 Group conduits wherever possible.

- E16.9.5 Do not pass conduits through structural members except as indicated.
- E16.9.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.
- E16.10 Concealed Conduits
- E16.10.1 Run parallel or perpendicular to building lines.
- E16.10.2 Do not install horizontal runs in masonry walls.
- E16.10.3 Do not install conduits in terrazzo or concrete toppings.
- E16.11 Conduits in Cast-in-Place Concrete
- E16.11.1 Unless specifically noted, do not embed conduit into concrete.
- E16.11.2 Protect conduits from damage where they stub out of concrete.
- E16.11.3 Install sleeves where conduits pass through slab or wall.
- E16.11.4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed. Use cold mastic between sleeve and conduit.
- E16.12 Conduits Underground
- E16.12.1 Slope conduits to provide drainage.
- E16.12.2 Waterproof joints (pvc excepted) with heavy coat of bituminous paint.

E17. INSTALLATION OF CABLES AND TRENCHES IN DUCTS

- E17.1 Related Sections
- E17.1.1 E8 - Common Work Results - For Electrical.
- E17.2 References
- E17.2.1 Canadian Standards Association, (CSA International)
- E17.2.2 Insulated Cable Engineers Association, Inc. (ICEA)
- E17.3 Products
- E17.3.1 Cable Protection: 38 x 140 mm planks pressure treated with coloured, or copper naphthenate or 5% pentachlorophenol solution, water repellent preservative.
- E17.3.2 Markers: Concrete type cable markers: 600 x 600 x 100 mm with words: cable, joint or conduit impressed in top surface, with arrows to indicate change in direction of cable and duct runs
- E17.4 Execution
- E17.4.1 Cable Installation in Ducts
- (a) Install cables as indicated in ducts. Do not pull spliced cables inside ducts.
 - (b) Install multiple cables in duct simultaneously.
 - (c) Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
 - (d) To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.
 - (e) Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

- (f) After installation of cables, seal duct ends with duct sealing compound.

E17.4.2 Markers

- (a) Mark cable every 150 m along runs and changes in direction.
- (b) Where markers are removed to permit installation of additional cables, reinstall existing markers.
- (c) Lay concrete markers flat and centred over cable with top flush with finish grade.

E17.4.3 Field Quality Control

- (a) Perform tests in accordance with Section E8 - Common Work Results – Electrical.
- (b) Perform tests using qualified personnel. Provide necessary instruments and equipment.
- (c) Check phase rotation and identify each phase conductor of each feeder.
- (d) Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.
- (e) Pre-accepted tests
 - (i) After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.
 - (ii) Check insulation resistance after termination to ensure that cable system is ready for acceptance testing.
- (f) Accepted tests:
 - (i) Ensure that terminations and accessory equipment are disconnected.
 - (ii) Ground shields, ground wires, metallic armour and conductors not under test.
 - (iii) High Potential (Hipot) Testing. Conduct hipot testing in accordance with manufacturer's recommendations.
 - (iv) Leakage Current Testing.
 - (v) Raised voltage in steps from zero to maximum values as specified by ICEA for type of cable being tested.
 - (vi) Hold maximum voltage for specified time period by ICEA.
 - (vii) Record leakage current at each step.
- (g) Provide Contract Administrator with list of test results showing location at which each test was made, circuit tested and result of each test. Include copies in Maintenance Manuals.
- (h) Remove and replace entire length of cable if cable fails to meet any of test criteria.

E18. LIGHTING CONTROL DEVICES – PHOTOELECTRIC

E18.1 Related Sections

E18.1.1 Section E8 - Common Work Results - For Electrical.

E18.2 Product Data

E18.2.1 Submit product data in accordance with Section E8 - Common Work Results - For Electrical.

E18.3 Submittals

E18.3.1 Submit product data in accordance with Section E8 - Common Work Results - For Electrical.

E18.4 Photoelectric Lighting Control

E18.4.1 Wall mounting.

- E18.4.2 Capable of switching 1800 W of lighting at 120 or 400W at 347 V.
- E18.4.3 Voltage variation: plus or minus 10%.
- E18.4.4 Temperature range: minus 40 °C to plus 40 °C.
- E18.4.5 Photocell: Switch on lights at 20ix; Switch off lights at 400 ix.
- E18.4.6 Rated for 5000 operations.
- E18.4.7 Fail-safe circuit completed when relay de-energized.
- E18.4.8 Sensitivity adjustment.
- E18.4.9 Switching time delay of 30 s.
- E18.4.10 Wall mounting bracket where required.
- E18.4.11 Colour coded leads: size 10 AWG, 460 mm long.
- E18.5 Contractor
 - E18.5.1 Cabinet mounting.
 - E18.5.2 Capable of switching multiple lamp circuits with total lighting load of 6000 W.
 - E18.5.3 Waterproof enclosure (where outside).
 - E18.5.4 Manual override.
- E18.6 Acceptable Manufacturers
 - E18.6.1 Acceptable manufactures - Douglas Power Equipment Ltd.
- E18.7 Installation
 - E18.7.1 Install controls in accordance with manufacturer's instructions.

E19. MOULDED CASE CIRCUIT BREAKERS

- E19.1 References
 - E19.1.1 Canadian Standards Association (CSA)
 - .1 CSA-C22.2 No. 5-02, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).
- E19.2 Submittals
 - E19.2.1 Submit product data & shop drawings in accordance with Section E8 - Common Work Results - For Electrical.
 - E19.2.2 Include time-current characteristic curves for breakers with ampacity of 100 A and over.
- E19.3 Breakers General
 - E19.3.1 Moulded-case circuit breakers, Circuit breakers, and Ground-fault circuit-interrupters: to CSA C22.2 No. 5.
 - E19.3.2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.
 - E19.3.3 Common-trip breakers: with single handle for multi-pole applications.
 - E19.3.4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting. Trip settings on breakers with adjustable trips to range from 3-8 times current rating.

- E19.3.5 Circuit breakers with interchangeable trips as indicated.
- E19.3.6 Minimum Interrupting Ratings (RMS Symmetrical) unless otherwise indicated: 120/208 Volts - to match existing.
- E19.4 Thermal Magnetic Breakers Design
 - E19.4.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.
- E19.5 Manufacturers
 - E19.5.1 Acceptable manufacturers: To match existing.
- E19.6 Installation
 - E19.6.1 Install circuit breakers as indicated.

E20. LIGHTING

- E20.1 Related Sections
 - E20.1.1 Section E8 - Common Work Results - For Electrical.
- E20.2 References
 - E20.2.1 American National Standards Institute (ANSI)
 - .1 ANSI C82.1-97, Electric Lamp Ballasts-Line Frequency Fluorescent Lamp Ballast.
 - .2 ANSI C82.4-92, Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps.
 - E20.2.2 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)
 - .1 ANSI/IEEE C62.41, Surge Voltages in Low-Voltage AC Power Circuits.
 - E20.2.3 American Society for Testing and Materials (ASTM)
 - .1 ASTM F1137-88, Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.
 - E20.2.4 United States of America, Federal Communications Commission (FCC)
 - .1 FCC (CFR47) EM and RF Interference Suppression.
- E20.3 Submittals
 - E20.3.1 Submit shop drawings in accordance with Section E8 - Common Work Results - For Electrical.
 - E20.3.2 Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Contract Administrator.
- E20.4 Lamps
 - E20.4.1 Provide lamps as indicated.
 - E20.4.2 HID lamps shall be rated 20,000 hours with coating as designated and universal mounting.
- E20.5 Ballasts
 - E20.5.1 High pressure sodium ballast: to ANSI C82.4 design.
 - .1 Rating: 60Hz voltage as indicated, for use with high pressure sodium lamps.

- .2 Totally encased and designed for 40°C ambient temperature.
- .3 Power factor: minimum 95 % with 95% of rated lamp lumens.
- .4 Type: solid state with matching igniter as recommended by manufacturer.
- .5 Input voltage range: plus 5% to minus 5% plus 10% to minus 10% of nominal.
- .6 Minimum starting temperature: minus 34°C at 90% line voltage.
- .7 Mounting: integral with luminaire.
- .8 Crest factor: 1.8 maximum current, 2.0 maximum voltage.

E20.6 Site Lighting

- E20.6.1 Provide post top, landscape and roadway luminaires as indicated.
- E20.6.2 Concrete bases to be provided for pole mounted luminaires and bollards as detailed. Anchor bolts to be designed to suit local wind conditions.
- E20.6.3 Provide a hand hole and ground lug on each pole.

E20.7 Finishes

E20.7.1 Baked enamel finish:

- .1 Conditioning of metal before painting:
 - .1 For corrosion resistance conversion coating to ASTM F1137.
 - .2 For paint base, conversion coating to ASTM F1137.
- .2 Metal surfaces of luminaire housing and reflectors finished with high gloss baked enamel or polyester powdercoat or alzak aluminum to give smooth, uniform appearance, free from pinholes or defects.
- .3 Reflector and other inside surfaces finished as follows:
 - .1 White, minimum reflection factor 85%.
 - .2 Colour fastness: yellowness factor not above 0.02 and after 250 hours exposure in Atlas fade-ometer not to exceed 0.05.
 - .3 Film thickness, not less than 0.03 mm average and in no areas less than 0.025 mm.
 - .4 Gloss not less than 80 units as measured with Gardner 60E gloss meter.
 - .5 Flexibility: withstand bending over 12 mm mandrel without showing signs of cracking or flaking under 10 times magnification.
 - .6 Adhesion: 24 mm square lattice made of 3 mm squares cut through film to metal with sharp razor blade. Adhesive cellulose tape applied over lattice and pulled. Adhesion satisfactory if no coating removed.

E20.7.2 Alzk finish:

- .1 Aluminum sheet fabricated from special aluminum alloys and chemically brightened, subsequently anodically treated to specifications established by Alcoa, to produce:
 - .1 Finish for mild commercial service, minimum density of coating 7.8 g/m², minimum reflectivity 83% for specular, 80.5% for semi-specular and 75% for diffuse.
 - .2 Finish for regular industrial service, minimum density of coating 14.8 g/m², minimum reflectivity 82% for specular and 73% for diffuse.

- .3 Finish for heavy duty service, minimum density of coating 21.8 g/m², minimum reflectivity 85% for specular, 65% for diffuse.

E20.8 Light Control Devices

E20.8.1 Design:

- .1 Lens type: as per Luminaire Schedule.
- .2 Treatment: ultraviolet inhibited.
- .3 Frame: as per Luminaire Schedule.
- .4 Type: reflector.

E20.9 Luminaires

E20.9.1 H.I.D. and H.P.S. luminaire design: as per Luminaire Schedule.

E20.10 Installation

- E20.10.1 Install luminaires at locations indicated, c/w lamps, all wiring, connections, fittings, hangers, aligners, box covers and accessories, as required.
 - E20.10.2 Install luminaires and lens materials in architectural details, as indicated.
 - E20.10.3 Install luminaires parallel with building lines. Wall mounted luminaires to be installed plumb.
 - E20.10.4 Review all ceiling types, construction details and mounting arrangements before placing luminaire orders and ensure that all mounting assemblies, frames, rings and similar features are included for and match the required installation.
 - E20.10.5 All luminaires and assemblies shall be properly secured and supported. Support luminaires independent of the ceiling construction c/w all fasteners, framing and hangers as may be required. Do not secure luminaires to mechanical ductwork or other vibration producing apparatus, unless specifically detailed on the drawings.
 - E20.10.6 Co-ordinate the installation of luminaires with the work of other trades, ensuring that the necessary depths and mounting spaces are provided. Luminaires which cannot be installed due to a conflict with structural members, pipes or ductwork shall be relocated to a more suitable location, as directed by the Contract Administrator.
 - E20.10.7 Install post top, landscape and roadway luminaires plumb.
- ## E20.11 Wiring
- E20.11.1 Connect luminaires to lighting circuits as indicated.
- ## E20.12 Lamps
- E20.12.1 Adjust lamp position in adjustable lampholder type luminaires to produce the proper beam distribution for the specified lamp.
- ## E20.13 Tests
- E20.13.1 Perform tests in accordance with Section E8.
- ## E20.14 Cleaning
- E20.14.1 Prior to take-over of the project, clean the lenses and reflectors of all luminaires with a damp cloth to remove dust, smudges and fingerprints.

E21. EARTH AND BASE WORKS

E21.1 Description

E21.1.1 This specification shall cover all labour, materials, methods, equipment and accessories for sub-grade compaction, and the supply and installation of crushed limestone base course material, geotextile fabric, and sub-grade compaction.

E21.2 References

E21.2.1 The City of Winnipeg Standard Construction Specifications

- .1 CW 3110 – Sub-Grade, Sub-Base and Base Course Construction
- .2 CW 3130 – Supply and Install Geotextile Fabrics

E21.3 Materials

E21.3.1 All materials shall conform to CW 3110 and CW 3130.

E21.4 Construction Method

E21.4.1 All construction methods shall conform to CW 3110 and CW 3130.

E21.5 Measurement and Payment

E21.5.1 Sub-grade compaction will be paid for on a square metre basis. Price shall be payment in full for supplying materials and for performing the Work.

E21.5.2 Geotextile fabric will be paid for on a lump sum basis. Price shall be payment in full for supplying materials and for performing the Work.

E21.5.3 Crushed limestone base course material will be paid for on a cubic metre basis. Price shall be payment in full for supplying materials and for performing the Work.

E22. ADJUSTMENTS

E22.1 Description

E22.1.1 Provide all labour, materials, methods, equipment and accessories for the adjustment of water valve.

E22.2 References

E22.2.1 The City of Winnipeg Standard Construction Specifications

- .1 CW 3210 – Adjustment of Pavement and Boulevard Structures.

E22.3 Materials

E22.3.1 All materials shall conform to CW 3210.

E22.4 Construction Method

E22.4.1 All construction methods shall conform to CW 3210.

E22.5 Measurement and Payment

E22.5.1 Adjustment of water valve will be paid on a unit each basis. Price shall be payment in full for supplying materials and for performing the Work.

E23. HANDRAILS AND CHAIN LINK FENCE

E23.1 Description

E23.1.1 Provide all labour, materials, methods, equipment and accessories for the fabrication and installation of stair handrail and galvanized chain link fence.

E23.2 References

- E23.2.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM A53/A53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A269-02, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .3 ASTM A307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- E23.2.2 Canadian Standards Association (CSA International)
- .1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel.
 - .2 CAN/CSA-G164-M93(R1998), Hot Dip Galvanized or Irregularly Shaped Articles, or latest.
 - .3 CAN/CSA-S16.1-01, Limit States Design of Steel Structures.
 - .4 CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .5 CSA W59-1989, R2001, Welded Steel Construction, Metal Arc Welding, Imperial Version.
- E23.2.3 The City of Winnipeg Standard Construction Specifications
- .1 CW 3550 – Chain Link Fencing.
- E23.3 Submittals
- E23.3.1 Submit product data, samples and shop drawings of the stair handrail and galvanized chain link fence to Contract Administrator.
- E23.3.2 Indicate dimensions, sizes, assembly, anchorage and installation details for stair handrail.
- E23.3.3 Use construction drawings as reference only. Field verify as-built stair dimensions. Report any discrepancies to Contract Administrator if as-built conditions are significantly different from drawings.
- E23.3.4 Clearly indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number and size of anchors, supports, reinforcement, details and accessories.
- E23.3.5 Indicate and list hardware and miscellaneous items.
- E23.3.6 Provide templates, patterns, fixing diagrams as required.
- E23.3.7 Indicate related, adjacent materials, and connections.
- E23.4 Delivery, Storage and Handling
- E23.4.1 Deliver materials to Site, suitably packaged, clearly marked indicating manufacturer name and any other identifying symbols or information. Do not deliver materials long before they are required on Site. Cause no delays to scheduling.
- E23.4.2 Temporarily store materials in storage areas as directed by the Contract Administrator.
- E23.4.3 Cover exposed stainless steel with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job Site.
- E23.4.4 Leave protective covering in place until final cleaning of Site. Provide instructions for removal of protective covering.
- E23.4.5 Store materials in a dry location off the ground, and prevent damage.
- E23.4.6 Materials that have been damaged or deemed unfit for use during delivery or storage shall be immediately replaced at no cost to The City.

E23.5 Site Conditions

E23.5.1 Make a careful examination of the building, Site and structures and investigate all matters relating to the nature of the work to be undertaken, the means of access and egress, the rights and interests which may be interfered with during the construction of the work.

E23.5.2 Report any discrepancies or omissions to the Contract Administrator, who will issue written clarification. Oral interpretations or instructions are not acceptable.

E23.6 Waste Management and Disposal

E23.6.1 Separate metal, plastic, wood and corrugated cardboard packing and place in area designated for disposal and recycling.

E23.7 Suppliers

E23.7.1 Acceptable Suppliers: Stair handrail shall be supplied by a local approved custom fabricator with more than five (5) years of proven experience.

E23.8 Materials

E23.8.1 Chain link fence as per CW 3550.

E23.8.2 Stair Handrail:

- .1 Handrail: 38mm Dia. stainless steel seamless round tubing.
- .2 Post: 25mm stainless steel square tubing with 25 x 25 x 3mm stainless steel flat bar cap.
- .3 Post Reducer: 6 x 6 x 12mm stainless steel square bar.
- .4 Base Plate: 50 x 50 x 5mm stainless steel.

E23.8.3 Accessories:

- .1 Welding materials: to CSA W59.
- .2 Welding to CSA W48 Series.
- .3 Caulk: GE Silicone II window and door caulking, clear, or approved equal in accordance with B6.

E23.9 Fabrication

E23.9.1 Obtain approval of shop drawings prior to ordering materials and commencing fabrication.

E23.9.2 Fabricate work square, true, straight and accurate to required sizes, with joints closely fitted and properly secured.

E23.9.3 Use self-tapping, shake-proof, counter-sunk or hidden screws on items requiring assembly by screws.

E23.9.4 Where possible, fit and shop assemble work, ready for erection.

E23.9.5 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

E23.9.6 De-grease and be-bur all sharp edges in the shop left behind after fabrication is complete.

E23.9.7 Chain link fence as per CW 3550.

E23.10 Installation

E23.10.1 Erect metalwork square, plumb, straight and true, accurately fitted, with tight joints and intersections.

E23.10.2 Provide suitable and acceptable means of anchorage, such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

- E23.10.3 Stair handrail to be surface mounted to concrete.
- E23.10.4 Exposed fastening devices to match finish and be compatible with material through which they pass, as per the drawings.
- E23.10.5 Do welding work in accordance with CSA W59, unless specified otherwise.
- E23.10.6 Make field connections with high tensile bolts, or weld to CSA S16.1-M (latest).
- E23.10.7 Touch up rivets, field welds, bolts and burnt or scratched surfaces after erection.
- E23.10.8 Chain link fence as per CW 3550.
- E23.11 Acceptance
 - E23.11.1 Work will be accepted only if it is erected true to the design intent in conformation with shop drawings and Site instructions.
- E23.12 Clean Up
 - E23.12.1 Upon completion of installation, remove construction and accumulated environmental dirt, surplus materials, rubbish, tools and equipment barriers.
- E23.13 Measurement and Payment
 - E23.13.1 Stair handrail will be paid on a lump sum basis. Price shall be payment in full for supplying materials and for performing the Work
 - E23.13.2 Chain link fence will be paid on a lineal metre basis. Price shall be payment in full for supplying materials and for performing the Work.

E24. TREE PROTECTION

- E24.1 Description
 - E24.1.1 Provide all labour, materials, methods, equipment and accessories for the protection of existing trees within and immediately outside the limit of work with temporary barriers for the duration of construction activities on Site.
- E24.2 References
 - E24.2.1 Agriculture and Agri-Food Canada (AAFC).
 - .1 Plant Hardiness Zones in Canada, 2000.
 - E24.2.2 Canadian Nursery Landscape Association (CNLA).
 - .1 Canadian Standards for Nursery Stock, 2001.
 - E24.2.3 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
 - .2 Transportation of Dangerous Goods Act (TDGA), 1992, c.34.
 - E24.2.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Materials Safety Data Sheets (MSDS).
- E24.3 Submittals
 - E24.3.1 Submit product data for: plastic web snow fence and snow fence supports to Contract Administrator.
- E24.4 Scheduling
 - E24.4.1 Obtain approval from the Contract Administrator of schedule indicating beginning of Work.

E24.5 Waste Management and Disposal

E24.5.1 Separate metal, plastic, wood and corrugated cardboard packing and place in designated areas for disposal or recycling.

E24.6 Materials

E24.6.1 Barrier Material: plastic UV stabilized, high density polyethylene web snow fence, international orange colour, 1.22 meter height, or approved equal in accordance with B6.

E24.6.2 Snow Fence Supports: rolled steel T-bar fence posts, or approved equal in accordance with B6.

E24.7 Identification and Protection

E24.7.1 All tree protection is to be in place prior to start of Site works and stay in place until construction completion.

E24.7.2 All trees identified for protection on Drawings are to remain and be protected from damage, except for trees designated to be removed.

E24.7.3 Obtain approval from the Contract Administrator of proposed barrier locations and materials prior to installation. Barriers shall be as large as practical, extending beyond the drip line (edge of canopy) where space allows. In a tight locations, a minimum 2m radius around the tree trunk is recommended as barrier location.

E24.7.4 Install fencing straight plumb, true and secure. All supports and bracing used to safely secure the barrier should be located outside the trees root zone defined by the extent of the tree canopy above. All supports and bracing should minimize damage to roots.

E24.7.5 Once the tree protection zone is established no vehicular traffic, material storage, refuse dumping or any other encroachment other than foot traffic shall be allowed in the protected area.

E24.7.6 Where some fill or excavation must be temporarily located near the tree protection zone, a plywood barrier must be used to ensure no material enters the tree protection zone.

E24.7.7 Ensure no pruning is done inside drip line. If pruning inside drip line is required consult a Certified Arborist or Canadian Certified Horticultural Technician (CCHT) as approved by the Contract Administrator.

E24.8 Excavation, Trenching, and Tunneling

E24.8.1 No excavation, tunneling or trenching is permitted within the tree protection zone.

E24.8.2 If utility have to traverse protected areas with large trees the Contractor must obtain written approval to remove the necessary specimens from the Contract Administrator or arrange to push pipes a minimum 2.4m below existing grades as possible for the entire span of the tree canopy above.

E24.9 Cleaning

E24.9.1 Upon completion of installation, remove construction and accumulated environmental dirt, surplus materials, rubbish, tools and equipment barriers.

E24.10 Acceptance

E24.10.1 The Contract Administrator will inspect the placement of tree protection barriers when initially installed and determine acceptance.

E24.11 Measurement and Payment

E24.11.1 Tree protection shall be included in the cost of the Work. No measurement or payment will be made for this work.

E25. ASPHALT PAVING

E25.1 Description

E25.1.1 Provide all labour, materials, methods, equipment and accessories for the supply and installation of asphalt paving.

E25.2 References

E25.2.1 The City of Winnipeg Standard Construction Specifications

- .1 CW 3110 – Sub-Grade, Sub-Base and Base Course Construction
- .2 CW 3130 – Supply and Installation of Geotextile Fabrics
- .3 CW 3410 – Asphaltic Concrete Pavement Works

E25.3 Materials

E25.3.1 All materials shall conform to CW 3410, CW 3110, and CW 3130.

E25.4 Construction Method

E25.4.1 All construction methods shall conform to CW 3410, CW 3110, and CW 3130.

E25.5 Measurement and Payment

E25.5.1 Asphalt paving shall be paid for on a square metre basis. Price shall be payment in full for supplying materials and for performing the Work.

E26. SITE CONCRETE

E26.1 Description

E26.1.1 Provide all labour, materials, methods, equipment and accessories for the supply and installation of: concrete retaining wall, concrete curb, concrete sidewalk curb ramp, concrete stairs, concrete box culvert, concrete sidewalk, and concrete light standard base.

E26.2 References

E26.2.1 The City of Winnipeg Standard Construction Specifications

- .1 CW 3130 – Supply and Installation of Geotextile Fabrics
- .2 CW 3310 – Portland Cement Concrete Pavement Works
- .2 CW 3325 – Portland Cement Concrete Sidewalk
- .3 SD 228A – Concrete Sidewalk
- .4 SD 229A – Curb Ramp Layout Intersections

E26.3 Materials

E26.3.1 All materials shall conform to CW 3130, CW 3310, CW 3325, SD 228A and SD 229A.

E26.4 Construction Method

E26.4.1 All construction methods shall conform to CW 3130, CW 3310, CW 3325, SD 228A and SD 229A.

E26.5 Measurement and Payment

E26.5.1 Concrete retaining wall shall be paid for on a lineal metre basis. Price shall be payment in full for supplying materials and for performing the Work.

- E26.5.2 Concrete curb shall be paid for on a lineal metre basis. Price shall be payment in full for supplying materials and for performing the Work.
- E26.5.3 Concrete sidewalk curb ramp shall be paid for on a lineal metre basis. Price shall be payment in full for supplying materials and for performing the Work.
- E26.5.4 Concrete stairs shall be paid for on a lump sum basis. Price shall be payment in full for supplying materials and for performing the Work.
- E26.5.5 Concrete box culvert shall be paid for on a lump sum basis. Price shall be payment in full for supplying materials and for performing the Work.
- E26.5.6 Concrete sidewalk shall be paid for on a square metre basis. Price shall be payment in full for supplying materials and for performing the Work.
- E26.5.7 Concrete light standard base shall be paid for a unit each basis. Price shall be payment in full for supplying materials and for performing the Work.

E27. PAVEMENT MARKING

E27.1 Description

- E27.1.1 Provide all labour, materials, methods, equipment and accessories for the supply and installation of parking lot pavement marking.

E27.2 References

- E27.2.1 CAN/CGSB-1.5M91, Low Flash Petroleum Spirits Thinner.
- E27.2.2 CGSB1-GP-12c-68, Standard Paint Colours.
- E27.2.3 CGSB1-GP-71-83, Method, of Testing Paints and Pigments.
- E27.2.4 CGSB1-GP-74M-79, Paint, Traffic, Alkyd.

E27.3 Submittals

- E27.3.1 Proof of Non-Toxic Composition: Product data confirming chemical composition for traffic paint conforms to the latest health and environmental standards.
- E27.3.2 Samples to Contract Administrator the following material sample quantities at least 2 weeks prior to commencing work and Mark samples with name of project and its location, paint manufacturer's name and address, name of paint, CGSB specification number and formulation number and batch number:
 - .1 One painted sample of paint.
 - .2 Sampling to CGSB1-GP-71.

E27.4 Waste Management and Disposal

- E27.4.1 Separate metal, plastic, wood and corrugated cardboard packing and place in designated areas for disposal or recycling.

E27.5 Materials

- E27.5.1 Paint: to CGSB1-GP-74M, alkyd traffic paint.
- E27.5.2 Colour: Yellow 505-308.
- E27.5.3 Thinner: to CAN/CGSB-1.5.

E27.6 Paint Equipment Requirements

- E27.6.1 Paint applicator to be an approved pressure type mobile distributor capable of applying paint in single line(s). Applicator to be capable of applying marking components uniformly, at rates specified, and to dimensions as indicated, and to have positive shut-off.

E27.7 Condition of Surfaces

E27.7.1 Pavement surface to be dry, free from ponding water, frost, ice, dust, oil, grease and other foreign materials. Clean paved areas as necessary to achieve acceptable surface preparation.

E27.8 Traffic Control

E27.8.1 Barricade areas to be painted to all vehicular traffic during installation and for 4 hours after installation.

E27.9 Application

E27.9.1 Lay out pavement lines as indicated on the drawings. Obtain Contract Administrator approval prior to painting.

E27.9.2 Unless otherwise approved by Contract Administrator, apply paint only when air temperature is above 10°C, wind speed is less than 60 km/h and no rain is forecast within the next 8 hours.

E27.9.3 Apply paint evenly at rate of 3 sq.m per litre. Do not thin paint unless approved by Contract Administrator.

E27.9.4 Paint lines to be 100mm wide, of uniform colour and density with sharply defined edges.

E27.9.5 Thoroughly clean distributor tank before refilling with paint of different colour.

E27.10 Tolerance

E27.10.1 Paint markings to be within plus or minus 6mm of dimensions indicated, straight and true and aligned with fixed features such as curbs, sidewalks and walls.

E27.10.2 Remove incorrect markings and re-apply at no extra cost to The City.

E27.11 Protection of Completed Work

E27.11.1 Protect pavement markings until dry.

E27.12 Cleaning

E27.12.1 Upon completion of installation, remove construction and accumulated environmental dirt, surplus materials, rubbish, tools and equipment barriers.

E27.13 Measurement and Payment

E27.13.1 Pavement marking shall be paid for on a lump sum basis. Price shall be payment in full for supplying materials and for performing the Work.

E28. PLANTING MEDIUM

E28.1 Description

E28.1.1 This specification shall cover the supply and install of planting medium in rock mulch planting beds, wood mulch / perennial planting beds and deciduous tree planting.

E28.2 References

E28.2.1 Agriculture and Agri-Food Canada

.1 The Canadian System of Soil Classification, Third Edition, 1998.

E28.2.2 Canadian Council of Ministers of the Environment (CCME) Guidelines.

E28.2.3 The City of Winnipeg Standard Construction Specifications

.1 CW 3540 – Topsoil and Finish Grading for Establishment of Turf Areas

E28.3 Submittals

- E28.3.1 Submit 0.5kg sample of topsoil to National Testing Laboratory, or approved alternate, and indicate present use and intended use. Prepare and ship sample in accordance with Provincial regulations and testing laboratory requirements.
- E28.3.2 Submit two (2) copies of soil analysis and recommendations for corrections to Contract Administrator.

E28.4 Quality Assurance

- E28.4.1 Inform Contract Administrator of proposed source of materials to be supplied and provide a sample for review by Contract Administrator prior to installation.
- E28.4.2 Testing of growing medium to be carried out and paid for by Contractor. Prepare and ship planting medium samples to approved laboratory in accordance with Provincial regulations and laboratory requirements, indicating intended use on each sample.
- E28.4.3 Test planting medium for nutrients N, P, K, micronutrients, soluble salt content, pH value and OM (organic matter).
- E28.4.4 Acceptance of growing medium is subject to an inspection of material and confirmation of test results. Do not commence soft landscaping work until Contract Administrator has accepted growing medium.

E28.5 Delivery, Storage and Handling

- E28.5.1 Store materials in a dry area, protected from freezing, sedimentation and contamination.
- E28.5.2 Deliver and store fertilizer in waterproof bags labeled with weight, analysis and name of manufacturer.

E28.6 Waste Management and Disposal

- E28.6.1 Separate metal, plastic, wood and corrugated cardboard packing and place in designated areas for disposal or recycling.

E28.7 Materials

- E28.7.1 Planting Medium: In accordance with CW 3540 for topsoil except organic matter to be in the range of 5-10%.
- E28.7.2 Peatmoss: deliver from partially decomposed fibrous or cellular stems and leaves of species of sphagnum mosses. Elastic and homogeneous, brown in colour. Free of wood and deleterious material that could prohibit growth. Shredded particle minimum size: 5 mm.
- E28.7.3 Sand: hard fine silica sand, well washed and free of impurities, chemical or organic matter. Coarse texture, and to the following gradation:

<u>Particle Size (mm)</u>	<u>% Passing through Screen</u>
2.0	100%
1.0	95 to 100%
0.5	80 to 100%
0.25	0 to 30%
0.15	0 to 8%
0.075	0 to 1%

- E28.7.4 Fertilizer: Synthetic start-up slow release fertilizer with a N-P-K analysis of 12-36-15 ratio at a rate of 4 kg per 100 m² which is 8 pounds per 100 sq ft.

E28.8 Excavation

- E28.8.1 Excavate planting beds by hand unless otherwise directed by Contract Administrator. Dispose of all rock, clay soils and other deleterious materials off Site.

- E28.8.2 Protect bottom of excavations against freezing.
- E28.8.3 Remove water that enters excavations and planters prior to planting. Ensure source of water is not groundwater.
- E28.8.4 Scarify bottom and sides of tree planting pits to depth of 150 mm.
- E28.8.5 Cover bottom of each tree pit with bone meal fertilizer.
- E28.8.6 Verify and obtain approval by Contract Administrator of planting beds complete filter fabric prior to compacted soil mound and growing medium placement.
- E28.9 Planting Medium Placement
 - E28.9.1 Place planting medium in uniform layers over approved, unfrozen sub-grade, to the depth indicated on the Drawings.
 - E28.9.2 Eliminate rough spots and low areas, Prepare a loose, friable bed, boot firm and level.
- E28.10 Soil Amendments
 - E28.10.1 Apply lime, sulphur, or other soil amendment at a rate determined and recommended from planting medium sample test.
 - E28.10.2 Mix soil amendment well into full depth topsoil prior to application of fertilizer.
- E28.11 Finish Grading
 - E28.11.1 As per CW 3540.
 - E28.11.2 Fine grade entire soil area to elevations as indicated on the drawings. Eliminate rough spots and low areas Leave surfaces smooth, uniform and firm against foot printing with a fine loose texture.
- E28.12 Surplus Material
 - E28.12.1 Dispose of unused growing medium off Site in accordance with CW 1130.
- E28.13 Cleaning
 - E28.13.1 Perform cleaning to remove accumulated environmental dirt from all paved surfaces of building faces. Remove surplus materials, rubbish, tools and equipment barriers.
- E28.14 Measurement and Payment
 - E28.14.1 Planting Medium shall be paid for a cubic metre basis. Price shall be payment in full for supplying materials and for performing the Work.

E29. SODDING

- E29.1 Description
 - E29.1.1 This specification shall cover the supply and install of sodding.
- E29.2 References
 - E29.2.1 The City of Winnipeg Standard Construction Specifications
 - .1 CW 3510 – Sodding
 - .2 SD 243 – Sodding Details
- E29.3 Materials
 - E29.3.1 All materials shall conform to CW 3510 and SD 243.
- E29.4 Construction Method

E29.4.1 All construction methods shall conform to CW 3510 and SD 243.

E29.5 Measurement and Payment

E29.5.1 Sodding shall be paid for a square metre basis. Price shall be payment in full for supplying materials and for performing the Work.

E30. TREES, SHRUBS, AND GROUNDCOVER PLANTING

E30.1 Description

E30.1.1 This specification shall cover the supply and installation of trees and perennials.

E30.2 References

E30.2.1 Agriculture and Agri-Food Canada (AAFC)

.1 Plant Hardiness Zones in Canada-2000.

E30.2.2 Canadian Nursery Landscape Association (CNLA)

.1 Plant Canadian Standards for Nursery Stock-2001.

E30.2.3 Department of Justice Canada (JUS)

.1 Plant Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.2 Transport of Dangerous Goods Act (TDGA), 1992, c.34.

E30.2.4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Materials Safety Data Sheets (MSDS).

E30.2.5 The City of Winnipeg Standard Construction Specifications

.1 CW 3130 – Supply and Installation of Geotextile Fabrics

E30.3 Submittals

E30.3.1 Submit product data for:

.1 Fertilizer.

.2 Anti-desiccant.

.3 Guying assembly including clamps, garden hose, guying wire, anchors, and wire tightener.

.4 Wood chip mulch.

.5 Geotextile fabric.

E30.3.2 Submit samples for:

.1 Wood chip mulch.

.2 Geotextile fabric.

.3 River rock mulch.

.4 Stone rip-rap.

E30.4 Source Quality Control

E30.4.1 Obtain approval from Contract Administrator of plant material at source.

E30.4.2 Notify Contract Administrator of source of material at least seven (7) days in advance of shipment. No work under this Section is to proceed without approval.

- E30.4.3 Acceptance of plant material at source does not prevent rejection on Site prior to or after planting operations.
- E30.4.4 Plant material imported from other nations will not be accepted.
- E30.4.5 Bare root plant material will not be accepted.
- E30.5 Storage and Protection
- E30.5.1 Coordinate the shipping of plants and excavation of holes to ensure minimum time laps between digging and planting.
- E30.5.2 Tie branches of trees securely and protect plant material against abrasion, exposure and extreme temperature change during transit. Avoid binding of planting stock with rope or wire that would damage bark, break branches or destroy natural shape of plant. Give full support to rootball and large trees during lifting.
- E30.5.3 Protect plant material from damage during transportation:
- .1 When delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.
 - .2 When delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.
 - .3 Protect foliage and rootballs using anti-desiccants and tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.
- E30.5.4 Remove broken and damaged roots with sharp pruning shears. Make clean cut and cover cuts over 20mm (3/4") diameter with wound dressing.
- E30.5.5 Keep roots moist and protect from sun and wind. Heel-in trees that cannot be planted immediately in shaded areas and water well.
- E30.6 Scheduling
- E30.6.1 Order plant material as soon as possible after award of contract to ensure plant availability. Request substitutes as required.
- E30.6.2 Provide Contract Administrator a written schedule fourteen (14) days in advance of shipment of plant material. Schedule to include: quantity and type of plant material, shipping dates, arrival dates on Site, and planting dates.
- E30.7 Warranty of Nursery Stock
- E30.7.1 For trees over 63mm (2.5") calliper a 24 month warranty period is required. For all other plant material an 18 month warranty period is required.
- E30.7.2 During the warranty period, upon written notification from the Contract Administrator, the Contractor warrants to replace and replant any nursery stock found dead and/or in poor condition as soon as possible thereafter, 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. Exempted is nursery stock damaged by accidental causes or vandalism, which stock shall be replaced at the cost of The City.
- E30.7.3 End-of-Warranty inspection will be conducted by Contract Administrator.
- E30.7.4 Contact Administrator reserves the right to extend Contractor's warranty responsibilities for an additional one (1) year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.
- E30.8 Replacements
- E30.8.1 During warranty period, remove from Site any plant material that has died or failed to grow satisfactorily as determined by the Contract Administrator. Dispose of material as per E30.9.

- E30.8.2 Extend warranty on replacement plant material for a period equal to the original warranty period.
- E30.8.3 All required replacements shall be by plants of at least the same size and species as specified, and shall be supplied and planted in accordance with the original Drawings and Specifications.
- E30.8.4 Should the replaced plant material not survive, the Contractor will be responsible to replace it a third time and guarantee it for a period equal to the original warranty period unless it is determined that unique Site conditions or inadequate maintenance causes the death of plants
- E30.9 Waste Management and Disposal
- E30.9.1 Separate metal, plastic, wood and corrugated cardboard packing and place in designated areas for disposal or recycling.
- E30.10 Plant Material
- E30.10.1 Type of root preparation, sizing, grading and quality: comply to Canadian Standards for Nursery Stock.
- E30.10.2 Source of plant material: grown in Zone 2 or 3 only in accordance with Plant Hardiness Zones in Canada.
- E30.10.3 Plant material must be planted in zone indicated as appropriate for its species.
- E30.10.4 Plant material free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.
- E30.10.5 Plant species, cultivars and sizes as indicated on the Drawings.
- E30.10.6 Trees: with straight trunks, well and characteristically branched for species except where specified otherwise.
- E30.10.7 Container grown stock: acceptable if containers are large enough for root development. Trees must have grown in container for minimum of one growing season but not longer than two. 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.
- E30.10.8 Balled and burlapped: deciduous trees in excess of 3 m (10') height must have been dug with large firm ball. Rootballs must include 75% of fibrous and feeder root system. This excludes use of native trees grown in light sandy or rocky soil. Secure rootballs with burlap, heavy twine and rope. For large trees wrap rootball in double layer of burlap and drum lace with minimum 10 mm (1/2") diameter rope. Protect rootballs against sudden changes in temperature and exposure to heavy rainfall.
- E30.10.9 Tree spade dug material: dig plant material with mechanized digging equipment of hydraulic spade or clam-shell type. Rootballs to satisfy CNTA standards. Lift rootball from hole, place in wire basket designed for purpose and line with burlap. Replace rootball and tie basket to ball with heavy rope. Take care not to injure trunk of tree with wire basket ties or rope.
- E30.10.10 Substitutions to plant material as indicated on planting plan are not permitted unless written approval has been obtained as to type, variety and size. Plant substitutions must be of similar species and of equal size as those originally specified
- E30.10.11 Refer to Plant Specification List on the Drawings for species, quantities, size and quality of plant materials.
- E30.11 Water

- E30.11.1 Water free of impurities that would hinder plant growth. The Contractor shall provide water, so that all costs to provide water for the watering operation and all associated costs shall be borne by the Contractor. These costs may include hydrant permit and meter rental fees.
- E30.11.2 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.
- E30.12 Planting Medium: backfill with planting medium as specified in Section E28 – Planting Medium.
- E30.13 Stakes: 76 dia. x 2440 mm wooden stakes, or approved equal in accordance with B6.
- E30.14 Heavy Duty Baler Twine: Polypropylene baler twine, UV protected.
- E30.15 Guying Wire: 9 guage, flexible, non-corrosive strand wire.
- E30.16 Wire Tightner: PG wire tightner.
- E30.17 Clamps: U-bolt: galvanized, 12 mm (1/2") \varnothing , c/w curved retaining bar and hex nuts.
- E30.18 Anchors: Drive-in Type: 12 mm (1/2") \varnothing x 102 mm (4") long, aluminum.
- E30.19 Tree Protection: Plastic 13 mm \varnothing , nylon reinforced garden hose over guy wire.
- E30.20 Protection Collar: white PVC plastic pipe protection collar, 300 mm ht.
- E30.21 Anti-Desiccant: wax-like emulsion.
- E30.22 Geotextile Fabric: as per CW 3130.
- E30.23 Wood Chip Mulch: wood chip mulch varying in size from 50 mm to 75 mm and 5 to 20 mm thick, free of bark. Wood chip shall be mulched locally within 80 km of the Site,
- E30.24 River Rock Mulch (Rock mulch beds): 100 - 300 mm granite boulders.
- E30.25 Stone Rip-Rap (box culvert): 100 - 200 mm granite boulders.
- E30.26 Fertilizer: synthetic start-up slow release fertilizer with a N-P-K analysis of 12-36-15 ratio at a rate of 4 kg per 100 m² which is 8 pounds per 100 sq ft.
- E30.27 Pre-Planting Preparation
- E30.27.1 Obtain approval from Contract Administrator of finish grading, and growing medium installation prior to commencing work in this section
- E30.27.2 Ensure plant material is acceptable to the Contract Administrator.
- E30.27.3 Remove damaged roots and branches from plant material with sharp clean equipment treating wounds as necessary to maintain plant health.
- E30.27.4 Apply anti-desiccant to deciduous trees in leaf in accordance with manufacturer's instructions.
- E30.28 Plant Material Layout
- E30.28.1 Prepare planting beds as per Section E28 – Planting Medium.
- E30.28.2 Lay out plants in pots on beds for Contract Administrator approval prior to installation.
- E30.28.3 For trees: stake out locations of all trees and obtain approval from Contract Administrator prior to excavating tree pits. Excavate tree pits to depths and widths indicated on the Drawings. Remove rocks, roots, debris and toxic material from the tree pit. Scarify sides of planting hole.

E30.28.4 For perennials: Lay out plants per drawings carefully ensuring spacing specified on the Drawings. Obtain Contract Administrator approval of plant layouts and make any necessary adjustments on Site.

E30.28.5 Remove water which enters excavations or shrub beds prior to planting. Notify Contract Administrator if water source is groundwater.

E30.29 Planting

E30.29.1 Cover bottom of each excavation with bonemeal in amount recommended by manufacturer.

E30.29.2 For jute burlapped rootballs, cut away top one third of wrapping and wire basket without damaging rootball. Do not pull burlap or rope from under rootball.

E30.29.3 For container stock or rootballs in non-degradable wrapping, remove entire container or wrapping without damaging rootball. Loosen rootball to encourage bonding.

E30.29.4 Plant vertically in locations as indicated. Orient plant material to give best appearance in relation to structure, roads and walks.

E30.29.5 For trees: backfill soil in 150 mm (6") lifts. Tamp each lift to eliminate air pockets. When two thirds of depth of planting pit has been backfilled, fill remaining space with water. After water has penetrated into soil, backfill to finish grade. Form watering saucer as indicated on the Drawings.

E30.29.6 For perennials: backfill soil evenly to finish grade and tamp to eliminate air pockets.

E30.29.7 Water plant material thoroughly. Report extreme ponding in planters indicative of malfunctioning drains to the Contract Administrator immediately.

E30.29.8 After soil settlement has occurred, fill with soil to finish grade.

E30.29.9 Dispose of burlap, wire and container material off Site.

E30.30 Tree Supports

E30.30.1 Install tree supports as indicated on the Drawings. Use double stake tree support for trees. Place first stake on prevailing wind side of tree trunk. Drive stakes minimum 150 mm into undisturbed soil beneath roots. Ensure stakes are secure, vertical and unsplit. Install garden hose tree protection over guy wire 1500mm above grade. Thread baler twine through garden hose. Twist wire to form collar and secure firmly to stake. Cut off excess wire.

E30.31 Pruning

E30.31.1 Undertake corrective pruning after planting to eliminate torn and broken branches. Do not damage lead branches or remove smaller twigs along main branches. Do not prune to compensate for root loss.

E30.31.2 Postpone pruning of those trees where heavy bleeding may occur, until in full leaf. Employ clean sharp tools and make cut flush with main branch, smooth and sloping as to prevent accumulation of water. Remove projecting stumps on trunks or main branches and branches that rub causing damage to bark. Treat cuts in excess of 20 mm (3/4") diameter and damaged parts with application of wound dressing.

E30.32 Mulching

E30.32.1 Obtain approval of planting and geotextile fabric placement from Contract Administrator before mulching material is applied.

E30.32.2 Ensure soil settlement has been corrected prior to mulching.

E30.32.3 Pull geotextile fabric as close to the bottom of rootball as possible without damaging plant stems.

- E30.32.4 Spread wood chip mulch as indicated on all wood mulch / perennial planting beds, and individual deciduous tree planting beds. Spread mulch to minimum thickness of 75 mm.
- E30.32.5 Spread river rock mulch as indicated on all rock mulch beds.
- E30.32.6 Spread stone rip-rap as indicated at the base of box culvert.
- E30.33 Maintenance
- E30.34 Maintain plant material from date of planting to the end of the warranty period. Refer to Section E30 - Landscape Maintenance.
- E30.35 Measurement and Payment
- E30.35.1 Trees shall be paid for on a unit each basis. Price shall be payment in full for supplying materials and for performing the Work.
- E30.35.2 Perennials shall be paid for on a unit each basis. Price shall be payment in full for supplying materials and for performing the Work.
- E30.35.3 Geotextile shall be paid for on a lump sum basis. Price shall be payment in full for supplying materials and for performing the Work.
- E30.35.4 River rock mulch shall be paid for on a square metre basis. Price shall be payment in full for supplying materials and for performing the Work.
- E30.35.5 Stone rip-rap shall be paid for on a lump sum basis. Price shall be payment in full for supplying materials and for performing the Work.
- E30.35.6 Wood chip mulch shall be paid for on a square metre basis. Price shall be payment in full for supplying materials and for performing the Work

E31. LANDSCAPE MAINTENANCE

E31.1 Description

E31.1.1 This Specification shall cover the maintenance of trees, and perennials following acceptance of the plant material to start warranty.

E31.1.2 In general, the Work shall include:

- .1 Fertilizing
- .2 Watering
- .3 Weed Control
- .4 Pest and disease Control
- .5 Mowing
- .6 Mulching
- .7 Tree Support
- .8 Winter Preparation

E31.1.3 Maintenance shall be performed on an as required basis.

E31.2 Maintenance and Warranty Period

E31.2.1 Maintenance shall occur between the date of installation and up to a period of two (2) years from date landscaped areas are accepted to start warranty. The warranty period for plant materials will be coincidental to the maintenance period.

E31.2.2 Thirty days after the planting installation has been completed, the Contract Administrator shall perform an inspection of the plant material to determine if the plant material is acceptable to start warranty.

E31.3 Materials and Equipment

- E31.3.1 Materials shall conform to the requirements of related Specification sections.
- E31.3.2 Provide all equipment to properly execute Work. Maintain such equipment in a workable, safe condition while in use during this project.
- E31.3.3 Contract Administrator shall review equipment to be used to execute Work prior to execution.

E31.4 Method

E31.4.1 General

- .1 Provide watering service within 24 hours, weeding services within 48 hours of the request by the Contract Administrator. Monitor the Site and advise the Contract Administrator of conditions that might void the Contractor's warranty responsibilities.
- .2 The Contractor shall maintain a log noting times, dates, equipment used, and quantity of materials used and areas treated for each maintenance application. Forms shall be provided by Contract Administrator. Submit log to Contract Administrator upon request. Contractor shall notify Contract Administrator of the exact time Contractor proposes to commence each application.
- .3 Schedule operations in accordance with growth, health, weather conditions, and use of Site.
- .4 Perform each operation continuously and completely within a reasonable time period.
- .5 Store equipment and materials off Site.
- .6 Collect and dispose of debris or excess material on the day the maintenance is undertaken.

E31.4.2 Maintenance of Trees and Perennials:

- .1 Fertilizing: Apply fertilizer only at frequency, ratio and rates as recommended by manufacturer. Water immediately after fertilizing. Apply fertilizer no later than May 30th of each maintenance year.
- .2 Watering: Apply water as required to supplement rainfall and to maintain optimum growing conditions. In general, water once a week to achieve rates as indicated. Allow soil to adequately dry between watering to prevent over saturation without creating water stress. Subject to the above-noted requirements, the Contractor must water at least once a week between May 1st and October 15th inclusive. A complete record is to be kept of each series of waterings for all planted trees noting location and date of watering. This record is to be given to the Contract Administrator when requested. Apply 40 litres of water per 25 mm calliper per application using a deep root feeder or low pressure open flow nozzle and hose. The water stream must not gouge the soil and mulch.
- .3 Weed Control: Inspect and undertake weed control weekly during the first year of maintenance and monthly during the second year. By hand, remove all weeds with their roots from tree pits and tree beds and dispose of off Site. When weeding operation is complete, replace and rake displaced mulch to its original condition.
- .4 Pests and Diseases: Obtain written approval of Contract Administrator prior to using any pesticide. Control pests and disease through pruning or application of pesticides. Use species specific pesticides where possible. Use only pesticides of low mammalian toxicity. Strictly follow manufacturer's written instructions.
- .5 Pruning: The Contractor shall provide a person with a Manitoba Arborists Certificate for each work crew or Work Site. Prune trees as required to remove dead, broken or damaged limbs. Prune back to healthy growth while maintaining balanced crown

shape. Employ clean sharp tools. Make cuts smooth and flush with outer edge of branch collar near the main stem or branch. Cuts must be smooth and sloping to prevent accumulation of water on cut. Do not leave little stumps (“horns”) on trunks or main branches. Prune trees according to accepted horticultural practices as outline in “The Pruning Manual”, Publication No. 1505-1977 by Agriculture Canada.

- .6 Mulching: add mulch as required to maintain original thickness. Contractor is to provide replacement mulch material.
- .7 Winter Preparation: Ensure adequate moisture in tree root zones prior to freeze-up.

E31.5 Measurement and Payment

E31.5.1 Landscape maintenance shall be paid for on a lump sum basis for the items of work listed below. Price shall be payment in full for supplying all material and performing all operations herein described and all other items incidental to the Work included in this Specification.

Items of Work:

- (i) Landscape Maintenance Year 1
- (ii) Landscape Maintenance Year 2