THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 310-2009

SOUTHWEST RAPID TRANSIT CORRIDOR: TEMPORARY TRACK CONSTRUCTION

NOTE: INCLUDES POTENTIAL FOR ADDITIONAL CONTRACT WORK FOR 2010 AND 2011 – SEE B16.

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 Southwest Rapid Transit Corridor: Temporary Track Construction

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, June 9, 2009.

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 Further to C3.1, the Contract Administrator or an authorized representative will be available at the Site from 10:00 to 11:00 on June 2, 2009 to provide Bidders access to the Site. No additional site visits on Railway property will be permitted without prior arrangements with the Contract Administrator.

B3.2 The Bidder is required to complete CN's Contractor Orientation Training as outlined in Appendix 'B' prior to entering CN property for the site visit.

B3.3 The Bidder shall not be entitled to rely on any information or interpretation received at the Site investigation unless that information or interpretation is the Bidder's direct observation, or is provided by the Contract Administrator in writing.

B4. ENQUIRIES

B4.1 All enquiries shall be directed to the Contract Administrator identified in D4.1.

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/bidopp.asp

B5.2.2 The Bidder is responsible for ensuring that he 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.

B5.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 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 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 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 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 B15.

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, in accordance with B7.6, deviations inconsistent with the Bid Opportunity document shall be evaluated in accordance with B15.1(a).

B7. BID COMPONENTS

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

(a) Form A: Bid;

(b) Form B: Prices;

(c) Bid Security;

(i) Form G1: Bid Bond and Agreement to Bond, or

(ii) Form G2: Irrevocable Standby Letter of Credit and Undertaking, or

(iii) A certified cheque or draft.

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 shall be submitted enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address.

B7.4.1 Samples or other components of the Bid 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.

B7.5 Bidders are advised not to include any information/literature except as requested in accordance with B7.1.

B7.6 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 B15.1(a).

B7.7 Bids submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.

B7.8 Bids shall be submitted to:

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

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 own name, his 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 own, the business name and the name of every partner or corporation who is the owner 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 12 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 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 and the corporate seal, if the corporation has one, shall be affixed;

(d) if the Bidder is carrying on business under a name other than his own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner 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.

B8.5 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 Prices from Non-Resident Bidders are subject to a 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

(c) have a written workplace safety and health program if required pursuant to The Workplace Safety and Health Act (Manitoba);

B10.4 Further to B10.3(c), 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/Subcontractor 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.

B10.5.1 The Bidder may be required to submit, within three (3) Business Days of a request by the Contract Administrator, a letter satisfactory to the Contract Administrator of the acceptance of the Bidder and of any proposed Subcontractor by CN.

CN contact regarding Bidder eligibility is:

Mr. Shane McCartney
CN Technical Services Engineer

Telephone No. (204) 231-7763

Mr. Shane McCartney will only respond to questions regarding Bidder eligibility. All other questions are to be in accordance with B4.1.

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. BID SECURITY

B11.1 The Bidder shall provide bid security in the form of:

(a) a bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in the form included in the Bid Submission (Form G1: Bid Bond and Agreement to Bond); or

(b) an irrevocable standby letter of credit, in the amount of at least ten percent (10%) of the Total Bid Price, and undertaking 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 included in the Bid Submission (Form G2: Irrevocable Standby Letter of Credit and Undertaking); or

(c) a certified cheque or draft payable to "The City of Winnipeg", in the amount of at least fifty percent (50%) of the Total Bid Price, drawn on a bank or other financial institution registered to conduct business in Manitoba.

B11.1.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.

B11.1.2 All signatures on bid securities shall be original.

B11.1.3 The Bidder shall sign the Bid Bond.

B11.1.4 The Surety shall sign and affix its corporate seal on the Bid Bond and the Agreement to Bond.

B11.2 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly executed by the successful Bidder and the performance security furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B11.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B11.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.

B11.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.

B11.3 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Bid Opportunity.

B12. OPENING OF BIDS AND RELEASE OF INFORMATION

B12.1 Bids will be opened publicly, after the Submission Deadline has elapsed, in the office of the Corporate Finance Department, Materials Management Division, or in such other office as may be designated by the Manager of Materials.

B12.1.1 Bidders or their representatives may attend.

B12.1.2 Bids determined by the Manager of Materials, or his designate, to not include the bid security specified in B11 will not be read out.

B12.2 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

B12.3 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

B12.4 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.

B13. IRREVOCABLE BID

B13.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.

B13.2 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 until a Contract for the Work has been duly executed and the performance security furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid.

B14. WITHDRAWAL OF BIDS

B14.1 A Bidder may withdraw his Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.

B14.1.1 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.

B14.1.2 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 12 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

B14.1.3 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 12 of Form A: Bid; and

(c) if the notice has been given by any one of the persons specified in B14.1.3(b), declare the Bid withdrawn.

B14.2 A Bidder who withdraws his Bid after the Submission Deadline but before his Bid has been released or has lapsed as provided for in B13.2 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, including the right to retain the Bidder's bid security.

B15. EVALUATION OF BIDS

B15.1 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 therefrom (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.

B15.2 Further to B15.1(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.

B15.3 Further to B15.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his Bid or in other information required to be submitted, that he is responsible and qualified.

B15.4 Further to B15.1(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.

B15.4.1 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.

B15.4.2 Further to B15.1(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.

B16. POTENTIAL FOR FUTURE CONTRACT FOR PHASE II TEMPORARY TRACK RELOCATION IN 2010, 2011

B16.1 The City of Winnipeg, in its sole discretion after consideration of the Contractor's performance on Bid Opportunity 309-2009, may negotiate and enter into a contract with the Contractor, to undertake the work associated with the Phase II Temporary Track Relocation during 2010 and Phase III Final Track Relocation in 2011, without a public bid solicitation. It is anticipated that the scope of this project would be similar in nature to the 2009 work. The City will provide terms, construction Specifications and other details if it initiates negotiations with the Contractor. No compensation will be provided to the Contractor for participating in this negotiation. The City of Winnipeg will be under no obligation to initiate negotiations or enter into a subsequent contract, and may choose to issue a public bid solicitation for the work with respect to the Phase II Temporary Track Relocation in 2010 as well as Phase III Final Track Relocation in 2011.

B17. AWARD OF CONTRACT

B17.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B17.2 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.

B17.2.1 Without limiting the generality of B17.2, 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.

B17.3 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 B15.

B17.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his Bid upon written request to the Contract Administrator.

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:

(a) Temporary Track Construction

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

(a) Track Construction
  (i) Supply and Install all track material identified, including turnouts and ballast.
  (ii) Refer to Section E7 for a detailed description of the work.

(b) Grade work
  (i) Supply and place all track embankments including sub ballast.

D3. DEFINITIONS

D3.1 When used in this Bid Opportunity:

(a) ”AREMA ” means American Railway Engineering and Maintenance of Way Association.;

(b) ”CN ” means Canadian National Railway Company or designated representative definition;

(c) See also Appendix ‘B’ CN Safety Requirements

D4. CONTRACT ADMINISTRATOR

D4.1 The Contract Administrator is Dillon Consulting, represented by:

AECOM

Mr. Bob Paetsch
Senior Rail Technologist
200-1600 Ness Winnipeg, MB R3J 3W7

Telephone No. (204) 928-7428
Facsimile No. (204) 453-5172

At the pre-construction meeting, AECOM

Mr. Bob Paetsch will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D5. CONTRACTOR'S SUPERVISOR

D5.1 At the pre-construction meeting, the Contractor shall identify his designated supervisor and any additional personnel representing the Contractor and their respective roles and responsibilities for the Work.

D5.2 At least two (2) business days prior to the commencement of any Work on the site, the Contractor shall provide the Contract Administrator with a phone number where the supervisor identified in D5.1 or an alternate can be contacted twenty-four (24) hours a day to respond to an emergency.

D6. NOTICES

D6.1 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.

D6.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D6.3, D6.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the address or facsimile number identified in D4.1.

D6.3 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 address or facsimile number:

The City of Winnipeg
Chief Financial Officer
Administration Building, 3rd Floor
510 Main Street
Winnipeg MB R3B 1B9

Facsimile No.: (204) 949-1174

D6.4 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 address or facsimile number:

The City of Winnipeg
Internal Services Department
Legal Services Division
Attn: City Solicitor
185 King Street, 3rd Floor
Winnipeg MB R3B 1J1

Facsimile No.: (204) 947-9155

D7. FURNISHING OF DOCUMENTS

D7.1 Upon award of the Contract, the Contractor will be provided with five (5) complete sets of the Bid Opportunity. If the Contractor requires additional sets of the Bid Opportunity, they will be supplied to him at cost.

SUBMISSIONS

D8. AUTHORITY TO CARRY ON BUSINESS

D8.1 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.

D9. SAFE WORK PLAN

D9.1 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.

D9.2 The Safe Work Plan shall 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

D9.3 Notwithstanding D9.1 and 9.2 The Contractor shall conform to CN's Safety Requirements while working on CN property as per Annex B.

D10. INSURANCE

D10.1 The Contractor shall provide and maintain the following insurance coverage:

(a) commercial general liability insurance, in the amount of at least ten million dollars ($10,000,000.00) inclusive, with The City of Winnipeg, CN, The Province of Manitoba and the Government of Canada 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, broad form property damage cover and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period;

(b) automobile liability insurance for owned automobiles used for or in connection with the Work in the amount of at least two million dollars ($2,000,000.00) at all times during the performance of the Work and until the date of Total Performance;

(c) an 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.

D10.2 Deductibles shall be borne by the Contractor.

D10.3 The Contractor shall provide the City Solicitor 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 the date specified in the C4.1 for the return of the executed Contract.

D10.4 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.

D11. PERFORMANCE SECURITY

D11.1 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.

D11.1.1 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.

D11.2 If the bid security provided in his Bid was not a certified cheque or draft pursuant to B11.1(c), 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 letter of intent and prior to the commencement of any Work on the Site and in no event later than the date specified in the C4.1 for the return of the executed Contract.

D12. SUBCONTRACTOR LIST

D12.1 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 or prior to a pre-construction meeting, or at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the C4.1 for the return of the executed Contract.

D13. EQUIPMENT LIST

D13.1 The Contractor shall provide the Contract Administrator with a complete list of the equipment which the Contractor proposes to utilize (Form K: Equipment List) at or prior to a pre-construction meeting, or at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the C4.1 for the return of the executed Contract.

D14. DETAILED WORK SCHEDULE

D14.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the General Conditions for the return of the executed Contract.

D14.2 The detailed work schedule shall consist of the following:

(a) a Gantt chart for the Work based on the C.P.M. schedule;

acceptable to the Contract Administrator.

D14.3 Further to D14.2(a), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the type of trade shall be on the vertical axis.

SCHEDULE OF WORK

D15. COMMENCEMENT

D15.1 The Contractor shall not commence any Work until he is in receipt of a letter of intent from the Award Authority authorizing the commencement of the Work.

D15.2 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 D8;
  (ii) evidence of the workers compensation coverage specified in C6.15;
  (iii) the twenty-four (24) hour emergency response phone number specified in D5.2.
  (iv) the Safe Work Plan specified in D9;
  (v) evidence of the insurance specified in D10;
  (vi) the performance security specified in D11;
  (vii) the subcontractor list specified in D12;
  (viii) the equipment list specified in D13;
  (ix) the detailed work schedule specified in D14; and

(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.

D15.3 The Contractor shall commence the Work on the Site within seven (7) Working Days of receipt of the letter of intent.

D15.4 The City intends to award this Contract by 26 June 2009.

D15.4.1 If the actual date of award is later than the intended date, the dates specified for Substantial Performance and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D15.4.2 Work cannot begin until the existing south Rogers Fibre line is relocated; expected to be completed by June 15, 2009.

D16. WORKING DAYS

D16.1 Further to C1.1(gg);

D16.1.1 The Contract Administrator will determine daily if a Working Day has elapsed and will record his assessment. On a weekly basis the Contract Administrator will provide the Contractor with a record of the Working Days assessed for the preceding week. The Contractor shall sign each report signifying that he agrees with the Contract Administrator's determination of the Working Days assessed for the report period.

D16.1.2 Work done to restore the Site to a condition suitable for Work, shall not be considered "work" as defined in the definition of a Working Day.

D16.1.3 When the Work includes two or more major types of Work that can be performed under different atmospheric conditions, the Contract Administrator shall consider all major types of Work in determining whether the Contractor was able to work in assessing Working Days.

D17. RESTRICTED WORK HOURS

D17.1 Further to clause 3.10 of CW 1130, the Contractor shall require written permission forty-eight (48) hours in advance from the Contract Administrator for any work to be performed between 2000 hours and 0700 hours, or on Saturdays, Sundays, Statutory Holidays and or Civic Holidays.

D17.2 The following work hour restrictions shall also apply:

(a) Work will be limited by CN flagman availability;

D18. WORK BY OTHERS

D18.1 Work by others on or near the Site will include but not necessarily be limited to:

(a) Bell Canada Fibre Relocation

D19. SEQUENCE OF WORK

D19.1 The sequence of work as follows has been deemed acceptable. Bidders are encouraged to review and determine if a more cost effective and or time saving option is possible.

D19.1.1 The Contractor shall be aware that any alternative sequence of work proposed will require that at all times two mainlines and the two 6000' capacity yard tracks be required in uninterrupted service.

D19.1.2 Stages

(a) Build connecting track from WF43 to track WF25

(i) Install new #8sp-115# RH SGM on track WF43

(ii) Remove SW No.P-25 #8-100# RH on track WF25

(iii) Install new #8sp-115# RH SGM on track WF25

(b) Build connecting ladder west of proposed shoofly from track WF32 to WF36

(i) Install new #8sp-115# LH RBM on track WF32

(ii) Build new track between WF32-WF34 and between WF34 to cutover location of WF36

(iii) Install new #8sp-115# RH SGM on track WF34 and line over WF36

(iv) Track WF34 now available for removal. Part of North and South Mainline shoofly and relocated WF31 and WF32 construction can begin

(v) Implement alternative CN access road which is to be maintained through all phases

(c) Reconfigure and relay WF37

(i) Relay track WF37 with 115# Rail between relocated X-0 PS east to start of new WF37 alignment opp. 2+155.982

(ii) Construct relocated WF3, tie into existing SW.No.F-6 #8-100 SGM.

(d) VIA operates from west while VIA ladder reconfiguration takes place

(i) Relocate SW.No. X-0 #8sp-115# LH RBM opp 2+283.445 on WF36 to opp 2+291.420 on WF37

(ii) Remove SW. No.M-01 #8-85# RBM and SW.No.0-X #8-85# RBM on M1, relocate to stockpile.

(iii) Construct 115# track and new #8sp-115# LH SGM from relocated turnout to existing ladder and realign track M1 to new turnout

(iv) Construct relocated WF32 from west of ladder to WF36

(v) Complete VIA east ladder reconfiguration

(vi) Remove SW.No.F-32 #8sp-115# RH SGM on track WF32, replace with panel. Relocate turnout to stockpile

(e) Complete WF31and WF32 reconfiguration

(i) Complete reconfiguration of WF32 and put into service. Original WF32 ready for dismantle

(ii) Realign East Ladder from SW.No. F-31 #8sp-115# SGM to end of new alignment opp. 2+194.833

(iii) Realign WF37 to final configuration, replace SW.No.F-6 #8-100# LH SGM with #8sp115# LH RBM (S&C) at new location opp. 2+013.876

(iv) Complete reconfiguration of WF31 and put into service. Original WF31 ready for dismantle

(f) Complete north and south mainline shoofly for same day cutover of both tracks by CN forces.

(g) Remove original north and south mainline.

D19.2 Immediately following the completion of the track works, the Contractor shall clean up the Site and remove all plant, surplus material, waste and debris, other than that left by the City or other contractors.

D20. SUBSTANTIAL PERFORMANCE

D20.1 The Contractor shall achieve Substantial Performance by 4 September 2009.

D20.2 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 re-inspected.

D20.3 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.

D21. TOTAL PERFORMANCE

D21.1 The Contractor shall achieve Total Performance by 4 September 2009.

D21.2 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 re-inspected.

D21.3 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.

D22. LIQUIDATED DAMAGES

D22.1 If the Contractor fails to achieve Total Performance in accordance with the Contract by the day fixed herein for Total Performance, the Contractor shall pay the City two thousand dollars ($2,000) per day for each and every day following the day fixed herein for Total Performance during which such failure continues.

D22.2 The amount specified for liquidated damages in D22.1 is based on a genuine pre-estimate of the City's damages in the event that the Contractor does not achieve Total Performance by the day fixed herein for same.

D22.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

CONTROL OF WORK

D23. JOB MEETINGS

D23.1 Regular weekly job meetings will be held on site. These meetings shall be attended by a minimum of one representative of the Contract Administrator and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator 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.

D23.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he deems it necessary.

D24. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D24.1 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).

WARRANTY

D25. WARRANTY

D25.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire one (1) year thereafter, except where longer warranty periods are specified in the respective Specification sections, unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.

D25.1.1 For the purpose of Performance Security, the warranty period shall be one (1) year.

D25.2 Notwithstanding C13.2, 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 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.

D25.2.1 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 D11)

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. 310-2009

Southwest Rapid Transit Corridor: Temporary Track Construction
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 D11)

_____
(Date)

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

RE: PERFORMANCE SECURITY – BID OPPORTUNITY NO. 310-209

Southwest Rapid Transit Corridor: Temporary Track Construction

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)

FORM J: SUBCONTRACTOR LIST
(See D12)

Southwest Rapid Transit Corridor: Temporary Track Construction

Portion of the Work	Name	Address

FORM K: EQUIPMENT
(See D13)

Southwest Rapid Transit Corridor: Temporary Track Construction

1. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

2. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

3. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

FORM K: EQUIPMENT
(See D13)

Southwest Rapid Transit Corridor: Temporary Track Construction

4. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

5. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

6. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

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 Appendix 'B' CN Safety Requirements take precedence on all matters within CN property.

E1.4 The following are applicable to the Work:

Drawing No.	Drawing Name/Title	Drawing (Original) Sheet Size
310_2009_Dwg_01-CT0000_R0	Cover Sheet	A1
310_2009_Dwg_01-CT1001_R0	Plans – Existing and Proposed Track Configurations	A1
310_2009_Dwg_01-CT1002_R0	Plan & Profile – Proposed Final Track Configurations & Proposed North and South Shoofly Profiles	A1
310_2009_Dwg_01-CT1003_R0	Plan & Profile – Stage "A"	A1
310_2009_Dwg_01-CT1004_R0	Plan & Profile – Stage "B"	A1
310_2009_Dwg_01-CT1005_R0	Plan & Profile – Stage "C"	A1
310_2009_Dwg_01-CT1006_R0	Plan & Profile – Stage "D"	A1
310_2009_Dwg_01-CT1007_R0	Plan & Profile – Stage "Ei"	A1
310_2009_Dwg_01-CT1008_R0	Plan & Profile – Stage "Eii"	A1
310_2009_Dwg_01-CT1009_R0	Plan & Profile – Stage "Eiii"	A1
310_2009_Dwg_01-CT1010_R0	Plan & Profile – Stage "Eiv"	A1
310_2009_Dwg_01-CT1011_R0	Plans – Stage "F & G"	A1
310_2009_Dwg_01-CT4001_R0	Typical Standard Details – Track Sections	A1
310_2009_Dwg_01-CT6001_R0	Curve and Stakeout Reports	A1

E2. GEOTECHNICAL REPORT

E2.1 Further to C3.1, the geotechnical report is provided to aid the Contractor's evaluation of the existing soil conditions. The geotechnical report is contained in Appendix 'A'.

E3. OFFICE FACILITIES

E3.1 The Contractor shall supply office facilities meeting the following requirements:

(a) The field office shall be for the exclusive use of the Contract Administrator.

(b) The building shall be conveniently located near the site of the Work.

(c) The building shall have a minimum floor area of 25 square metres, with two windows for cross ventilation and a door entrance with a suitable lock.

(d) The building shall be suitable for all weather use. It shall be equipped with an electric heater and air conditioner so that the room temperature can be maintained between either 16-18oC or 24-25oC.

(e) The building shall be adequately lighted with fluorescent fixtures and have a minimum of three wall outlets.

(f) The building shall be furnished with one desk, one drafting table, table 3m x 1.2m, one stool, one four drawer legal size filing cabinet and a minimum of six chairs.

(g) A portable toilet shall be located near the field office building. The toilet shall have a locking door and be for the exclusive use of the Contract Administrator and other personnel from the City.

(h) The field office building and the portable toilet shall be cleaned on a weekly basis immediately prior to each site meeting. The Contract Administrator may request additional cleaning when he deems it necessary.

E3.2 The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the office facilities.

E3.3 The office facilities will be provided from the date of the commencement of the Work to the date of total performance.

E3.4 On a one time basis, where directed by the Contract Administrator, the Contractor shall relocate the office facilities to a location more convenient for the remaining Work.

E4. TRAFFIC MANAGEMENT

E4.1 Further to D19:

E4.1.1 The Contractor shall schedule construction activities to meet the following:

(a) Site access for railway traffic shall be maintained at all times.

E4.1.2 Ambulance/emergency vehicle access must be maintained at all times.

E5. SITE SECURITY

E5.1 During the project the Contractor shall be responsible for maintaining only authorized site access 24 hours a day. Any existing security fencing etc. that may be altered during construction will need to have an equivalent replacement. No measurement for payment shall be made for this work.

E6. WATER USED BY CONTRACTOR

E6.1 Further to clause 3.7 of CW 1120-R1, the Contractor shall pay for all costs associated with obtaining water in accordance with the Waterworks By-law. Sewer charges will not be assessed for water obtained from a hydrant.

E7. TEMPORARY TRACK CONSTRUCTION

E7.1 Flag Protection of Work

E7.1.1 The cost of the railway supplied flag protection for the work will be at the Contractors expense and charged by the day. This amount is $1,000/day. A day is considered to be the time limits in the issued track protection. Requests for flag protection will be submitted to CN flagman each afternoon prior to the day of work requiring same. Should a request be made, track protection issued and work on the day in question be cancelled for whatever reason the charge still applies. Appendix “B” CN Safety Requirements Item 11 governs the protection requirements and may be amended by CN at their discretion.

E7.1.2 The Contractor will be required to open an account with CN to cover the cost of the flagging. The daily costs will then be withdrawn from this account and CN will require a minimum balance of 2 weeks charges to be maintained at all times. When the expected completion date appears to be 2 weeks away this requirement will be reviewed.

E7.2 Description of Work

(a) Provide all labour and equipment to construct trackage as shown on the drawings and specified in this Specification.

(b) Track & turnout construction and ballast surfacing shall be performed by foremen and labourers experienced in railroad track construction, in particular continuous welded rail construction. Track will be constructed to the design alignment and top of rail profile as indicated on the Drawings. Track construction consists of 2 mainline shooflies, 2 yard track shooflies, 2 new connections and 1 connection reconfiguration in addition to removal and stockpiling of surplus material.

(c) Supply and install all track material including turnouts and ballast.

(d) Stockpile of surplus material to be in a location as directed by the Contract Administrator.

(e) Construct 132 lb one spot continuously welded rail (CWR) track structure on new No. 1 treated hardwood track ties.

(f) Construct 115 lb one spot rail track structure on No. 1 treated hardwood track ties.

(g) Relay existing 85 lb track to 115 lb one spot rail track structure replacing ties as required with new No. 1 treated hardwood track ties.

(h) Install two No. 8 special 115 lb. RBM turnouts, 16’6” switch points on new switch ties and 22E switch stand complete with targets and transition rails.

(i) Install one No. 8 special 115 lb. SGM turnouts, 16’6” switch points on new switch ties and 22E switch stand complete with targets and transition rails.

(j) Relay existing No.8 100lb. SGM turnout as a No. 8 special 115 lb. RBM turnouts, 16’6” switch points on new switch ties and 22P switch stand complete with targets and transition rails.

(k) Construct four hardwood plank crossings. Temporary maintenance road access crossings to be maintained during construction.

(l) Place ballast for turnouts and track to design alignment and elevation.

(m) Lift, line and surface turnouts and track to design alignment and elevation.

(n) Removal and salvage of chain link fence.

(o) Removal and stockpile of ballast.

(p) Obtain all permits or approvals required and pay all permits and approval fees.

(q) All other work as called for on the drawings and/or described in the Specifications.

E7.3 Materials

(a) Mainline rail shall be minimum second hand, one spot 132lb, CWR. All rail shall be control cooled, straight, and free of kinks and be in compliance with current AREMA Specifications, Chapter 4.

(b) Non mainline rail shall be minimum second hand, one spot 115lb. All rail shall be control cooled, straight, and free of kinks and be in compliance with current AREMA Specifications, Chapter 4.

(c) Turnout rail shall be minimum second hand, one spot 115lb. free of physical defects and have less then 20% of allowable head wear. All rail shall be control cooled, straight, and free of kinks and be in compliance with current AREMA Specifications, Chapter 4.

(d) Wood ties for mainline usage shall be new 7” x 9”x 8.5’ track ties. Wood ties for non mainline usage may be new or secondhand 7” x 9”x 8.5’ track ties. All ties shall be hardwood grade ties, treated with a creosote-coal tar solution to a net retention of 9.2 lbs.

per cubic foot minimum for mixed hardwoods and 7 lbs. per cubic foot minimum for oak. Wood ties shall conform to current AREMA Specifications, Chapter 30, “Ties”, for size, quality, treatment, and defects.

(i.) No ties will be accepted with the following defects

1. Broken tie – tie which is broken through.
2. Split tie – tie split end to end for the entire depth of the tie.
3. Split tie end – tie end split resulting in poor surface and gauge.
4. Cut tie – tie which is rail or plate cut, or adzed to a depth of 1 inch or more.
5. Crushed tie – tie which has the bearing surface under the rail crushed one inch or more.
6. Spike killed tie – Condition is indicated by numerous splits at the tie end and/or loose or high spikes, wide gauge and poor alignment.
7. Decayed tie – tie which is decayed and cannot hold spikes, gauge or surface.
8. Damaged tie – tie which is damaged to a depth of 2 inches or more due to derailments, dragging equipment or fire.
9. A break across the annular rings (commonly known as a "split") which is not over 8 inches long will be allowed. A split over 8” long or more than one split, or a split wider than ¼” at the face across which it occurs, will not be allowed.

(e) .Crossing ties shall be new 7” x 9”x 9’ track ties. All ties shall be hardwood grade ties, treated with a creosote-coal tar solution to a net retention of 9.2 lbs. per cubic foot minimum for mixed hardwoods and 7 lbs. per cubic foot minimum for oak. Wood ties shall conform to current AREMA Specifications, Chapter 30, “Ties”, for size, quality, treatment, and defects.

(f) Turnouts may be new or secondhand #8 Special (16’6” points) 115lb either RBM or SGM and must be in accordance with the current CN Standard Plans, TS-015 for the #8 115lb RBM and SGM. Secondhand turnouts must be of acceptable quality as judged by the Contract Administrator.

(i.) All turnouts must have new hardwood switch ties.

(ii.) All turnouts must be equipped with adjustable braces.

(iii.) .Minimum 14" tie plates are to be used in turnout construction.

(iv.) Switch stands shall be new or second hand 22P, complete with connecting rods, targets, and reflective tips as required.

(v.) Secondhand turnout material is not to be painted.

(g) Rail anchors shall be new or manufacturer certified refurbished, drive-on-type and of standard manufacture, as approved by the Contract Administrator, of the proper size to fit 132lb and 115lb rail sections.

(h) Tie plates shall be new or secondhand, in good condition, and measure a minimum of 7-1/2”x12” in size for 132lb rail on tangent, a minimum of 7-1/2”x11” in size for 115lb rail on tangent and 7-1/2”x14” on curves. The 11’ & 12” plates shall have 4 spike holes and the 14” shall have 6 spike holes. All tie plates are to be double shoulder with 1:40 cant, free of injurious defects and foreign material, and shall conform to current AREMA Specifications for 115lb & 132lb rail.

(i) Joint bars shall be new or secondhand, in good condition, toeless type, free of foreign material and without injurious defects. They shall conform to current AREMA Specifications, and must be to the proper design and dimensions for the rail on which it is

to be applied. 115lb and 132lb joint bars shall have 6 bolt holes and measure a minimum 36" in length.

(j) Compromise bars shall be new, in good condition, toeless type, free of foreign material and without injurious defects. They shall conform to current AREMA Specifications, and must be to the proper design and dimensions for the rails on which it is to be applied. Installed bars will be painted blue.

(k) Track spikes must be new 5/8" square with reinforced throat design. All track spikes shall conform to current AREMA Specifications for High-Carbon Steel Track Spikes, Chapter 5, Part 2. Length of track spike under its head shall be 6 inches.

(l) Track bolts with nuts must be new. Bolts and nuts shall conform to current AREMA Specifications. Bolts and nuts shall be to the appropriate size for the bolt holes in the rail section with length sufficient for a full nut and spring washer and 1/4" thread exposed.

(m) New spring washers of the appropriate size to fit the track bolt used shall conform to current AREMA Specifications. Each track bolt shall receive one spring washer.

(n) Tie plugs shall be new, creosote treated, and shall conform to current AREMA Specifications, Chapter 30.

(o) Thermite field welding material for 132lb rail is to be as manufactured by Boutet or Orgotherm.

(p) Crossing planks shall be new hardwood treated 7"x10"x20' prebored and meeting current CN standard.

(q) Crossing lag bolts shall be new hex ¾"x12" complete with ¾" flat washer.

(r) Derails shall be Hayes EB6 sliding type and will be right or left hand as required.

(s) Rock ballast shall be as approved by CN. The gradation of the rock ballast is 2" minus in size with a minimal amount of fines as per CN Specification 12-20B Class 2. Walking ballast shall conform to AREMA Size No. 5, and meet the quality requirements as shown in the AREMA Table No. 1 and No. 2. All ballast shall be crushed to assure abrasive edges. Frozen ballast, at time of placement, will not be accepted.

(i.) Contractor shall furnish written test results to the Contract Administrator that indicates the crushed rock ballast is accordance with the limiting values referenced above.

(ii.) Ballast to have a minimum count of particles with one or more fractured faced of 70% on each sieve size.

(iii.) The percent of wear due to abrasion shall be less then 30% for the ballast per ASTM C 131 "A" Grading.

E7.4 Track Construction

E7.4.1 Contractor shall exercise care in the unloading and distribution of track material and in the construction of trackage to avoid disturbing the surface of the subballast and the seeding and mulching on the side slopes. Any damage to either the subballast surface or side slopes caused by Contractor's operations shall be repaired at Contractor's expense to the satisfaction of the Contract Administrator. The Contractor shall provide for the movement and handling of and the laying of rail in such a manner as to avoid damage to new roadbed, subballast, and rail. Care must be exercised to avoid twisting or damaging rail. During handling, Contractor shall be responsible for damage to rail to the extent that sections thereof damaged, in the opinion of the Contract Administrator, unsuitable for use in track, such rail section shall be replaced at the sole expense of the Contractor. It is entirely up to the Contract Administrator to determine if any rails or portions thereof have been damaged.

E7.5 Handling of Material

(a) Contractor shall be responsible for all track material. Contractor's responsibility begins at his loading of materials, unloading of materials to ground at site locations, continues

through its placement into the track structure and until final acceptance of the track by the Contract Administrator.

(b) No additional compensation will be allowed for segregating or replacing materials of questionable quality or condition. After inspection by the Contract Administrator, Contractor will be advised if material in question is suitable for use. If material is rejected by Contract Administrator, the Contractor will replace the rejected material at his expense.

(c) The Contractor's responsibility for materials continues through its placement into the track structure and until final acceptance of the track by the Contract Administrator and CN. If materials are damaged, lost, or wasted through Contractor's negligence, poor workmanship or handling, Contractor shall replace said materials in kind at no additional cost.

E7.6 Execution

E7.6.1 Timber ties shall be unloaded and handled in such a manner as not to damage them, using approved handling equipment. Pulling timber ties into position with picks or shovels will not be permitted. Tie tongs shall be used for this purpose.

(a) Cross ties shall be placed at a design spacing of 20-1/2" center to center. The cross ties shall be placed on the approved finished subballast, perpendicular to center line of track, with the right hand (in the direction of increasing stationing) ends of cross ties being parallel with and each end of the cross tie being the same distance from center line of track, except on curves, where cross ties are to be aligned to the inside of the curve. All rail joints/welds are to be suspended between ties.

(b) If spikes are pulled from any timber tie, hole shall immediately be filled by driving in a treated wood tie plug the full depth of the hole.

(c) Lay timber ties with heartwood face down, and if not possible to determine position of the heartwood, lay the widest surface of the timber tie down.

(d) Top surface of timber ties shall be clean and smooth to provide full bearing for tie plates. The bottom of the rail, the tie plate and the wearing surface of the timber tie shall be broom cleaned before the rail is laid.

E7.6.2 Tie plates shall be used under running rails on all track where timber ties are placed.

(a) Tie plates should be free of dirt and foreign material when installed.

(b) Care must be exercised to see that canted tie plates are applied so as to cant the rail inward.

(i.) Tie plates must be placed square with the rail and centered on the tie. Particular care must be given to see that the tie plate shoulders and spike heads are never under the base of the rail and that the tie plates are well seated with full even bearing on the ties and the rail is properly seated on the tie plate. After rails are in place, outside shoulder of tie plate shall be in full contact with outside edge of rail base.

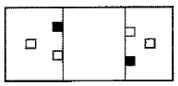
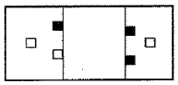
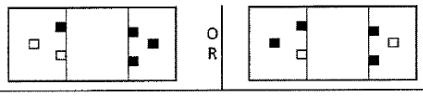
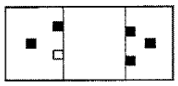
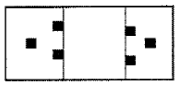
(c) The same size tie plate must be used opposite one another on each cross tie.

(d) Sweep off all granular material from ties prior to placement of tie plates.

(e) Sweep off all granular material from tie plates prior to placement of rail.

(f) Cutting or burning of tie plates is not permitted.

E7.6.3 Cross ties shall be spiked.

No.	SPIKING PATTERN Field / Gauge	MGTs PER YEAR	DEGREE OF CURVE			
			Tangent up to 2°	2° to 4°	4° to 6°	Greater than 6°
A		Other than Main Track	X			
B		Other than Main Track		X	X	X
		0-20	X			
C	 (OR)	0-20		X	X	
		Greater than 20	X			
D		0-20				X
		Greater than 20		X	X	
E		Greater than20				X

E7.6.4 Installation of joint bars complete with tightened bolts must occur before spiking rail.

(a) Uniform track gauge must be maintained when spiking and must be checked by use of standard track gauge.

(b) The right hand rail going in the direction of increasing stationing shall be spiked to cross ties, and the opposite rail shall be brought to standard gauge of 4' 8-1/2" measured at right angles between the rails, 5/8" below the top of rail. Gauge to be checked at every third tie by using a tested and approved track gauge. Curves shall have gauge widened in accordance with the following table:

Degree of Curve	Gauge
10 Degrees or less	4 feet, 8-1/2 inches
Greater than 10 degrees	Increased 1/16 inch per degree of curvature

(c) Spikes will be driven only with a standard spike maul, sledge hammer, pneumatic or hydraulic spiking hammer or spiking machine.

(d) All spikes shall be started and driven vertically with the face of the spike in contact with the base edge of the rail and so driven as to allow 1/8 inch to 3/16 inch space between the underside of the head of the spike and the top of the base of the rail. In no case shall the spikes be overdriven or straightened while being driven. When spikes are driven by machine, work shall be closely supervised to see that they are driven with a hammer centered exactly over each spike head and drive spike vertically. Set stop on the machine to prevent overdriving.

(e) No spike shall be within 2" of the end of a joint bar. Do not strike rail directly with a maul, either on top when driving, or on side to obtain track gauge.

(f) Withdraw spikes which are incorrectly driven and fill hole by driving a treated tie plug to full depth of hole. Locate replacement spike at another hole in tie plate.

E7.6.5 As required assemble temporary track rail joints before fastening rails to timber ties using joint bars with 4 track bolts and a spring washer for each bolt, first removing all dirt, loose mill scale, and rust from contact surfaces of joint bars and rails.

(a) Holes for track bolts shall only be drilled by an approved type of rail drill. Under no circumstances shall new holes be drilled between two holes already drilled.

(b) Rail joints shall be applied so that bars are not cocked between base and head of rail.

(c) If necessary to force joint bar into position, strike lower edge of bar lightly with 4 lb. maul. Do not drive bolts in place. Under no circumstances shall rail be struck in web with tool or any metal object.

(d) Tighten bolts in sequence, beginning at joint center and working out to ends. Bolts to be tightened to torques required as per E7.6.6 (g). If a bolt tightening machine is not used, a standard track wrench with a 42" long handle may be used.

E7.6.6 The Contractor shall provide such equipment, tools, and materials necessary and required for turnout construction

(a) Install turnouts in accordance with the appropriate standard plans TS-015 for the #8sp 115lb RBM and SGM.

(b) Rail gaps at turnout panels shall be welded.

(c) Minimum 14" Tie Plates are to be used in turnout construction.

(d) All switch ties must be as laid out on standard plans, properly spaced and square to through track.

(e) The turnout stock-rail must be bent horizontally, as shown on the standard plan. Only standard carbon and 3HB rail, in 115 lb section or smaller, may be field bent with an approved bender. **For safety reasons, under no circumstances are head hardened rails or rails greater than 115 lb to be bent in the field.**

(f) Ensure the switch point fits snugly against the stock rails for the entire length of the planed portion. Points will not overhang gauge plates nor be more then one inch back from front edge. Running surface of points will be ¼" above stock rail, as measured at the location where the distance between gauge face of stock rail and gauge face of switch point when tight against the stock rail is 4-1/2".

(g) Bolt switches, frogs and guard rails fully. Provide washers and cotter pins for bolts. Grade 8 bolts are identified by six radial lines on the head of the bolt and are to be tightened as per:

Grade 8 Bolts

Size of Bolt Inches	Torque Ft-Lb.
1	840
1-1/4	1675
1-3/8	2500

(h) All turnouts must be fully spiked or fastened with tie screws and clips. Spikes to be fully driven or timber tie screws drawn down.

(i) Switch stands will be located as per instructions issued by the Contract Administrator.

(j) Switch stands must be plumb, securely spiked, bolted or lagged to the head block ties. They must also be secured with lock or keeper as supplied.

(k) Standard throw of switch points as measured at the No. 1 switch rod and at the No.5 switch rod of turnouts equipped with auxiliary throw mechanism must be set in accordance with the appropriate standard plan.

(l) Switch rods and transit clips must not contact the side of the tie or the slide plate.

(m) All switch stands must be equipped with the appropriate reflectorized target assembly (in some locations a double bladed target tip is required). Target assemblies will be properly adjusted to display green when the switch is lined for the normal route and yellow when lined for the diverging route.

(n) Install switch rod bolts and connecting rod bolts, except the bolt under the switch stand, with the nut on the upper side to permit ready inspection of the cotter pin.

(o) Install the connecting rod bolt under the switch stand with the head on the upper side.

(p) Install cotter pins on all connecting and switch rod bolts.

(q) Position the handle on the switch stand so that when the switch is in the normal position it faces away from the frog and the track, and moves in the same direction as the points when the switch is lined for the diverging route. Switch handles of rigid switch stands will

be adjusted such that they cannot be placed in locking position with normal pressure when 1/8" shim placed between point and stock rail at first rod.

(r) Lubricate switch stands, switch plates, connecting rod bolts and spring frogs properly after assembly.

(s) Stock rails must be properly seated in the switch plate, have no lateral movement in the plates and switch plates have no movement on the ties.

(t) Care must be taken in adjusting braces to avoid over-driving and rotating the stock rails out of the seat of the plate.

(u) Flangeways must be clear of obstructions and not less then 1-1/2" deep, not less then 1-3/4" wide and not more then 2" wide.

(v) Guard Check Gauge. The minimum distance from the gauge line of a frog to the guard line of its guard rail or guarding face, as measured across the track at right angles to the gauge line is 4′6 1/4″.

(w) Guard Face Gauge. The maximum distance between guard lines as measured across the track at right angles to the gauge line is 4′5 1/8″.

(x) Fully anchor the rail on both tracks through turnouts except where anchors will interfere with switch points. Fully anchor for 200 feet in both directions beyond the turnout.

(y) Once installed, line new turnouts for through movement and spike the switch point. Switch points shall remain spiked until inspected by the Contract Administrator.

E7.6.7 Derails shall be installed as per CN Plan TS 2208.

(a) Derails are classified as either right or left hand. A right hand derail is installed on the right hand rail and derails toward the right. Care must be taken to ensure that derails are located properly.

(b) Derails are to be installed such that in the derailing position the derail block covers the ball of the rail and lie flat on the top of the rail throughout the underside of the derailing block surface and will bear directly on sound ties.

(c) A plywood or steel shim of the correct thickness with holes punched or drilled for all fasteners may be necessary under the derail to ensure the block lies flat on top of the rail. Where 2" plywood shims or extender/ elevator plates are used, tie screws of 1" longer must be used.

(d) Ties to which derails are fastened must be sound and well tamped and have the top surfaces in the same plane.

(e) Derails must be installed at right angles to the rail and will be fastened with1"x 6-1/2" lag screws.

(f) Derails which have been manufactured to accommodate eight or more fasteners must be fastened with a minimum of eight fasteners. Where derails are manufactured to accommodate less then eight fasteners, all available holes must be used.

(g) Derails must be properly lubricated and adjusted for ease of movement.

(h) Derails must be painted yellow.

(i) Tracks equipped with a derail shall have the switch stand lever painted yellow.

E7.7 Execution

E7.7.1 The method and equipment used by the Contractor in handling and movement and the laying of rail will be subject to the approval of the Contract Administrator.

(a) Rail shall be free of dirt and foreign material when installed

(b) Rail will only be cut square and clean by means of a rail saw with all burrs removed. Torch cut rail will not be allowed to remain in the track. When sawing rail for reuse saw cut must be made at least 4" (100mm) from any torch mark on the rail.

(c) Contractor will ensure that rails are laid such that gauge faces of rail are matched according to their previous position in track such that the gauge side remains the gauge side.

(d) Rail must not be struck with mauls, sledgehammers or other heavy objects.

(e) Rail of different chemistries or manufacturers shall not be mixed in any given stretch. Use compromise bars to join rails of different sections.

(f) Jointed rail shall be laid with staggered joints. The stagger between joints of opposite rails must not be less than 12 feet.

(g) Rail temperature shall be measured periodically throughout the day with at least two accurate thermometers placed on the base of the rail near the web, away from wind and out of the direct rays of the sun and away from all sources of artificial heat or cold. The thermometer shall be left in place for at least 10 minutes prior to taking a reading. A pyrometer may also be used to measure rail temperature.

(i.) When using pyrometers to determine rail temperature, the pyrometer should be pointed into the shaded portion of the web of the rail. Rail temperature must be taken at intervals of approximately 150'.

(h) Expansion space between rail ends must be provided. Expansion space of the proper dimension between rail ends can be obtained through the use of shims of the correct thickness as per tables below.

TABLE 2A. EXPANSION GAP IN INCHES REQUIRED FOR RAIL TEMPERATURE

Expansion Gap Inches	33 ft. Rail Rail Temp. Degree F.	39 ft. Rail Rail Temp. Degree F.
5/16	Below 10	Below 6
¼	10 to 14	6 to 25
3/16	15 to 34	26 to 45
1/8	35 to 59	46 to 65
1/16	60 to 85	65 to 85
0	Above 85	Above 85

TABLE 2B. EXPANSION GAP IN MILLIMETRES REQUIRED FOR RAIL TEMPERATURE

Expansion Gap mm	10 m Rail Rail Temp. Degree C.	12 m Rail Rail Temp. Degree C.
8	Below -12	Below -15
6	-12 to -10	-14 to -4
5	-9 to 1	-3 to 7
3	2 to15	8 to 18
2	16 to 29	19 to 29
0	Above 30	Above 30

(i) Fibre, hardwood, or metal shims may be used to obtain the proper expansion space by bringing rail ends squarely together against the expansion shims. Expansion shims must not be removed until the rail is properly spiked, the bolts tightened and rail anchors applied.

(j) When new rail adjoins rail previously in track the old rail will be built up by welding at the joint to protect the end of the new rail.

(k) Where rail end mismatch exceeds 1/4" on the top or the gauge side of a rail joint, it shall be reduced by grinding, welding or replacement of the rail.

(l) .Rail ends with excessive flow will be repaired by slotting. Crushed or battered rail ends will be repaired by welding.

(m) Nicked or gouged rail shall be rejected and replaced as determined by the Contract Administrator at the sole cost of the Contractor for any rail damage due to the Contractor's

handling. This includes the cost of the replacement rail, transportation, welds, and any associated costs in the change out of the defect.

(n) Upon completion of the days work, all rail laid must be fully spiked, bolted and anchored.

E7.7.2 All cross ties shall be anchored to a minimum box pattern of 8 ties per 39'. The same ties on opposite rails shall be boxed.

(a) Only the proper tools or machines will be used when applying or removing anchors. The use of spike mauls is prohibited. When applying anchors by machine ensure the machine is properly adjusted.

(b) Anchors must be installed from gauge to field side of rail to insure full bearing surface against the side of the tie, bearing against the adjacent tie and remain tight on the rail. Anchors must be on the same side of the same tie on both rails. Ties are to be at right angles to the rail before applying anchors. Anchors improperly installed will be removed and applied correctly without additional charge by the Contractor. Anchors will only be removed when the rails is still in the track and done such as to prevent damage to the anchor or rail.

(c) Anchors must be fully driven; however, care must be taken to avoid over-driving as this may fracture or spread the metal, resulting in loss of holding power. Any rail anchor that is fractured or with metal spread will be rejected and replaced with another anchor at the Contractor's expense.

(d) Anchors shall be installed only to the rail section for which they are designed and shall only be the same type of anchor to any one tie.

(e) Care must be exercised in the spacing of anchors to ensure that no anchors are located on any tie under or adjacent to the ends of a rail joint bar, bond wires, insulated joints or other signal or track appliances.

(f) Anchor rail immediately after laying.

(g) Bumping posts shall have 10 ties in front of and all ties behind fully box anchored.

E7.8 CWR

E7.8.1 The Contractor shall provide such equipment, tools, and materials necessary and required for welded rail track construction.

E7.8.2 Definitions

(a) Continuous Welded Rail (CWR) is rail welded into lengths of 400 feet or more.

(b) Rail Laying Temperature (RLT) is the actual temperature at which the CWR is laid.

(c) Preferred Rail Laying Temperature (PRLT) is the target installation temperature of welded rail in a particular area. For this location the PRLT is 105 degrees F.

(d) Preferred Rail Laying Temperature Range (PRLTR) is the PRLT plus 25 degrees Fahrenheit.

E7.8.3 It will be necessary for the Contractor to move the welded rail strings to the exact location they are to be installed. The Contractor shall furnish such additional equipment and supplies as may be required to adequately distribute welded rail strings. Care must be taken to ensure that strings are laid such that gauge faces of rail are matched according to their previous position in track.

(a) The Contractor shall provide for the movement and handling of and the laying of welded rail strings in such a manner as to avoid damage to new roadbed, subballast, and rail. Care must be exercised to avoid twisting or damaging welded rail strings. During handling, Contractor shall be responsible for damage to welded rail strings to the extent that complete strings or sections thereof damaged, in the opinion of the Contract Administrator, unsuitable for use in track, such rail section shall be replaced at the sole expense of the Contractor. It is entirely up to the Contract Administrator to determine if any rail strings or portions thereof have been damaged. The method and equipment used

by the Contractor in handling and movement and the laying of welded rail strings will be subject to the approval of the Contract Administrator.

(b) Rail shall be free of dirt and foreign material when installed. Each string of rail placed into the track structure shall be numbered at a point within ten (10) feet of each end of the rail as it is laid by the Contractor with permanent type marker prior to adjustment for temperature. Numbering shall be in accordance with Contract Administrator's instructions.

(c) Contractor will not create any additional joints in a solid length of CWR without the authority of the Contract Administrator.

(d) The welded rail strings may be delivered with torch cut ends or torch cut holes in the ends. Rail ends with torch cut holes or torched ends will have to be removed. Any removal of ends with torched areas shall be accomplished by use of a rail saw a minimum of 6" from the edge of the torch cut area. Distance is measured from the cut face to the closest edge of the torch cut or area.

(e) Rail will only be cut square and clean by means of a rail saw with all burrs removed. Torch cut rail will not be allowed to remain in the track. CWR strings shall not be cut to facilitate laying or fitting without written approval of the Contract Administrator.

(f) Upon completion of the final ballast lift and after all final lining, surfacing, and brooming has taken place, the rail shall be adjusted to arrive at the PRLT for final placement.

(g) Rail temperature shall be measured at each end of the CWR string by placing at least two rail thermometers on the base of the rail near the web, away from wind and out of the direct rays of the sun and away from all sources of artificial heat or cold.

    (i.) When using pyrometers to determine rail temperature, the pyrometer should be pointed into the shaded portion of the web of the rail. Rail temperature must be taken at intervals of approximately 150'.

(h) CWR will be anchored within the PRLTR without further adjustment.

(i) CWR below the PRLT must be de-stressed as soon as possible. CWR must be de-stressed using proper procedures.

    (i.) If rail temperature is below the minimum then approved rail heaters must be used to raise the rail temperature. Rail vibrators shall be used to prevent rail from hanging up in tie plates or tie pads. Rail heaters and rail vibrators are to be operated uniformly and continuously. CWR being adjusted by heating must be free to expand longitudinally towards it loose end. The rail anchoring on ties is to be done immediately behind the rail heaters when the rail is within the PRLTR. Where rail heaters are used, care must be exercised to prevent damage to the ties. A steel hammer must not be used for vibration as it will damage the rail.

(j) A record shall be kept by the Contractor indicating the rail and air temperatures for each piece of CWR laid. This form must be completed by the Contractor and given to the Contract Administrator on a daily basis whenever CWR is placed.

(k) To determine the proper expansion or contraction for any length of CWR for any temperature differential Contractor shall refer to Appendix A entitled "Continuous Welded Rail Thermal Expansion". The Appendix contains a table that indicates the necessary CWR expansion or contraction adjustments based on length of rail string versus the temperature differential.

(l) The ends of welded rail strings and field cuts shall be field welded in accordance with the Thermite Field Welding of this specification.

(m) The air and rail temperature at the time of laying shall be painted on the web on the field side of the rail 6' from the end of each rail string with 4" letters. As an example: A 78° R80° will indicate and air temperature of 78° and a rail temperature of 80°. Rail that is laid at a rail temperature below 90° and heated in accordance with these instructions shall have an additional marking of H 105°. As an example: A 68° R 60° H 105° will indicate an air temperature of 68°, rail temperature of 60°, and a 105° heated rail condition. Markings

on the rail should be legible and made with a permanent paint type marker. Markings from previous installation must be obliterated.

(n) Rails less than 12' long on curves and 8' long on tangents shall not be used except for temporary closures.

(o) Ends of welded rail strings shall be staggered by at least 19-1/2' unless otherwise authorized in writing by the Contract Administrator. Plant welds will be staggered (to the extent possible) by at least 19-1/2'

(p) Nicked or gouged rail shall be rejected and replaced as determined by the Contract Administrator at the sole cost of the Contractor for any rail damage due to the Contractor's handling. This includes the cost of the replacement rail, transportation, welds, and any associated costs in the change out of the defect.

(q) Upon completion of the days work, all rail laid must be fully spiked, bolted and anchored, unless approved protective measures are in place.

E7.8.4 All cross ties shall be anchored in a box pattern on every other tie except at permanent joints not welded, adjacent to jointed rail and at turnouts & non glued insulated joints they will be anchored at every tie for a distance of 200 feet. The same ties on opposite rails shall be boxed.

(a) Only the proper tools or machines will be used when applying or removing anchors. The use of spike mauls is prohibited.

(b) Anchors must be installed from gauge to field side of rail to insure full bearing surface against the side of the tie, bearing against the adjacent tie and remain tight on the rail. Anchors must be on the same side of the same tie on both rails. Ties are to be at right angles to the rail before applying anchors. Anchors improperly installed will be removed and applied correctly without additional charge by the Contractor. Anchors will only be removed when the rails is still in the track.

(c) Anchors must be fully driven; however, care must be taken to avoid over-driving as this may fracture or spread the metal, resulting in loss of holding power. Any rail anchor that is fractured or with metal spread will be rejected and replaced with another anchor at the Contractor's expense.

(d) Anchors shall be installed only after the track has been raised, lined, and ties re-spaced, following all ballast operations and de-stressing of the welded rail.

(e) Care must be exercised in the spacing of anchors to ensure that no anchors are located on any tie under or adjacent to the ends of a rail joint bar or thermite weld.

E7.9 THERMITE FIELD WELDING

E7.9.1 General

(a) All rail joints between CWR strings and transition rail shall be thermite field welded.

(b) Field welds should be made at the time of rail laying regardless of temperature. When the field welding of a rail joint cannot be completed, each rail must be bolted with at least two bolts on each side of the joint before the track is placed in temporary service (four bolts per joint).

(c) Holes for complete bolting of cut rails shall be drilled by an approved type of rail drill. Under no circumstances shall new holes be drilled between two holes already drilled. Cutting rails or drilling holes in cut rails by means of acetylene or electric torch will not be permitted.

E7.9.2 Execution

(a) All thermite field welding shall be supervised and performed by an experienced rail welding supervisor and welder certified by the manufacturer of the welding equipment.

(b) Contractor shall inform the Contract Administrator daily of the location of completed welds in order for the Contract Administrator to arrange for testing and inspection. A record shall

be kept by the Contractor for each field weld made during new track construction and copied to the Contract Administrator.

(c) All equipment and material required in the production of thermite welds shall be furnished by the Contractor. Thermite welding materials and equipment shall be as manufactured by Boutet or Orgotherm.

(d) The thermite welding method and procedure shall conform to current AREMA Specification Chapter 4 and with the instructions from the welding kit manufacturer (Boutet or Orgotherm) and as specified herein. Boutet or Orgotherm self-preheating weld kits shall be applied in strict accordance with manufacturer instructions, these Specifications, and to the satisfaction of the Contract Administrator.

(e) Thermite welding shall not be performed during rain or snow.

(f) Wearing of all protective clothing and safety equipment is required during welding operations.

(g) Prior to welding, rail must be visually examined for physical defects and must meet the criteria within this specification for alignment and wear. Any rail not meeting the criteria must be reported to the Contract Administrator immediately.

(h) Thermite welds shall be located as close as possible to the center of tie cribs. The weld shall not be closer then 4" to the edge of the tie and in no case shall a weld be situated over a tie plate. Contractor shall re-space ties as necessary to prevent a weld from sitting on a tie. Field welded joints are to be centered between ties.

(i.) Contractor shall tamp and dress track, as necessary, to provide firm support at the weld.

(ii.) Contractor shall plug and re-drive all necessary spikes.

(iii.) Contractor shall re-apply and adjust anchors as necessary to conform to specified anchor pattern.

(i) No holes closer than 6" from the weld will be permitted in the rail. Distance is measured from the cut face to the closest edge of the hole.

(j) Thermite welds will not be made within 6' of another field weld or within 3' of a plant weld without written approval by the Contract Administrator.

(k) Welding gaps for thermite welds shall be 1" except where approved wide gap welds are used.

(l) All rail ends shall be saw cut. The cut must be square and perpendicular to the rail axis, with a variation not exceeding 0.03" and all scale, rust and burrs must be removed.

(m) Overflow on rails shall be ground off for 2" beyond the mold area.

(n) Vertical rail end alignment shall be made along the running surface of the rails, such that a flat running surface will result on cool down. Any difference in height of rails shall be in the vertical base offset.

(o) Vertical misalignment of rail ends on the base underside must not exceed 1/8" on thermite welds.

(p) Horizontal alignment must be straight for at least 36" through the weld area. To meet this requirement when welding in curved track, rail positioners (aligners) must be used.

(q) Horizontal rail end alignment shall be made along both sides of the head, web and base edges of the rail. Adjustments shall be made such that:

(i.) On new rails, or rails with comparable gauge face wear, any difference in the width of head, web or base shall be divided equally on either side.

(ii.) On rails with uneven head width, the bases and webs of the rails shall be aligned so that the horizontal offset in the head, web or base does not exceed 0.06". The gauge and field sides of the railhead shall be blended in by grinding.

(r) Head bond weld nuggets of exothermic rail bonds, which fall within the mold are, must be completely removed by grinding prior to thermite welding.

(s) Immediately prior to mold installation the rail ends and surface area that will be exposed to the thermite material must be cleaned a minimum distance of 6" from the end with a wire brush or a grinding wheel in order for this area to be free of grease, rust, and other foreign material, along with any other recommendations of the welding kit manufacturer.

(t) Molds must be centered over the weld gap.

(u) During sealing of the molds, cardboard inserts must be placed over the molds to prevent any foreign material from falling into the mold cavity.

(v) Check the plastic bag containing the charge, ensuring that the bag is sealed and has not been punctured in handling.

(w) Before preheating, check the rail temperature with a rail thermometer, if the rail temperature is below 60 degrees Fahrenheit both rails must have supplemental heat applied to raise the rail temperature to at least 100 degrees Fahrenheit.

(i.) The length of the rail to be supplementally heated shall be between 30 and 36 inches for rail temperatures between 60 degrees Fahrenheit down to 16 degrees Fahrenheit.

(x) A rail expander will be placed on the rail to maintain the correct gap and crown unless temperature conditions are such that the possibility of rail movement is eliminated.

(i.) If a change in rail temperature is anticipated while the weld is being poured or while it is cooling, the rail expander should be adjusted to compensate for any stresses which will occur at the weld due to a change in temperature.

(ii.) Depending upon the type of change expected, one of the following procedures will assist in preventing temperature induced stresses from affecting the quality of the weld.

.1 Rail temperature is low and a raise in temperatures is anticipated, the rail expander should be set up to expand the gap and enough pressure built up to cause a slight increase in the gap. This should prevent any subsequent decrease in gap width.

.2 Rail temperature is high and a drop in temperature is anticipated, the rail expander should be set up to pull and enough pressure built up to cause a slight subsequent increase in width.

.3 Whenever either of the above procedures is required, the final gap width must be as stated in the manufacturers instructions for the rail weight being welded.

.4 The rail expander must remain on the rail until the weld is complete and has cooled to 700 degrees F. This is verified when the center of the weld around its entire periphery will not melt a 700 degree F tempilstick.

.5 When the rail expander is removed, it must be released in a gradual manner.

(y) .Rail ends will be preheated prior to welding to a sufficient temperature and for a sufficient time to ensure full fusion of the weld metal to the rail ends without cracking of the rail or weld, per manufacturers instructions. Preheating must not be interrupted and the heat shall be uniformly distributed over the rail ends. The preheat time specified for the process must be adhered to.

(z) .Ignition must be preformed immediately after preheating.

(aa) .During the pour, the crucible must be centered over the mold. When the pour is completed the molten slag must be allowed to solidify for three minutes prior to removing the slag pot. **For the CJ One shot crucible, the slag pot must not be removed until 5 minutes after the pour. The weld must not be sheared until 6-1/2 minutes after the pour.**

(bb) In the event of a leak, apply molded fusal paste with the end of a wood handle at least 36" in length. Never attempt to stop a leak in any other manner.

(cc) Should the thermite reaction or the time delay of the self-tapping thimble be abnormal, the weld must be rejected.

(dd) With multi-use crucibles if the reaction is abnormal and the automatic thimble doesn't tap, the crucible should be left standing over the mold for 5 minutes. If the thimble releases during that time, the metal will pour into the mold and although the weld will have to be cut out, there is no danger of personal injury. The loaded crucible should then be carefully set aside and no attempt made to empty it until the metal has cooled. After cool down, the metal is easily dumped.

(ee) .With power shears or a sledge hammer and hot cut chisel, remove the excess metal, while still hot, off the sides of the ball of the rail.

(ff) Never dump hot slag or any molten material on wet soil, wet ballast, or into water. To extinguish a metal fire, use only dry sand. The use of vapour forming extinguishing materials is forbidden.

(gg) The mold shall be left in place after tapping for a sufficient time to permit complete solidification of the molten metal and proper slow cooling to prevent cracking and provide a complete weld with the proper hardness and ductility.

(hh) Thermite welds shall be ground hot. When hot grinding, the weld shall be left at least 0.032" above the parent rail steel on the running surface, to ensure it does not shrink below the rail head upon cool down. The contour radius, gauge face and field side of the head shall be hot ground flush or blended in where necessary. Do not grind the rail head free hand.

(ii) After the weld has cooled to ambient temperature it shall be cold ground, flush with the rail surface and blended in where necessary. Do not grind the rail head free hand. Check the final contour of the rail head with a 36" straight edge.

(jj) The weld must be protected against water or any liquid for two hours after finish grinding. Welds shall be allowed to cool normally, without induced cooling.

(kk) Date and initials of welder and Contractor's name shall be placed on the web of the rail with metal marking paint and all welds shall have a number based upon a numbering system approved by the Contract Administrator. These marks will be placed on the field side of the rail being welded.

(ll) Contractor shall not add more rail than what was removed when installing insulated joints, replacement rail, and performing welds after final de-stressing of the CWR.

(mm) Contractor shall provide sufficient time to allow welds to cool to 450 degrees Fahrenheit and have completed the finish grinding prior to any equipment movement across welds.

(nn) With the "unfinished" base of the thermite welds the Contractor will need to exercise caution when adjusting the rail so as not to bind the rail at a tie plate, or allow the ties to be skewed.

E7.9.3 Field Quality Control

(a) All welds giving fault indication by ultrasonic inspection or visible inspection, being unacceptable, shall be replaced at Contractors expense. This includes the addition of a rail plug and additional welds where required.

(i.) Ultrasonic testing of all completed welds in the track shall be carried out as specified herein.

(ii.) All initial testing and submittals shall be performed as directed by the Contract Administrator at no cost to the Contractor.

(iii.) Welds not meeting the following requirements will be rejected:

.1 Each weld shall have full penetration and complete fusion with no evidence of surface or internal fissures or cracks.

.2 Porosity or slag type defects shall not exceed 0.040 inches in any dimension and the total area of all defects shall not exceed 0.024 square inches.

.3 Conformance to alignment tolerances.

(iv.) If a defective weld is found, it shall be cut out and a new section not less than 8' long on tangent track and not less than 12' long on curved track shall be inserted, welded with two thermite welds, and re-tested all at Contractor's expense.

(v.) Ultrasonic testing will be performed by a competent material testing service as determined by the Contract Administrator.

(vi.) All welds shall be visually inspected by the Contractor and Contract Administrator for surface cracks and alignment. Welds with surface cracks visible to the eye or not within the alignment tolerances will not be acceptable.

E7.10 BALLASTING AND SURFACING

E7.10.1 General

(a) Ballast as required, shall be supplied by Contractor. Contractor shall unload all crushed rock ballast material, surface, tamp, line, finish surface, regulate, and power broom new track constructed. All track shall be surfaced and tamped as soon as possible after unloading ballast.

(i.) Ballast shall be placed to a minimum depth of 12" below the bottom of the ties at grade point to the dimensions and widths (minimum 12" shoulders for CWR) as shown on the drawings. Ballast shall be compacted by approved tamping methods to hold track firmly in place. All tamping operations shall be performed with an approved power tamper machine.

(ii.) Placement of ballast and surfacing of track shall be done in a manner such that all tolerances and requirements of these specifications shall be retained by the track structure for a period of 1 year from the time of acceptance.

(b) Contractor at their expense shall provide all the plant, equipment, and labor necessary to unload and transport the ballast to the track construction site and distribute the ballast to the track structure.

E7.10.2 Execution

(a) Contractor will direct the unloading and distribution of ballast and will be fully responsible for all aspects of the unloading and distribution, subject to approval by the Contract Administrator. All costs associated with any equipment derailed during ballasting including repairs to damaged railway equipment will be the responsibility of the contractor.

(b) When unloading ballast in the center of the track, a plow tie may be used in order to evenly spread ballast and prevent excessive rock from accumulating on the rail and possibly derailing cars.

(c) After unloading ballast, all cars must be completely empty and doors closed and locked prior to releasing.

(d) Power tamping machines are to be used throughout all track construction. Manual tamping will not be allowed. The use of a ballast compactor together with the power tamping machines may be used with the written permission of the Contract Administrator.

(i.) Tamping machines are to be automatic multi-tooled with a minimum of 8 tamping feet per rail and having automatic profile reference beams of not less then 75'.

(ii.) Each tool shall have a tamping pressure sufficient to close the ballast beneath each tie. The foot of each tool shall be a minimum of 1 ½"x3" at all times.

(iii.) A junior tamping machine less the reference beam may be used in conjunction with a lead machine provided that all other characteristics of the lead machine are the same on the junior tamper. The tamping machine with the reference beam will tamp a minimum of every second tie.

(iv.) Any proposed ballast compaction equipment shall be listed in Form K and is subject to acceptance of the Contract Administrator.

(e) No part of the track structure will be raised more than 3" in any one lift. New track construction will have to be worked more than once and the Contractor will have to apply additional ballast to conform to the ballast cross section shown within the Typical Track Section drawings.

(f) Each lift is to be tamped from a line 16" inside each rail on both sides of and to the ends of the ties. Center area between these limits shall be filled lightly with ballast but not tamped. Tamping shall proceed, simultaneously; at both ends of the tie making sure ballast is forced directly under the ties and against the sides and ends of the ties.

(i.) Too many insertions with a power tamper may cause a center bound track condition. Generally two squeezes per tie up to 1-1/2" of raise with one additional insertion and squeeze for each additional 1" of raise is required with insertion depth being a minimum of 1 ½" below the bottom of tie.

(ii.) When the track has been raised to within 2" of final grade, the final lift shall be made by raising the track up to grade stake elevation making necessary allowance for settlement. The ballast shall be applied under the ties for their entire length.

(g) During raising and tamping, if any crib area is void of ballast below the bottom of the tie then the area of the track is to be re-tamped following the application of additional ballast.

(h) While raising and tamping track levels shall be constantly used to insure correct surface and cross level.

(i.) Contractor will finish each point on the track to within a maximum of ½" deviation from zero cross level on tangent. Average cross level on tangent and superelevation on curves will be as specified.

(ii.) Contractor will finish the track so that the difference in cross level between any two points less than 62' apart on tangents and on curves between the spirals must be no more than 1". Deviation from zero cross level at any point on tangent may not be more than ½". Variations in cross level on spirals in any 31' may not be more than ¾". Track will be finished so that the deviation from uniform profile on either rail at the mid-ordinate of a 62' chord may not be more than 1-1/4".

(iii.) Contractor will finish the track so that the horizontal alignment between any two points 62' apart on tangent track will deviate from a straight line by no more than ¾". Mid ordinate of a 62' chord between two points on the gauge side of the outer rail will be one inch per degree of curve with an allowable tolerance of plus or minus 5/8".

(i) After track has been brought to true surface, elevation, and grade, it shall be given a final lining and placed in true alignment and grade conforming to the elevations and alignment according to the drawings and the ballast dressed to the design ballast cross section.

(j) When raising track, the Contractor has a tolerance of plus or minus 1/2 " to the design grade as long as requirements of this Section are met. If not raised to the established grade, then the Contractor will unload ballast in sufficient quantity and continue to surface the track to comply with the tolerances.

(i.) All ties are to be straightened and re-spaced as necessary immediately prior to unloading ballast for the final raise.

(ii.) If the Contractor raises the track too high to comply with the allowable tolerance, Contractor, at his expense, will excavate the ballast sufficiently to lower the track and then surface the track again to bring it into full conformity.

(k) When track is lifted or jacked, care must be exercised by the Contractor to avoid stressing or permanently bending the rail, joints, or turnout components.

(l) When surfacing through a turnout with boltless adjustable rail braces, switch points and stock rails will be blocked to prevent displacement of stock rail from the switch plate.

(m) Tamp turnout ties for 16" on each side of main and turnout rails. Headblock ties to be tamped as above with no voids under remainder of tie.

(n) Turnout tie cribs are to be full except to prevent contact with rods and for drainage as required.

(o) Contractor will correct any hanging or skewed tie that is a result of his tamping and raising the track. Tie plates will be positioned so that the shoulder is against the outside base of rail for the entire length of the shoulder.

(i.) Contractor will plug and re-drive all high or loose spikes and will plug and replace all spikes removed.

(ii.) Contractor will replace and/or adjust all tie plates and rail anchors knocked off or that worked loose or were damaged during the surfacing and regulating. The anchors must remain matched across from each other on each rail. Tie plates must remain square to the tie.

(p) Contractor will provide the ballast section as shown in the Typical Track Section drawings. No dirt or foreign materials will be allowed into the ballast section.

(q) After track has been brought to true surface, elevation, and grade it shall be given a final lining and placed in true alignment conforming to design and the ballast shall be trimmed neatly to the dimensions and widths of the Typical Track Section drawings

(i.) Cribs shall be filled to top of tie.

(ii.) No ballast will be left on top of ties, spikes, fasteners and plates.

(r) Surplus ballast shall be spread evenly along the ballast slopes. Dressing of the ballast by placing earth higher than the toe and thus preventing proper drainage will not be permitted. After all ballast placement has been completed, the track shall be given a complete power broom finish with approved machinery. Contractor shall insure that the top of ballast rock matches the top of tie surface and that no excess ballast remains on either the top of rail, top of tie, base of rail, or top of tie plate, spike or anchor or roadway crossing surface.

(s) Contractor shall exercise caution while regulating ballast shoulders so as to avoid track misalignments and to avoid obstructing adjacent drainage ditches, structures, or culverts with ballast, dirt, vegetation, or other material.

(i.) If Contractor obstructs an adjacent drainage ditch, structure, or culvert, he will have to initiate the cleaning of those as soon as possible.

(ii.) Contractor is responsible to ensure that the partially ballasted track in his work area does not buckle out of alignment. If a misalignment of the track occurs as a result of the Contractor's operations, he must correct at his expense.

E7.11 CROSSINGS

E7.11.1 General

(a) The Contractor will be allowed, at the Contractor's expense, to supply and install additional temporary crossings as required for convenience and shall make good, at the Contractor's expense, any track material damaged by same. This shall include all material and labour required to meet the specifications of this project. Upon completion of all work these temporary crossings are to be removed, at the contractors expense.

(b) Contractor is responsible for any and all approved detouring, detour roadways, all signage, barricading and traffic control that may be necessary to facilitate crossing installation. It shall be the sole responsibility of the Contractor to erect and maintain such detour roadways, signage, barricades and traffic control as required by during the length of time that the road is closed to traffic or while crossing protection is required.

(c) Track materials and construction execution associated with crossing installation to be in accordance with all parts of these specifications.

E7.11.2 Execution

(a) Hardwood Crossing Surface

(i.) Install new 7" x 9"x 9' hardwood crossing ties between locations as shown on drawings in accordance with Part 3.3 of these specifications except ties to be installed at 19-1/2" centers.

(b) Install new 7" x 10"x 20' hardwood crossing planks.

(i.) Planks will be cut to length as required with the outer ends of all planks beveled so to minimize the effects of dragging equipment.

(ii.) Planks will be placed such that a flangeway space not less then 3" nor more then 4-3/4" wide shall be provided between the gauge side of the running rails and the planking. A flangeway on the field side of the running rails will not be allowed.

(iii.) Planks will be fastened to the crossing ties by means of the ¾"x12" hex lag bolts and washers through the prebored holes in the planks. Should additional pilot holes be required they will consist of a 5/8" hole drilled a minimum of 5" into the crossing plank such that they are aligned with every 4th crossing tie.

(iv.) All wood surfaces exposed by either cutting or drilling must be treated with P2 - Petroleum Creosol.

(v.) Remove all debris from site and leave crossing in a clean condition.

E7.12 MEASURE OF PAYMENT

E7.12.1 The Unit Price, submitted in the Bid, shall include the entire cost of supplying all labour and equipment to construct trackage as shown on the drawings and specified in this Specification. With the exception of the quantities identified with the track WF43 connection grading complete shall be considered incidental to the work.

(a) Supply and construction of the 132lb continuous welded rail (CWR) track complete will be paid for at the contract unit price per track foot bid for this work, including rail de-stressing, anchoring and ballasting & surfacing. Track complete shall include the rail, ties, tie plates, thermite field welds, anchors, track spikes, OTM, all other incidental items and rock ballast. Track feet of 132lb track construction will be based on as built measurements taken by the Contract Administrator upon completion of all ballasting and surfacing, de-stressing of rails and 132lb thermite field welding. Length of track constructed will be measured from the centerline of the first and last ties to the edge of the hardwood crossing transition rails. Payment will be based on the track feet completed. A track foot is described as the lineal measurement in feet along the centerline of a set of rails (two rails). Completed track will be measured for length along the centerline of track by the Contract Administrator. Length of measurement will be to the nearest whole foot.

(b) Supply and construction of the 115lb jointed rail track complete will be paid for at the contract unit price per track foot bid for this work, including anchoring and ballasting & surfacing. Track complete shall include the rail, ties, tie plates, anchors, track spikes, OTM, all other incidental items and rock ballast. Track feet of 115lb track construction will be based on as built measurements taken by the Contract Administrator upon completion of all ballasting and surfacing. Length of track constructed will be measured from the centerline of the first and last track ties (excluding switch ties).

Payment will be based on the track feet completed. A track foot is described as the lineal measurement in feet along the centerline of a set of rails (two rails). Completed track will be measured for length along the centerline of track by the Contract Administrator. Length of measurement will be rounded up to the nearest whole foot.

(c) Supply and construction of #8 Special 115 lb turnouts complete will be paid for at the contract unit price per turnout bid for this work, including rail anchoring and ballasting and surfacing. Turnout complete shall include the turnout rail, transition rail, frog, switch ties, switch stands, switch plates, frog plates, tie plates, anchors, clips, screws, track spikes, OTM, all other incidental items and rock ballast. Turnout construction will be based on as built measurements taken by the Contract Administrator upon completion of all ballasting and surfacing, de-stressing of rails and thermite field welding. Turnouts will be counted as each.

(d) Relining existing of #8 Special 115 lb turnouts complete will be paid for at the contract unit price per turnout bid for this work, including rail anchoring and ballasting and surfacing. Turnout complete shall include the turnout rail, transition rail, frog, switch ties, switch stands, switch plates, frog plates, tie plates, anchors, clips, screws, track spikes, OTM, all other incidental items and rock ballast. Turnout relining will be based on as built measurements taken by the Contract Administrator upon completion of all ballasting and surfacing, de-stressing of rails and thermite field welding. Turnouts will be counted as each.

(e) Supply and complete installation of hardwood railroad crossing material complete, will be paid for at the contract unit price per track foot bid for this work. Completed hardwood railroad crossing shall include, planks, plank fastenings, crossing ties, OTM, detours, traffic control and all other incidental items. Completed hardwood railroad crossing will be measured by the Contract Administrator along the centerline of track from outside edge of plank to outside edge of plank at each crossing.

(f) Relining of existing track complete will be paid for at the contract unit price per track foot bid for this work, including ballasting & surfacing. Track complete shall include the rail, ties, tie plates, anchors, track spikes, OTM, all other incidental items and rock ballast. Track feet of relining will be based on as built measurements taken by the Contract Administrator upon completion of all ballasting and surfacing. Length of track constructed will be measured from the centerline of the first and last track ties (excluding switch ties). Payment will be based on the track feet completed. A track foot is described as the lineal measurement in feet along the centerline of a set of rails (two rails). Completed track will be measured for length along the centerline of track by the Contract Administrator. Length of measurement will be rounded up to the nearest whole foot.

(g) Supply and installation of derails complete will be paid for at the contract unit price per derail bid for this work. Derail complete shall include the derail, spikes, OTM, all other incidental items required. Derail construction will be based on as built measurements taken by the Contract Administrator upon completion of all ballasting and surfacing. Derails will be counted as each.

(h) Removal and stockpiling of the surplus track complete will be paid for at the contract unit price per track foot bid for this work. Track complete shall include the rail, ties, tie plates, anchors, track spikes, OTM and all other incidental items. Track feet will be based on as removed measurements taken by the Contract Administrator upon completion of placing material in identified stockpile location. Length of track removed will be measured from the centerline of the first and last track ties (excluding switch ties). Payment will be based on the track feet completed. A track foot is described as the lineal measurement in feet along the centerline of a set of rails (two rails). Completed track will be measured for length along the former centerline of track by the Contract Administrator. Length of measurement will be rounded up to the nearest whole foot.

(i) Removal and stockpiling of turnouts complete will be paid for at the contract unit price per turnout bid for this work. Turnout complete shall include the turnout rail, transition rail, frog, switch ties, switch stands, switch plates, frog plates, tie plates, anchors,

clips, screws, track spikes, OTM, all other incidental items. Turnouts will be counted as each.

(j) Removal and stockpiling of ballast will be paid at the contract unit price bid for this work. Upon establishment of a stockpile site cross sections of the prepared ground will be done. Upon completion of stockpiling cross sections of the pile will be done and the quantity established.

E8. RAILWAY PROPERTY CLEANING

E8.1 GENERAL

(a) Conduct cleaning and disposal operations to comply with local ordinances and anti pollution laws.

(b) Store volatile wastes in covered metal containers and remove from premises daily.

(c) Prevent accumulation of wastes which create hazardous conditions.

(d) Provide adequate ventilation during use of volatile or noxious substances.

E8.2 MATERIALS

(a) Use only cleaning materials recommended by manufacturer of surface to be cleaned and as recommended by cleaning material manufacturer.

E8.3 CLEANING DURING CONSTRUCTION

(a) On a daily basis maintain premises free from debris and waste material.

(b) Maintain project site and public properties free from accumulations of waste materials and rubbish.

(c) Remove waste materials and rubbish from site.

(d) Disposal of wastes on Railway property by burial or burning shall not be permitted.

E9. RAILWAY GRADING AND DRAINAGE

E9.1 RELATED WORK

E9.1.1 E11 – Granular Materials

E9.2 GENERAL

E9.2.1 The Unit and Lump Sum Prices, submitted in the Bid, shall include the entire cost of supplying all labour, material, equipment and tools for stripping, excavation and grading of all classes of material; all as required to construct the Railway roadbed, for the siding extension and the turnout access as shown on the Drawings and specified in this Specification.

E9.2.2 The Unit and Lump Sum Prices shall also include the cost of supplying all pumping, bailing, shoring and sheeting, etc. and also the furnishing of all necessary pumps, tools and equipment required to keep all excavations dry.

E9.3 DEFINITIONS

E9.3.1 Excavation classes: only three classes of excavation will be recognized, stripping, common excavation and borrow material.

(a) Stripping: excavation of surface material containing organic material and, which in the opinion of the Contract Administrator, is not suitable material for embankment construction but shall be placed over cut and fill slopes prior to seeding.

(b) Common Excavation: excavation of materials from within Railway property of whatever nature, such as loose stones, hardpan and seamed rock, which in the opinion of the Contract Administrator, do not require blasting prior to removal. Clay, shale, sand, gravel, silt, etc. are also in this class.

(c) Borrow Material: material obtained from areas off Railway property, required for construction of embankments or for other portions of work.

(d) Geortextile: Woven fabric meeting the Specification of HC02215, 2.1.4, placed on original ground or stripped surface, required, in the opinion of the Contract Administrator, to facilitate construction of the embankment in areas of soft embankment soil.

E9.3.2 Waste material: material unsuitable for use in work or surplus to requirements.

E9.3.3 Embankment Fill: material derived from common excavation or borrow material and placed above original ground or stripped surface to construct the subgrade for the rail bed or access road.

E9.3.4 Subgrade elevation: elevation immediately below subballast or road surface gravel.

E9.4 MEASUREMENT FOR PAYMENT

E9.4.1 Excavation materials shall be measured in cubic metres.

E9.4.2 Quantities shall be calculated by the method of average end areas based on cross sections taken by the Contract Administrator.

E9.4.3 Clearing and grubbing: The quantity of clearing and grubbing shall be based on area measured prior to construction and again after completion of clearing and grubbing.

E9.4.4 Stripping: The quantity of stripping shall be based on cross sections taken prior to construction and again after completion of stripping.

E9.4.5 Geotextile: The quantity of geotextile shall be the area of geotextile supplied and installed as measured after placement.

E9.4.6 Common Excavation: The quantity of common excavation, within Railway property, shall be taken as the volume of material excavated in place below the grades attained after stripping and shall be calculated from cross sections taken after stripping and again after embankment construction.

E9.4.7 Borrow Material: The quantity of borrow material shall be taken as the total volume of embankment fill material in place above the grades attained after stripping, minus the volume of Common Excavation calculated in accordance with HC02215, Sub-Clause 1.3.4. The total volume of embankment fill material shall be calculated from cross sections taken after embankment construction and before placing stripped topsoil on embankment cut and fill slopes.

E9.4.8 Include in unit price for borrow material entire cost to supply, haul, place and compact material including, but not limited to, costs for developing borrow pits, stripping, grubbing, excavating, constructing and maintaining roads, regulations and permits.

E9.4.9 Include in unit price for stripping at Hubbard the entire cost to do any required clearing and grubbing within the stripping limits. This work shall include the clearing of trees, brush, embedded logs, fallen timber, branches and other surface litter and all objectionable material below the ground surface including roots, brush, stumps and buried debris. Removal and replacement of existing railway right of way fence, as directed by the Contract Administrator, is also to be included.

E9.5 REQUIREMENTS of REGULATORY AGENCIES

E9.5.1 Adhere to municipal, provincial and national government requirements relating to safety of excavations and protection of workers.

E9.5.2 Adhere to regulations of authority having jurisdiction if blasting is required.

E9.6 SOIL CONDITIONS

E9.6.1 A soil investigation has been carried out at the site to determine soil conditions, soil characteristics and water levels.

(a) The results are included with the Contract Documents in the attachments.

E9.6.2 Study these results and be familiar with the soil conditions at the site.

E9.6.3 Accept responsibility for any interpretation of this data.

E9.6.4 The City will not accept unfamiliarity with encountered soil conditions and water levels as a basis for a claim for additional payment.

E9.7 MATERIALS

E9.7.1 Embankment materials require approval by Contract Administrator.

E9.7.2 Material used for embankment shall not contain organic matter, frozen lumps, snow, ice, weeds, roots, logs, stumps or any other objectionable matter.

E9.7.3 Borrow Material:

(a) Borrow material from off Railway property shall consist of inorganic plastic clay with properties and consistency similar to the common excavation approved for subgrade construction.

(b) The Contractor shall be responsible for supplying required additional borrow material from a site off Railway property.

(c) The Contractor shall identify his proposed source of borrow material after award, no later than two weeks prior to commencement of construction.

(d) The borrow site shall be accessible to the Contract Administrator for the purpose of sampling and evaluating the proposed borrow material.

(e) The Contractor shall provide at no cost to the City necessary equipment to excavate test pits at the borrow site and recover samples or shall provide representative samples to the Contract Administrator if requested.

(f) Borrow material shall not be used for embankment construction prior to approval by the Contract Administrator.

E9.7.4 Geotextile Fabric

Property	Standard	Test Method
Grab Tensile Strength	1400 N – minimum	ASTM D4632
Puncture Strength	530 N – minimum	ASTM D4833
Trapezoid Tear	500 N – minimum	ASTM D4533
Apparent Opening Size	0.430 mm – maximum	ASTM D4751
Permittivity	0.05 sec^{-1} – minimum	ASTM D4491
U.V. Resistance	70% per 500 hrs – minimum	ASTM D4355
Mullen Burst	3500 kPa – minimum	ASTM D3786

E9.8 PREPERATION of AREAS for EARTH WORKS

E9.8.1 Maintain silt fences as per General Instructions environmental guidelines.

E9.8.2 Strip fill areas of unsuitable materials as designated by Contract Administrator.

E9.8.3 Stripped material shall be classified as "stripping."

(a) Unless specified otherwise, this material is paid under "Stripping".

(b) Strip organic material to necessary depth or as directed by the Contract Administrator.

(c) Salvage stripping material.

(d) The maximum depth of stripping in ditches shall be the ditch invert.

(e) After completion of embankment, spread stripping uniformly against embankment cut and fill slopes or as directed by the Contract Administrator.

E9.9 EXCAVATING

E9.9.1 General:

(a) Advise Contract Administrator sufficiently in advance of excavation operations for initial cross sections to be taken.

(b) Maintain excavation to typical cut sections indicated on drawings or as directed.

(c) Take particular note of the following:

(i.) Where necessary, the Contract Administrator may design cuts and fills specially for stability, which will affect dimensions indicated on the drawings.

(ii.) Remove unsuitable materials encountered in cut sections to depth and extent directed.

1. Replace with approved material and compact.

(iii.) When slides occur in cuts after they are properly formed, remove the material, modify the slopes and adopt other precautions as directed.

1. The materials shall be classified as "Common Excavation" and Contractor will be paid for its removal at the unit contract price for "Common Excavation".

(iv.) Complete all excavation as far in advance of fill construction as practical.

(v.) Maintain all work in a well drained condition, free of debris and other obstructions.

(d) The City will not pay for additional excavation (borrow or common) which the Contractor may require for his convenience or movement of equipment.

E9.9.2 Waste Material

(a) Remove and dispose of unsuitable material as directed.

(i.) Refill depressions and holes from this work. This work shall be paid for at the contract unit price for “Common Excavation”.

(b) Remove and dispose of material off Railway property in excess of requirements for embankment construction as directed.

E9.9.3 Borrow

(a) Completely use in embankments, suitable materials removed from excavations before taking material from borrow areas.

(b) Obtain from borrow areas located off Railway property additional suitable embankment material.

(c) Strip all organic topsoil.

(d) Excavate borrow material after the Contract Administrator has inspected borrow areas.

(e) Trim and leave borrow pits in a neat condition.

E9.9.4 Drainage Excavation

(a) Drainage excavation shall include all side ditches and off-take ditches, as indicated on the drawings or staked out in the field by the Contract Administrator.

(b) Complete ditch excavation as far in advance of embankment construction as practical, to the grades set by the Contract Administrator, to permit ready flow of surface water.

(c) Excavate ditches in cuts at the same time as the main cut in order that the excavated material can be used in adjacent embankments.

(d) Use suitable equipment to ensure cut slopes and subgrade sections are not undercut.

(e) Maintain and keep ditches open and free from debris and other obstructions until final acceptance.

E9.10 EMBANKMENTS

E9.10.1 Where indicated or directed by Contract Administrator, key existing slopes to ensure a proper bond between new materials and existing surfaces.

(a) The City will not pay extra compensation for this operation.

E9.10.2 Prior to placement of fill material, scarify the top 0.15 metres (6 inches) of existing ground surface and compact to 95% for Track Grade of Standard Proctor maximum density, in accordance with this Specification.

E9.10.3 Obtain, place and compact approved materials from excavation areas in the locations indicated on the drawings.

(a) In general, material approved for fill shall have a natural water content close to optimum, as determined by the Standard Proctor Test.

(b) Where fill contains lumps larger than 0.15 metres (6 inches), use scarifiers or disks to break down lumps before compacting.

E9.10.4 Do not place material which is frozen or place material on frozen surfaces.

E9.10.5 Maintain a crowned surface during construction to ensure ready run-off of surface water.

E9.10.6 Take particular note of the following:

(a) Where fills are to be placed over areas with weak formation soils, use a stage loading technique to construct embankments.

(b) Where significant long term settlements are expected, Contract Administrator will increase the top width of embankments from the standard dimensions indicated.

E9.10.7 Maintain fill to typical sections indicated on drawings.

E9.10.8 Winter grading

(a) Place fills during freezing weather only after permission received from Contract Administrator.

(b) Provide necessary amount of earth moving and compacting equipment to provide a continuous operation on areas approved by Contract Administrator.

(c) Do not place frozen material in fills.

(d) Compact material thoroughly before it freezes.

(i.) If materials freeze before attaining required compaction, stop placing of fill and remove frozen material before resumption of filling.

(ii.) Removal of frozen material to be at Contractor’s expense.

E9.10.9 Placement of Geotextile

(a) Where the geotextile is required over soft ground exposed after stripping, methods that minimize disturbance or further softening of the ground shall be employed during stripping and other construction activities.

(b) Place geotextile over areas of soft ground by methods that minimize disturbance of soft ground.

(c) The geotextile shall be installed full width for the required length of the embankment in accordance with the manufacturer’s recommended procedure. Align machine direction parallel to the rail line, free of tension, stress, folds, wrinkles, or creases. Joints in the fabric shall be overlapped not less than 2 feet.

(d) Securing pins with washers shall be inserted through the fabric at intervals not greater than 5 feet along a line 6 inches from both exterior edges of the fabric blanket.

(e) Additional pins shall be installed as necessary, regardless of location, to prevent any slippage of the fabric.

(f) The supply and installation of securing pins shall be incidental to the cost of the fabric blanket.

(g) The fabric shall be placed within a key in the existing embankment and secured as directed by the Contract Administrator.

(h) The fabric shall be placed and wrapped back upon itself at the end away from the track as directed by the Contract Administrator.

(i) Dumping of material or equipment movement directly on the geotextile will not be allowed.

(j) The geotextile shall not be exposed more than 48 hours before covering.

E9.11 COMPACTION

E9.11.1 Equipment

(a) Compaction equipment to meet or exceed following requirements.

(i.) Sheepsfoot Roller: Drum 60 inches diameter, feet 8 inches long, average pressure on feet 425 pounds per square inch.

(ii.) Rubber Tired Rollers: Weight 30,000 pounds, tire pressure 90 pounds per square inch.

(iii.) Vibratory Rollers: Vibrating force 4,500 pounds per cycle per foot width, vibration frequency 1,600 cycles per minute.

(b) Compaction equipment must be capable of obtaining required densities in materials on project.

(c) Contract Administrator sole judge of adequacy of any compaction equipment and may reject any compaction equipment he deems inadequate.

E9.11.2 Execution

(a) Compact all embankment fill material and excavations to a density of not less than 95% for Track Grade and 98% for Road Grade maximum dry density in accordance with Standard Proctor Compaction Test (ASTM D698).

(b) Place and compact embankment fill to full width of section in uniform layers not exceeding 8 inches loose thickness. Contract Administrator may authorize thicker lifts if specified compaction can be achieved.

(i.) Do not place boulders exceeding 0.20 metres (8 inches) in diameter in the fill.

(ii.) Do not place boulders exceeding 0.15 metres (6 inches) in size within 0.6 m (2 feet) of subgrade level.

(c) Apply water uniformly by means of an approved distributor to any fill which, in the opinion of the Contract Administrator, is deficient in water content for thorough compaction.

(i.) Apply water to reduce dust nuisance.

(d) Scarify or disk and aerate fill material which is too wet, until proper water content for compaction is attained. With approval of Contract Administrator, blend drier material with wet material to achieve a water content satisfactory for compaction as specified in 3.4.4.

(e) Remove material not thoroughly compacted at no cost to the Railway.

(f) Where compaction is not being obtained, cease placing material and give additional compaction to material in place.

(g) Operate sufficient compaction equipment to thoroughly compact the fill at the rate being placed.

(h) Place and compact side slopes of fills simultaneously with core of fill.

(i.) Do not construct fill by means of central core finished off by side dumping of materials to make up the section.

(i) 9 In areas incapable of supporting earth moving equipment, increase the cover over the areas to sufficiently support equipment.

(i.) Place the layer over full width of embankment.

(ii.) Thoroughly compact the surface.

(iii.) Build remainder of fill in layers of specified normal thickness.

(iv.) Use granular material for initial fill layer in soft swampy areas, as directed.

(j) Route all loaded earth-hauling equipment over entire width of embankment.

(k) Construct and maintain embankments in a well-drained condition.

E9.12 FIELD QUALITY CONTROL

E9.12.1 During fill placement, Contract Administrator may perform density and other tests to control construction and may also install stand-pipes, settlement gauges and other apparatus to measure and observe fill performance.

(a) Facilitate such work and promptly replace, at no cost to the City, any such apparatus damaged from the operations.

(b) Do not claim for delays to the operations resulting from field tests.

E9.12.2 Contract Administrator shall take representative samples at expense of the Contractor and submit them for laboratory tests for approval of its quality and nature prior and/or during its use.

(a) Provide necessary personnel and equipment to permit adequate investigation and sampling.

(b) Advise Contract Administrator at least one week in advance of use of any material to allow sufficient time for sampling and testing.

(c) Contract Administrator will pay for testing of material.

E9.12.3 Final acceptance of materials made after materials dumped, spread and compacted in place.

(a) Contract Administrator may reject at source, on transportation vehicle or in place.

(b) Contract Administrator will not pay for removal and disposal of any rejected material.

E9.13 FINISHING

E9.13.1 Remove soft or other unstable material that will not compact properly and fill resulting depressions with approved material.

E9.13.2 Shape and compact entire roadbed to design elevations within 13 mm (0.5 inch) of design but not uniformly high or low.

E9.13.3 Do scarifying, blading, compacting or other methods of work as necessary to provide thoroughly compacted roadbed shaped to grades and cross sections indicated or directed.

E9.13.4 Finish back and side slopes of common material to neat condition, true to line and grade.

E9.13.5 Trim all waste and stockpile areas neatly and maintain in a well-drained condition.

E9.13.6 Maintain finished surfaces in a condition conforming to this section until acceptance and surveyed by the Contract Administrator.

E10. RAILWAY GRANULAR MATERIALS

E10.1 Related Work

E10.1.1 E 10 – Railway Grading and Drainage

E10.2 Description of Work

E10.2.1 The Lump sum Price, submitted in the Bid, shall include the entire cost of supplying all labour, material and equipment to supply, load, haul, place and compact suitable granular materials in the work as shown on the drawings and specified in this specification.

E10.3 Measurement for Payment

E10.3.1 Granular material will be measured in cubic metres of material in place and accepted by Contract Administrator.

E10.3.2 Calculation of quantities will be based on granular material compacted in place based on surveyed quantities.

E10.3.3 Granular material placed outside design sections as staked by the Contract Administrator will not be considered for payment.

E10.4 Material Source

E10.4.1 State on Bid Submission the source of granular materials to be incorporated into work.

(a) Contract Administrator will investigate quality of material after award of contract.

E10.4.2 Materials require approval before being used in the work.

E10.4.3 Provide access for sampling.

E10.4.4 The Contractor shall provide, at no cost to the Railway, necessary equipment to obtain samples of granular materials.

E10.4.5 If requested, the Contractor shall submit samples of the proposed granular material for testing and evaluation.

E10.4.6 If, in opinion of Contract Administrator, materials from proposed source do not meet, or cannot reasonably be processed to meet specified requirements, locate an alternate source or demonstrate that material from source in question can be processed to meet specific requirements.

E10.4.7 Should a change of material source be proposed during work, advise Contract Administrator 2 weeks in advance of proposed change to allow sampling and testing.

E10.4.8 Acceptance of a material at source does not preclude future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unsatisfactory.

E10.4.9 When common excavation material is suitable for use as granular material, use such common excavation materials as granular material in preference to obtaining granular material from other sources.

E10.4.10 Include in unit price for granular material entire cost of constructing and/or maintaining suitable access roads, opening work faces, clearing, grubbing and stripping of pit areas, and royalties.

E10.5 MATERIALS

E10.5.1 Subballast:

Material to be crushed or screened pit run gravel, containing no more than 3% organics by weight as determined by ASTM C 123.

Gradations to be within limits specified.

Sieve Size	Percent Passing
75 mm (3")	100
25 mm (1")	60 - 90

4.75 mm (#4)	35 - 60
425 micro m (#40)	10 -40
75 micro m (#200)	3 - 10

E10.6 EXECUTION

E10.6.1 Placing:

(a) Use granular material to construct subballast course and other work as indicated or directed.

(b) Do not place granular material until finished subgrade surface is inspected and approved by Contract Administrator.

(c) Place material only on a clean unfrozen surface, properly shaped and compacted and free from snow and ice.

(d) Place, using methods which do not lead to segregation or degradation of material.

(e) Place material to full width of section in uniform layers not exceeding 6" loose thickness and compact to specified density. Contract Administrator may authorize thicker lifts if specified compaction can be achieved.

(f) Replace fouled material with approved material and compact, at no cost to Contract Administrator.

E10.6.2 Compaction:

(a) Compaction equipment to be vibratory type and to meet or exceed following requirements.

Vibratory Rollers: Vibratory force 4,500 pounds per cycle per foot width, vibration frequency 1,600 cycles per minute.

(b) Contract Administrator sole judge of adequacy of any compaction equipment.

(c) Compact full width to density not less than 95% maximum dry density in accordance with Standard Proctor Compaction Test (ASTM D698).

(i.) Sub-ballast – 95% Standard Proctor Maximum Dry Density.

(d) Apply water as necessary during compaction to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.

(e) Apply water to reduce dust nuisance.

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

E10.6.3 Field Quality Control

(a) Contract Administrator shall take representative samples at expense of Contractor and submit them to laboratory tests for approval of its quality and nature prior and/or during its use.

(i.) Provide necessary personnel and equipment to permit adequate investigation and sampling.
(ii.) Advise Contract Administrator at least two weeks in advance of use of any material to allow sufficient time for sampling and testing.
(iii.) Contract Administrator will pay for testing of material.

(b) Contract Administrator may perform density and other tests on site, to control construction.

(i.) Facilitate such work and pay for any testing apparatus damaged from the operations.
(ii.) Do not claim for delays to the operations resulting from field tests.

(c) 3 Final acceptance of materials made after materials dumped, spread and compacted in place.

(i.) Contract Administrator may reject at source, on transportation vehicle or in place.

(ii.) Contract Administrator will not consider for payment the removal and disposal of any rejected material.

E10.6.4 Finishing

(a) Finished subballast surface shall be within 15 mm (0.5 inches) of design elevations but not uniformly high or low.

(b) Maintain surface in a clean condition, free draining and conforming to the specification until final acceptance.