NATIONAL CAPITAL COMMISSION
COMMISSION DE LA CAPITALE NATIONALE

NCC Tender File #	AL1716
Project Description	Rideau Canal: New railing, Ottawa, Ontario
Site Visit	No site visit is scheduled
Closing date and time	Friday, September 8, 2017 at 3pm EDT

INVITATION TO TENDER & ACCEPTANCE FORM

RETURN TENDERS TO:	National Capital Commission 40 Elgin Street, Security Office on the 2nd floor Ottawa, ON K1P 1C7	**NCC Tender Number** **AL1716**
TENDER CLOSING DATE AND TIME:	Friday, September 8, 2017 at 3pm EDT	**NCC Contract Number**

DESCRIPTION OF WORK: Rideau Canal: New railing, Ottawa, Ontario

1. BUSINESS NAME AND ADDRESS OF BIDDER

Name: _____

Address: _____

_____

Telephone number: _____ **Fax number:** _____

E-mail address: _____

2. THE OFFER

The Bidder offers to the National Capital Commission (NCC) to perform and complete the work for the above mentioned project in accordance with the tender documents for the total tender amount (to be expressed in numbers only) of:

Sub Total $ _____

OHST – 13% $ _____

TOTAL ESTIMATED AMOUNT $ _____

3. TENDER VALIDITY PERIOD

The tender shall not be withdrawn for a period of 60 days following the date and time of tender closing.

4. CONTRACT DOCUMENTS

1. The following are the contract documents:
   (a) Invitation to Tender & Acceptance Form when signed by the NCC;
   (b) Duly completed Invitation to Tender & Acceptance Form and any Appendices attached thereto;
   (c) Drawings and Specifications;
   (d) General Conditions (GC1 to GC10);
   (e) Supplementary Conditions, if any;
   (f) Insurance Terms;
   (g) Occupational Health and Safety Requirements;
   (h) Addenda
   (i) Any amendments issued or any allowable tender revision received before the date and time set for tender closing;
   (j) Any amendment incorporated by mutual agreement between the NCC and the Contractor before acceptance of the tender; and
   (k) Any amendment or variation of the contract documents that is made in accordance with the General Conditions;
   (l) Security Requirements.

2. The language of the contract documents shall be the language of the Invitation to Tender & Acceptance Form submitted.

NCC Tender Number AL1716	NCC Contract Number

5. APPENDICES

The tender includes Appendix(ces) Nos I and II to the Invitation to Tender & Acceptance Form.

6. ACCEPTANCE AND CONTRACT

Upon acceptance of the Contractor's offer by the NCC, a binding Contract shall be formed between the NCC and the Contractor. The documents forming the Contract shall be the contract documents referred to in 4 – CONTRACT DOCUMENTS.

7. CONSTRUCTION TIME

The Contractor shall perform and complete the Work no later than twelve (12) weeks after contract award.

8. UNIT PRICE TABLE

The Bidder agrees that

(a) the Unit Price Table designates that part of the Work to which a Unit Price Arrangement applies.

(b) the Price per Unit and the Estimated Total Price must be entered for each item listed;

(c) the Price per Unit as tender governs in calculating the Total Estimated Amount, and any errors in the extension of the Price per Unit and in the addition of the Estimated Total Prices shall be corrected by the NCC in order to obtain the Total Estimated Amount; and

(d) the following table is the Unit Price Table for the purposes of the tender and the Contract:

UNIT PRICE TABLE

Note: Transfer the Total Estimated Amount from the Unit Price Table to item 2 – THE OFFER of this Invitation to Tender & Acceptance Form

Item #	Description	Unit	Est. Qty	Unit Rate of the Item excl taxes	Extended Total or Lump Sum price
	Rideau Canal New Railing				
	General				
A-1	Mobilization and General Requirements	lump sum	1		
A-2	Traffic control	lump sum	1		
A-3	Allowance for unforeseen work	allowance	1	$100,000.00	$ 100,000.00
A-4	Temporary Access Work	lump sum	1		
A-5	Removal and Restoration of Temporary Access Work	lump sum	1		
A-6	Advance Notice Signs PVMS	ea	2		

	Pathway and Railings				
R-1	Earth Excavation	m3	10		
R-2	Removal of Asphalt pathway	m2	25		
R-3	HL3F mix with PGAC 58-34 for Pathway Reinstatement (50mm thickness)	m2	25		
R-4	Supply and place Granular 'A' base - Pathway	tonne	24		
R-5	Line Posts	ea	593		
R-6	Expansion Posts	ea	66		
R-7	1.5" Nominal ID Railing	m	6,480		
R-8	Aluminum Posts	ea	61		
R-9	Pavement markings	lump sum	1		
	Landscaping				
L-1	Pruning	lump sum	1		
L-2	Tree Protection Fencing	lump sum	1		
L-3	Tree Trunk Protection	lump sum	1		
	Structural - Wall Rehabilitation				
	Removals				
S-1	Access to work area, work platform and scaffolding	lump sum	1		
S-2	Concrete removal - partial depth - Type A	m3	6		
S-3	Abrasive blast cleaning of concrete surface	m2	60		
S-4	Abrasive blast cleaning of reinforcing steel	m2	30		
	New Construction				
S-5	Dowels into concrete - 15M	ea	100		
S-6	Galvanized reinforcing steel	tonne	0.5		
S-7	Galvanized welded wire fabric	m2	30		
S-8	Concrete patches, formed surface	m3	7		

S-9	Crack injection	m	50		
				SUB-TOTAL	

9. The basis of award is low total cost to the NCC including all taxes.

10. I/We acknowledge receipt of the following addenda _____
(Bidder to enter number of addenda issues, if any) and have included for the requirement of it/them in my/our tendered price.

11. TENDER SECURITY

1. The Bidders shall enclose tender security with its tender in accordance with GI08 TENDER SECURITY REQUIREMENTS.

2. If the security furnished does not comply fully with the requirements referred to in paragraph 1) herein, the tender shall be disqualified.

3. If a security deposit is furnished as tender security, it shall be forfeited in the event that the tender is accepted by the NCC and the Contractor fails to provide Contract Security in accordance with GC9 CONTRACT SECURITY, provided that the NCC may, if it is in the public interest, waive the forfeiture of the security deposit.

We hereby offer to supply to the NCC in accordance with the terms and conditions set out herein, the construction work listed above and on any attached sheets at the submitted price(s).

Name and title of person authorized to sign on behalf of Bidder (please print or type)	Signature	Date

Your tender is accepted to supply to the NCC, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the construction services listed herein and on any attached sheets at the price(s) set out therefore.

Name and title of the person authorized to sign on behalf of the NCC (please print or type)	Signature	Date

INVOICING

Send the original invoice and 1 copy to:

Accounts Payable
National Capital Commission
202-40 Elgin Street
Ottawa, ON K1P 1C7

Or by email at the following address: **payables@ncc-ccn.ca**

To ensure prompt payment, please prepare your invoice in accordance with the prices quoted. Errors in invoicing can cause delay of payment. Submit your invoice to the address shown above and clearly indicate the Purchase Order number.

INVITATION TO TENDER & ACCEPTANCE FORM	APPENDIX 1

1) The Bidder will subcontract the parts of the work listed below to the subcontractor named for each part. The Bidder agrees not to make changes in the list of subcontractors without the written consent of the NCC Representative. The Bidder understands that for each part of the work identified as Mandatory, if more than one subcontractor is named or no subcontractor is named, or, the Bidder fails to state that the work will be done by its own forces where applicable, the tender will be disqualified.

2) The Bidder certifies that tenders for the part(s) of the Work listed below were received from the following sub-contractors:

MANDATORY REQUIREMENT: The subcontractors performing the work listed below must be identified. Failure to disclose the name of the sub-contractor for any work identified will result in the disqualification of your tender.

(a) **XXXX**

Sub-contractor: _____

Address: _____

(b) **XXXX**

Sub-contractor: _____

Address: _____

(c) **XXXX**

Sub-contractor: _____

Address: _____

(d) **XXXX**

Sub-contractor: _____

Address: _____

NON-MANDATORY REQUIREMENT:

(a) Any other work not listed above

Type of work: _____ Sub-contractor: _____

Type of work: _____ Sub-contractor: _____

Type of work: _____ Sub-contractor: _____

Type of work: _____ Sub-contractor: _____

Type of work: _____ Sub-contractor: _____

Type of work: _____ Sub-contractor: _____

NCC CCN Canada

PROTECTED "B" when completed
PROTÉGÉ « B » lorsque rempli

☐ New supplier / Nouveau fournisseur ☐ Update / Mise à jour

Supplier No. / N° du fournisseur

For NCC use only / À l'usage de la CCN seulement

SUPPLIER–DIRECT DEPOSIT PAYMENT AND TAX INFORMATION FORM
FOURNISSEUR–FORMULAIRE DE PAIEMENT PAR DÉPÔT DIRECT ET RENSEIGNEMENTS AUX FINS DE L'IMPÔT

PART 'A' – IDENTIFICATION / PARTIE 'A' - IDENTIFICATION

Legal name of entity or individual / Nom légal de l'entité ou du particulier	Operating name of entity or individual (if different from Legal Name) / Nom commercial de l'entité ou du particulier (s'il diffère du nom légal)

Former Public Servant in receipt of a PSSA Pension / Ancien fonctionnaire qui reçoit une pension en vertu de la LPFP	☐ **Yes / Oui**	☐ **No / Non**
An entity, incorporated or sole proprietorship, which was created by a Former Public Servant in receipt of a PSSA pension or a partnership made of former public servants in receipt of PSSA pension or where the affected individual has a controlling or major interest in the entity. / Une entité, constituée en société ou à propriétaire unique, créée par un ancien fonctionnaire touchant une pension en vertu de la LPFP, ou un partenariat formé d'anciens fonctionnaires touchant une pension en vertu de la LPFP, où les entités dans lesquelles ils détiennent le contrôle ou un intérêt majoritaire.	☐ **Yes / Oui**	☐ **No / Non**

Address / Adresse	Telephone No. / N° de téléphone :	Fax No. / N° de télécopieur :
_____ _____ _____ Postal code / Code postal	( )	( )

PART 'B' – STATUS OF SUPPLIER / PARTIE 'B' – STATUT DU FOURNISSEUR
IMPORTANT : CHOOSE ONLY ONE OF THE FOLLOWING/CHOISIR SEULEMENT UNE DES OPTIONS SUIVANTES:

(1) Sole proprietor / Propriétaire unique ☐ If sole proprietor, provide: / Si propriétaire unique, indiquez : Last Name / Nom de famille First name / Prénom Initial / Initiale

(2) Partnership / Société de personnes ☐ (3) Corporation /Société ☐

Business No. (BN) / N° de l'entreprise (NE) –	**OR / OU**	SIN / NAS –

GST/HST / TPS et TVH	QST / TVQ (Québec)
Number / Numéro : _____ Not registered / non inscrit ☐	Number / Numéro : _____ Not registered / non inscrit ☐

Type of contract / Genre de contrat

Contract for services only / Contrat de services seulement ☐ Contract for mixed goods & services / Contrat de biens et services ☐ Contract for goods only /Contrat de biens seulement ☐

Type of goods and/or services offered / Genre de biens et / ou services rendus :

PART 'C' – FINANCIAL INSTITUTION / PARTIE 'C' – RENSEIGNEMENTS SUR L'INSTITUTION FINANCIÈRE

Please send a void cheque with this form / Veuillez, s.v.p., envoyer un spécimen de chèque avec ce formulaire

Branch Number / N° de la succursale _____ Institution No. / N° de l'institution : _____ Account No. / N° de compte : _____

Institution name / Nom de l'institution : Address / Adresse : _____

Postal Code / Code postal :

PART 'D' – DIRECT DEPOSIT PAYMENT NOTIFICATION / PARTIE 'D' – AVIS DE PAIEMENT PAR DÉPÔT DIRECT

E-mail address / Adresse courriel :

PART 'E' – EMAIL ADDRESS TO SEND CONTRACTS / PARTIE 'E' – ADRESSE COURRIEL POUR ENVOYER LES CONTRATS

E-mail address / Adresse courriel :

PART 'F' – CERTIFICATION / PARTIE 'F' – CERTIFICATION

I certify that I have examined the information provided above and it is correct and complete, and fully discloses the identification of this supplier.

Where the supplier identified on this form completes part C, he hereby requests and authorizes the National Capital Commission to directly deposit into the bank account identified in part C, all amounts payable to the supplier.

Je déclare avoir examiné les renseignements susmentionnés et j'atteste qu'ils sont exacts et constituent une description complète, claire et véridique de l'identité de ce fournisseur.

Lorsque le fournisseur indiqué sur ce formulaire remplit la partie C, par la présente, il demande et autorise la Commission de la capitale nationale à déposer directement dans le compte bancaire indiqué à la partie C, tous les montants qui lui sont dus.

Name of authorized person / Nom de la personne autorisée _____ Title / Titre _____ Signature _____ Date _____

Telephone number of contact person / Numéro de téléphone de la personne ressource : ( )

IMPORTANT

Please fill in and return to the National Capital Commission with one of <u>your business cheque unsigned and marked « VOID</u> » (for verification purposes).

Mail or fax to: Procurement Services
National Capital Commission
202-40 Elgin Street
Ottawa, ON K1P 1C7 Fax: (613) 239-5007

Veuillez remplir ce formulaire et le retourner à la Commission de la capitale nationale avec <u>un spécimen de chèque de votre entreprise non signé et portant la mention « ANNULÉ »</u> (à des fins de vérification).

Poster ou télécopier à : Services de l'approvisionnement
Commission de la capitale nationale
40, rue Elgin, pièce 202
Ottawa (Ontario) K1P 1C7 Télécopieur : (613) 239-5007

SUPPLIER – DIRECT DEPOSIT PAYMENT AND TAX INFORMATION FORM

FOURNISSEUR – FORMULAIRE DE PAIEMENT PAR DÉPÔT DIRECT ET RENSEIGNEMENTS AUX FINS DE L'IMPÔT

Supplier Tax Information

Pursuant to paragraph 221(1) (d) of the *Income Tax Act*, NCC must declare form T-1204, contractual payments of government for services, all payments made to suppliers during the calendar year in accordance to related service contracts (including contracts for mixed goods and services).

The paragraph 237(1) of the *Income Tax Act* and the article 235 of the Income Tax Regulations require the supplier to provide all necessary information below to the organization who prepares the fiscal information forms.

Questions: Sylvie Monette, Accounts Payable Supervisor
(613) 239-5678 ext. 5156 or sylvie.monette@ncc-ccn.ca

Direct deposit payment information

All amounts payable by NCC to the supplier will be deposited directly into the account you identified in part C. A NCC payment advice notice will also be sent to you by e-mail detailing the particularities of the payment to the address identified in part D.

Until we process your completed form, we will still pay you by check.

You must notify the NCC of any changes to your financial institution, branch or account number. You will then have to complete a new form.

The account you identified has to hold Canadian funds at a financial institution in Canada.

The advantages of direct deposit payment

Direct deposit payment is a convenient, dependable, safe and timesaving way to receive your invoice payment. Direct deposit payment is completely confidential.

There are fewer risks of direct deposit payment being lost, stolen, or damaged as may happen with cheques.

Funds made by direct deposit payment will be available in your bank account on the same day that we would have mailed your cheque.

Renseignements sur les fournisseurs aux fins de l'impôt

En vertu de l'alinéa 221(1) (d) de la *Loi de l'impôt sur le revenu*, la CCN est tenu de déclarer, à l'aide du formulaire T-1204, Paiements contractuels de services du gouvernement, tous paiements versés aux fournisseurs pendant une année civile en vertu de marchés de services pertinents (y compris les marchés composés à la fois de biens et de services).

Le paragraphe 237 (1) de la *Loi de l'impôt sur le revenu* et l'article 235 du Règlement de l'impôt sur le revenu obligent les fournisseurs à fournir toutes les informations demandées ci-dessous à l'organisme qui prépare les formulaires de renseignements fiscaux.

Questions : Sylvie Monette, Superviseure aux comptes payable
(613) 239-5678 poste 5156 ou sylvie.monette@ncc-ccn.ca

Renseignements sur le paiement par dépôt direct

Tous les montants versés par la CCN au fournisseur seront déposés directement dans le compte identifié à la partie C. Un avis de paiement de la CCN détaillant les particularités du paiement par dépôt direct vous sera envoyé par courriel à l'adresse courriel identifiée à la partie D.

Nous continuerons à vous payer par chèque jusqu'à ce que nous ayons traité votre formulaire.

Vous devez aviser la CCN de tout changement d'institution financière, de succursale ou de numéro de compte. Vous devrez donc remplir un nouveau formulaire.

Le compte que vous désignez doit être un compte en monnaie canadienne, détenu dans une institution financière au Canada.

Avantages du paiement par dépôt direct

Le paiement par dépôt direct est une méthode pratique, fiable et sécuritaire, qui permet de gagner du temps dans la réception de vos paiements de factures. Le paiement par dépôt direct est entièrement confidentiel.

Avec les paiements par dépôt direct, il y a moins de risques de perte, de vol ou de dommage, comme cela peut se produire dans le cas des chèques.

Les paiements effectués par paiement par dépôt direct sont versés dans votre compte le jour même où nous aurions posté votre chèque.

Revised May 2017/ Révisé mai 2017

SPECIAL INSTRUCTIONS TO BIDDERS

SI01 TENDER DOCUMENTS

1) The following are the tender documents:

   (a) Invitation to Tender & Acceptance Form and any Appendices attached thereto;

   (b) Special Instructions to Bidders; and

   (c) General Instructions to Bidders.

   Submission of a tender constitutes acknowledgement that the Bidder has read and agrees to be bound by these documents.

SI02 ENQUIRIES DURING THE SOLICITATION PERIOD

1) Enquiries regarding this tender must be submitted in writing to the following: Sr. Contract Officer, Allan Lapensée, e-mail address – allan.lapensee@ncc-ccn.ca as early as possible within the solicitation period. Except for the approval of alternative materials as described in GI15 of the General Instructions to Bidders, enquiries should be received no later than five (5) calendar days prior to the date set for solicitation closing to allow sufficient time to provide a response. Enquiries received after that time may result in an answer not being provided.

2) To ensure consistency and quality of the information provided to Bidders, the Sr. Contract Officer shall examine the content of the enquiry and shall decide whether or not to issue an amendment.

3) All enquiries and other communications related to this tender sent throughout the solicitation period are to be directed ONLY to the Sr. Contract Officer named above. Non-compliance with this requirement during the solicitation period can, for that reason alone, result in disqualification of a tender.

SI03 [NON MANDATORY] SITE VISIT

1) No site visit is scheduled.

SI04 REVISION OF TENDER

1) A tender may be revised by letter or facsimile in accordance with GI10 of the General Instructions to Bidders. The facsimile number for receipt of revisions is 613-239-5012.

SI05 TENDER RESULTS

1) Following solicitation closing, tender results may be obtained by calling or emailing the Sr. Contract Officer (see SI02).

SI06 NEGOTIATIONS

1) In the event that the lowest compliant tender exceeds the amount of funding the NCC has allocated for the construction phase of the work:

   (a) by 15% or less, the NCC, at its sole discretion, shall either:

      (i) cancel the invitation to tender; or

      (ii) obtain additional funding and, subject to the provisions of GI11 and GI09 of the General Instructions to Bidders, award the Contract to the Bidder submitting the lowest compliant tender; or

      (iii) revise the scope of the work accordingly and negotiate, with the Bidder submitting the lowest compliant tender, a corresponding reduction in its tender price.

   (b) by more than 15%, the NCC, at its sole discretion, shall either:

      (i) cancel the invitation to tender; or

      (ii) obtain additional funding and, subject to the provisions of GI11 and GI09 of the General Instructions to Bidders, award the Contract to the Bidder submitting the lowest compliant tender; or

      (iii) revise the scope of the work accordingly and invite those who submitted compliant tenders at the original invitation to tender to re-tender the work.

2) If negotiations or a re-tender are undertaken as is contemplated in subparagraphs 1)(a)(iii) or 1)(b)(iii) above, Bidders shall retain the same subcontractors and suppliers as they carried in their original tenders.

3) If the NCC elects to negotiate a reduction in the tender price as is contemplated in subparagraph 1)(a)(iii) herein and the negotiations fail to reach an agreement, the NCC shall then exercise either of the options referred to subparagraphs 1)(a)(i) or 1)(a)(ii).

SI07 TENDER VALIDITY PERIOD

1) The NCC reserves the right to seek an extension to the tender validity period prescribed in 3 of the Invitation to Tender & Acceptance Form. Upon notification in writing from the NCC, Bidders shall have the option to either accept or reject the proposed extension.

2) If the extension referred to in paragraph 1) of SI07 is accepted, in writing, by all those who submitted tenders, then the NCC shall continue immediately with the evaluation of the tenders and its approvals processes.

3) If the extension referred to in paragraph 1) of SI07 is not accepted in writing by all those who submitted tenders then the NCC shall, at its sole discretion, either:

   (a) continue to evaluate the tenders of those who have accepted the proposed extension and seek the necessary approvals; or

(b) cancel the invitation to tender.

4) The provisions expressed herein do not in any manner limit the NCC's rights in law or under GI11 of the General Instructions to Bidders.

SI08 CONSTRUCTION DOCUMENTS

1) The successful contractor will be provided with one paper copy of the sealed and signed plans, the specifications and the amendments upon acceptance of the offer. Additional copies, may be available free of charge upon request by the contractor. If not, obtaining more copies shall be the responsibility of the contractor including costs.

SI09 PUBLIC TENDER OPENING

1) A public tender opening will be held on September 8, 2017 at 3pm EDT at 40 Elgin Street, Ottawa, ON beside the security office on the 2nd floor.

GI01 Completion of Tender

1) The tender shall be:

   (a) submitted on the Invitation to Tender and Acceptance Form provided through the Government Electronic Tendering Service (GETS) or on a clear and legible reproduced copy of such Invitation to Tender and Acceptance Form that must be identical in content and format to the Invitation to Tender and Acceptance Form provided through GETS;

   (b) based on the Tender Documents listed in the Special Instructions to Bidders;

   (c) correctly completed in all respects;

   (d) signed by a duly authorized representative of the Bidder; and

   (e) accompanied by

      (i) tender security as specified in GI08; and

      (ii) any other document or documents specified elsewhere in the solicitation where it is stipulated that said documents are to accompany the tender.

2) Subject to paragraph 6) of GI11, any alteration to the pre-printed or pre-typed sections of the Invitation to Tender and Acceptance Form, or any condition or qualification placed upon the tender shall be cause for disqualification. Alterations, corrections, changes or erasures made to statements or figures entered on the Invitation to Tender and Acceptance Form by the Bidder shall be initialled by the person or persons signing the tender. Initials shall be original(s). Alterations, corrections, changes or erasures that are not initialled shall be deemed void and without effect.

3) Unless otherwise noted elsewhere in the Tender Documents, facsimile copies of tenders are not acceptable.

GI02 Identity or Legal Capacity of the Bidder

1) In order to confirm the authority of the person or persons signing the tender or to establish the legal capacity under which the Bidder proposes to enter into Contract, any Bidder who carries on business in other than its own personal name shall, if requested by the NCC prior to award of contract, provide satisfactory proof of:

(a) such signing authority; and

(b) the legal capacity under which it carries on business.

Proof of signing authority may be in the form of a certified copy of a resolution naming the signatory(ies) that is (are) authorized to sign this tender on behalf of the corporation or partnership. Proof of legal capacity may be in the form of a copy of the articles of incorporation or the registration of the business name of a sole proprietor or partnership.

GI03 Goods and Services Tax / Harmonized Sales Tax

1) The National Capital Commission (NCC) is a Crown Corporation subject to the Goods and Services Tax (GST), the Ontario Provincial Sales Tax (OST) and the Quebec Sales Tax (QST). The rates quoted are exclusive of the GST and the OST/QST. The successful firm will be required to indicate separately, on all invoices or requests for payments, the amount of Goods and Services Sales Tax (GST), the amount of Ontario Sales Tax (OST) and the amount of Quebec Sales Tax (QST), to the extent applicable, that the Commission must pay. These amounts will be paid to the successful Bidder who is required to make the appropriate remittances to Revenue Canada and the respective provincial governments.

Pursuant to paragraph 221 (1)(d) of the Income Tax Act, payments made by Crown Corporations under applicable service contracts (including contracts involving a mix of goods and services) must be reported on a "T1204" slip. To comply with this requirement, the Bidder is required to provide the following information on the "Supplier – Direct Payment and Tax Information Form" (see Appendix 11).

By signing this form, the Bidder/Proponent certifies that he/she has examined the information provided on the form and that it is correct, complete, and fully discloses the identification of the Contractor.

This "Supplier – Direct Payment and Tax Information Form" must be completed and returned to the Commission prior to any contract being awarded to your firm (see Appendix 11).

GI04 Quebec Sales Tax

1) See GI03.

GI05 Capital Developement and Redevelopment Charges

1) For the purposes of GC1.8 LAWS, PERMITS AND TAXES in the General Conditions of the Contract, only fees or charges directly related to the processing and issuing of building permits shall be included. The Bidder shall not include any monies in the tender amount for special municipal development, redevelopment or other fees or charges which a municipal authority may seek as a prerequisite to the issuance of building permits.

GI06 Registry and Pre-qualification of Floating Plant

1) Dredges or other floating plant to be used in the performance of the Work must be on Canadian registry. For dredges or other floating plant that are not of Canadian make or manufacture, the Bidder must obtain a certificate of qualification from Industry Canada, if applicable, and this certificate must accompany the tender. Plant so qualified by Industry Canada may be accepted on this project.

GI07 Listing of Subcontractors and Suppliers

1) Notwithstanding any list of Subcontractors that the Bidder shall be required to submit as part of the tender, the Bidder submitting the lowest acceptable tender shall, within 24 hours of receipt of a notice to do so, submit all information requested in the said notice including the names of Subcontractors and Suppliers for the part or parts of the Work listed. Failure to do so may result in the disqualification of its tender.

GI08 Tender Security Requirements

1) The Bidder shall submit tender security with the tender in the form of a bid bond or a security deposit in an amount that is equal to not less than 10% of the tender amount including all applicable taxes.

   The maximum amount of tender security required with any tender is $2,000,000.00.

2) A bid bond shall be in an approved form, properly completed, with original signature(s) and issued by an approved company whose bonds are acceptable to the NCC either at the time of solicitation closing or as identified on the list displayed at the following Website:

   http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=12027

   The approved form for the bid bond is enclosed at the end of this section.

3) A security deposit shall be an original, properly completed, signed where required and be either:

   (a) a bill of exchange, bank draft or money order payable to the NCC;

   (b) bonds of, or unconditionally guaranteed as to principal and interest by, the Government of Canada; or

4) A bill of exchange, bank draft or money order referred to in subparagraph 3)(a) of GI08 shall be certified by or drawn on:

   (a) a corporation or institution that is a member of the Canadian Payments Association;

   (b) a corporation that accepts public deposits and repayment of the deposits is unconditionally guaranteed by Her Majesty in right of a province;

   (c) a corporation that accepts deposits that are insured by the Canada Deposit Insurance Corporation or the "Régie de l'assurance-dépôts du Québec" to the maximum permitted by law;

   (d) a corporation, association or federation incorporated or organized as a credit union or co-operative credit society that conforms to the requirements of a credit union which are more particularly described in paragraph 137 (6)(b) of the *Income Tax Act*; or

   (e) Canada Post Corporation.

5) If a bill of exchange, bank draft or money order is drawn on an institution or corporation other than a chartered bank, it must be accompanied by proof that the said institution or corporation meets at least one of the criteria described in paragraph 4) of GI08, either by letter or by a stamped certification on the bill of exchange, bank draft, or money order.

6) For the purposes of this section, a bill of exchange is an unconditional order in writing signed by the Bidder and addressed to an approved financial institution, requiring the said institution to pay, on demand, at a fixed or determinable time, a certain sum of money to, or to the order of, the NCC.

7) Bonds referred to in subparagraph 3)(b) of GI08 shall be provided on the basis of their market value current at the date of solicitation closing, and shall be:

(a) payable to bearer;

(b) accompanied by a duly executed instrument of transfer of the bonds to the NCC in the form prescribed by the Domestic Bonds of Canada Regulations; or

(c) registered as to principal or as to principal and interest in the name of the NCC pursuant to the Domestic Bonds of Canada Regulations.

8) As an alternative to a security deposit an irrevocable standby letter of credit is acceptable to the NCC and the amount shall be determined in the same manner as a security deposit referred to above.

9) An irrevocable standby letter of credit referred to in paragraph 8) of GI08 shall:

(a) be an arrangement, however named or described, whereby a financial institution (the "Issuer") acting at the request and on the instructions of a customer (the "Applicant) or on its own behalf:

(i) is to make a payment to, or to the order of, the NCC as the beneficiary;

(ii) is to accept and pay bills of exchange drawn by the NCC;

(iii) authorizes another financial institution to effect such payment or accept and pay such bills of exchange; or

(iv) authorizes another financial institution to negotiate against written demand(s) for payment provided that the terms and conditions of the letter of credit are complied with.

(b) state the face amount which may be drawn against it;

(c) state its expiry date;

(d) provide for sight payment to the NCC by way of the financial institution's draft against presentation of a written demand for payment signed by the NCC Contract Administrator identified in the letter of credit by his/her office;

(e) provide that more than one written demand for payment may be presented subject to the sum of those demands not exceeding the face value of the letter of credit;

(f) provide that it is subject to the International Chamber of Commerce (ICC) Uniform Customs and Practice for Documentary Credits, 2007 Revision, ICC Publication No. 600;

(g) clearly specify that it is irrevocable or deemed to be irrevocable pursuant to article 6 c) of the International Chamber of Commerce (ICC) Uniform Customs and Practice for Documentary Credits, 2007 Revision, ICC Publication No. 600; and

(h) be issued or confirmed, in either official language, by a financial institution which is a member of the Canadian Payments Association and is on the letterhead of the Issuer or Confirmer. The format is left to the discretion of the Issuer or Confirmer.

10) Tender security shall lapse or be returned as soon as practical following:

(a) the solicitation closing date, for those Bidders submitting non-compliant tenders; and

(b) the administrative tender review, for those Bidders submitting compliant tenders ranked fourth to last on the schedule of tenders; and

(c) the award of contract, for those Bidders submitting the second and third ranked tenders; and

(d) the receipt of contract security for the successful Bidder; or

(e) the cancellation of the solicitation, for all Bidders.

11) Notwithstanding the provisions of paragraph 10) of GI08 and provided more than three (3) compliant tenders have been received, if one or more of the tenders ranked third to first is withdrawn or rejected for whatever reason, then the NCC reserves the right to hold the security of the next highest ranked compliant tender in order to retain the tender security of at least three (3) valid and compliant tenders.

GI09 Submission of Tender

1) The Invitation to Tender and Acceptance Form, duly completed with the bid security, shall be enclosed and sealed in an envelope provided by the Bidder, and shall be addressed and submitted to the office designated on the front page of the Invitation to Tender and Acceptance Form for the receipt of tenders.

2) Unless otherwise specified in the Special Instructions to Bidders:

(a) the tender shall be in Canadian currency;

(b) exchange rate fluctuation protection is not offered; and

(c) any request for exchange rate fluctuation protection shall not be considered.

3) Prior to submitting the tender, the Bidder shall ensure that the following information is clearly printed or typed on the face of the tender envelope:

(a) Solicitation Number;

(b) Name of Bidder.

5) Timely and correct delivery of the tender is the sole responsibility of the Bidder. The tender must be received on or before the date and time set for solicitation closing. Late tenders shall be disqualified.

GI10 Revision of Tender

1) A tender submitted in accordance with these instructions may be revised by letter or facsimile (fax number only 613-239-5012 provided the revision is received at the office designated for the receipt of tenders, on or before the date and time set for the closing of the solicitation. The letter or facsimile shall:

(a) be on the Bidder's letterhead or bear a signature that identifies the Bidder;

(b) for the Total Bid Amount, clearly identify the amount of the current revision. The total aggregate sum of all revisions submitted, including the current revision, shall be shown separately; and

(c) for the Price per unit portion of a tender, clearly identify the current revision(s) to the Price(s) per unit and the specific item(s) to which each revision applies. If a revision is to be applied to a specific Item that was previously amended then, in addition to the amount of the current

revision, the total aggregate sum of all revisions submitted, including the current revision, for that Item shall be shown separately.

2) A letter or facsimile submitted to confirm an earlier revision shall be clearly identified as "CONFIRMATION ONLY", for each contemplated change.

3) Failure to comply with any of the above provisions shall result in the rejection of the non-compliant revision(s) only. The tender shall be evaluated based on the original tender submitted and all other compliant revision(s).

GI11 Acceptance of Tender

1) The NCC may accept any tender, whether it is the lowest or not, or may reject any or all tenders.

2) Without limiting the generality of paragraph 1) of GI11, the NCC may reject a tender if any of the following circumstances are present:

(a) the Bidder, or any employee or subcontractor included as part of the tender, have been convicted under section 121 ("Frauds on the government" & "Contractor subscribing to election fund"), 124 ("Selling or purchasing office"), 380 (Fraud committed against Her Majesty) or 418 ("Selling defective stores to Her Majesty") of the Criminal Code of Canada, or under paragraph 80(1)(d) (False entry, certificate or return), subsection 80(2) (Fraud against her Majesty) or Section 154.01 (Fraud against her Majesty) of the Financial Administration Act;

(b) the Bidder's bidding privileges are suspended or are in the process of being suspended;

(c) the bidding privileges of any employee or subcontractor included as part of the tender are suspended or are in the process of being suspended, which suspension or pending suspension would render that employee or subcontractor ineligible to tender on the Work, or the portion of the Work the employee or subcontractor is to perform;

(d) with respect to current or prior transactions with the NCC

(i) the Bidder is bankrupt or if, for whatever reason, its activities are rendered inoperable for an extended period;

(ii) evidence, satisfactory to the NCC, of fraud, bribery, fraudulent misrepresentation or failure to comply with any law protecting individuals against any manner of discrimination, has been received with respect to the Bidder, any of its employees or any subcontractor included as part of its tender;

(iii) the NCC has exercised, or intends to exercise, the contractual remedy of taking the work out of the contractor's hands with respect to a contract with the Bidder, any of its employees or any subcontractor included as part of its tender; or

(iv) the NCC determines that the Bidder's performance on other contracts is sufficiently poor to jeopardize the successful completion of the requirement being tendered on.

3). In assessing the Bidder's performance on other contracts pursuant to subparagraph 2)(d)(iv) of GI11, the NCC may consider, but not be limited to, such matters as:

(a) the quality of workmanship in performing the Work;

(b) the timeliness of completion of the Work;

(c) the overall management of the Work and its effect on the level of effort demanded of the NCC and its representative; and
(d) the completeness and effectiveness of the Contractor's safety program during the performance of the Work.

4) Without limiting the generality of paragraphs 1), 2) and 3) of GI11, the NCC may reject any based on an unfavourable assessment of the:

(a) adequacy of the tender price to permit the work to be carried out and, in the case of a tender providing prices per unit, whether each such price reasonably reflects the cost of performing the part of the work to which that price applies;

(b) Bidder's ability to provide the necessary management structure, skilled personnel, experience and equipment to perform competently the work under the Contract; and

(c) Bidder's performance on other contracts.

5) If the NCC intends to reject a tender pursuant to a provision of paragraphs 1), 2), 3) or 4) of GI11, other than subparagraph 2)(b)of GI11, the NCC shall so inform the Bidder and provide the Bidder ten (10) days within which to make representation, prior to making a final decision on the tender rejection.

6) The NCC may waive informalities and minor irregularities in tenders received, if the NCC determines that the variation of the tender from the exact requirements set out in the Tender Documents can be corrected or waived without being prejudicial to other Bidders.

GI12 Procurement Business Number

1) Not applicable.

GI13 Bid Depository

1) If the solicitation advertisement states that a Bid Depository shall be used, the Bidder shall obtain bids in accordance with local Bid Depository rules and procedures.

GI14 Compliance with Applicable Laws

1) By submission of a tender, the Bidder certifies that the Bidder has the legal capacity to enter into a contract and is in possession of all valid licences, permits, registrations, certificates, declarations, filings, or other authorizations necessary to comply with all federal, provincial and municipal laws and regulations applicable to the submission of the tender and entry into any ensuing contract for the performance of the work.

2) For the purpose of validating the certification in paragraph 1) of GI14, a Bidder shall, if requested, provide a copy of every valid licence, permit, registration, certificate, declaration, filing or other authorization listed in the request, and shall provide such documentation within the time limit(s) set out in the said request.

3) Failure to comply with the requirements of paragraph 2) of GI14 shall result in the disqualification of the tender.

GI15 Approval of Alternative Materials

1) When materials are specified by trade names or trademarks, or by manufacturers' or suppliers' names, the tender shall be based on use of the named materials. During the solicitation period,

alternative materials may be considered provided full technical data is received in writing by the Contracting Officer at least seven (7) calendar days, unless otherwise noted in the Tender documents, prior to the solicitation closing date. If the alternative materials are approved for the purposes of the tender, an addendum to the tender documents shall be issued.

GI16 Performance Evaluation

1) Bidders shall take note that the performance of the Contractor during and upon completion of the work shall be evaluated by the NCC. The evaluation shall be based on the quality of workmanship, timeliness of completion of the work, project management, contract management and management of health and safety. Should the Contractor's performance be considered unsatisfactory, the Contractor's bidding privileges on future work may be suspended indefinitely. Contractor Evaluation Report Form is enclosed at the end of this section.

BID BOND

Bond Number _____

Amount $ _____

KNOW ALL MEN BY THESE PRESENTS, that _____ as Principal, hereinafter called the Principal, and _____ as Surety, hereinafter called the Surety, are, subject to the conditions hereinafter contained, held and firmly bound unto the National Capital Commission as Obligee, hereinafter called the NCC, In the amount of _____ dollars ($ _____), lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

SIGNED AND SEALED this _____ day of _____ , _____ . WHEREAS, the Principal has submitted a written tender to the NCC, dated the _____ day of _____ , _____ , for: _____ .

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION are such that if:

(a) The Principal, should his tender be accepted within the period be specified by the NCC, or, if no period be specified, within sixty (60) days after closing date of the tender:

1. does execute within a period specified by the NCC, or, if no period be specified therein, within fourteen (14) days after the prescribed forms are presented to him for signature, execute such further contractual documents, if any, as may be required by the terms of the tender as accepted; and does

2. furnish a Performance Bond and a Labour and Material Payment Bond, each in the amount of 50% of the Contract price and satisfactory to the NCC, or other security acceptable to the NCC; or

(b) the Principal does pay to the NCC the difference between the amount of the Principal's tender and the amount of the Contract entered into by the NCC for the work, supplies and services which were specified in the said tender, if the latter amount be in excess of the former,

then, this obligation shall be void; otherwise it shall remain in full force and effect.

PROVIDED, HOWEVER, that the Surety and the Principal shall not be liable to the NCC for an amount greater than the amount specified in the bond.

PROVIDED FURTHER that the Surety shall not be subject to any suit or action unless such suit or action is instituted and process therefore served upon the Surety at its Head Office in Canada, within twelve (12) months from the date of this bond.

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its authorized signing authority, the day and first above written.

SIGNED, SEALED AND DELIVERED in the presence of:

Principal _____

Witness _____

Surety _____

Note: Affix Corporate seal if applicable.

NCC CCN Canada

CONTRACTOR PERFORMANCE EVALUATION REPORT FORM
FORMULAIRE - RAPPORT D'ÉVALUATION DU RENDEMENT DE L'ENTREPRENEUR

Date	Contract no. / No du contrat
Description of work / Description des travaux	
Contractor's business name / Nom de l'entreprise de l'entrepreneur	Contractor's site superintendent / Contremaître de l'entrepreneur
Contractor's business address / Adresse de l'entreprise de l'entrepreneur	

NCC representative / Représentant de la CCN

Name / Nom	Telephone no. / N°. de téléphone	E-mail address / Adresse électronique

Contract information / Information sur le contrat

Contract award amount / Montant du marché adjugé	Contract award date / Date de l'adjudication du marché
Final amount / Montant final	Actual contract completion date / Date réelle d'achèvement du contrat
Number of change orders / Nombre d'ordres de changement	Final certificate date / Date du certificat final

Quality of workmanship / Qualité des travaux exécutés	Category / Catégorie	Scale / Échelle	Points / Pointage
This is the rating of the quality of the workmanship. At final completion the quality of the materials and equipment incorporated in the work must meet the requirements set out in the plans and specifications. Il s'agit de l'évaluation de la qualité des travaux exécutés. À l'achèvement des travaux, la qualité des matériaux et de l'équipement doit satisfaire les exigences établies dans les plans et devis.	Unacceptable / Inacceptable Not satisfactory / Non-satisfaisant Satisfactory / Satisfaisant Superior / Supérieur	0 – 5 6 – 10 11 – 16 17 - 20	
Time / Délai d'exécution			
This is the rating of the timeliness of completion considering the actual completion date compared with the original (or amended) contract completion date and allowing for conditions beyond the control of the contractor. Il s'agit de l'évaluation du délai d'exécution des travaux en prenant en considération la date actuelle d'achèvement des travaux par rapport à la date originale (ou modifiée) et en tenant compte des conditions indépendantes de la volonté de l'entrepreneur.	Unacceptable / Inacceptable Late / En retard On time / À temps Ahead of schedule / En avance sur le calendrier	0 – 5 6 – 10 11 – 16 17 - 20	
Project management / Gestion de projet			
This is the rating of how the project, as described in the drawings and specifications, was managed including co-ordination, quality control, effective schedule development and implementation. Voici l'évaluation de la façon dont le projet décrit dans les documents contractuels a été géré, y compris la coordination, le contrôle de la qualité, l'élaboration d'un calendrier efficace et la mise en œuvre.	Unacceptable / Inacceptable Not satisfactory / Non-satisfaisant Satisfactory / Satisfaisant Superior / Supérieur Criteria not applicable / Critère non-applicable	0 – 5 6 – 10 11 – 16 17 - 20	☐ N/A / S/O
Contract management / Gestion de contrat			
This is the rating of how the contract was administered in accordance with the provisions expressed in the "front end" portion of the documents. Voici l'évaluation de la façon dont le contrat a été administré conformément aux dispositions comprises dans la partie « prioritaire » des documents.	Unacceptable / Inacceptable Not satisfactory / Non-satisfaisant Satisfactory / Satisfaisant Superior / Satisfaisant Criteria not applicable / Critère non-applicable	0 – 5 6 – 10 11 – 16 17 - 20	☐ N/A / S/O
Health and safety / Santé et sécurité			
This is the rating of the effectiveness of how the occupational health and safety provisions (whether identified in the contract or those of provincial legislation or those otherwise applicable) were managed and administered. Voici l'évaluation de l'efficacité avec laquelle les dispositions relatives à la santé et à la sécurité au travail (dans le contrat, dans les règlements provinciaux ou dans tout autre document) ont été gérées et administrées.	Unacceptable / Inacceptable Not satisfactory / Non-satisfaisant Satisfactory / Satisfaisant Superior / Satisfaisant	0 – 5 6 – 10 11 – 16 17 - 20	
		Total points / Pointage total	**/100**

Comments / Commentaires

Name / Nom	Title / Titre	Signature	Date

INSTRUCTIONS AND ADDITIONAL INFORMATION (Contractor Performance Evaluation Report)
INSTRUCTIONS ET RENSEIGNEMENTS SUPPLÉMENTAIRES (Rapport d'évaluation du rendement de l'entrepreneur)

QUALITY OF WORKMANSHIP – QUALITÉ DES TRAVAUX EXÉCUTÉS

The NCC representative is to consider how the workmanship compares with:

- the norms in the area in which the work was carried out
- the contractor's compliance with any quality provisions outlined in the drawings and specification
- the quality of workmanship provided by other contractors on similar projects in the same facility/facilities

Le représentant de la CCN doit évaluer la qualité de l'exécution en fonction de ce qui suit :

- le respect des normes s'appliquant aux travaux réalisés
- la conformité de l'entrepreneur aux exigences de qualité comprises dans les dessins et dans les devis
- la qualité de l'exécution des travaux accomplis par d'autres entrepreneurs dans le cadre de projets similaires réalisés dans la même installation ou dans des installations semblables.

TIME / DÉLAIS D'EXÉCUTION

For the purpose of evaluation the contractor's time performance, consideration must be given to conditions beyond the contractor's control including NCC / Consultant / Client performance.

Consider conditions beyond the contractor's control, e.g.,

- availability of, and access to the site
- changes in soil or site conditions
- weather extremes
- strikes
- material / equipment supply problems originating from manufacturers/suppliers
- quality of plans and specifications
- major change(s) in scope
- cumulative effect of changes
- was the NCC able to meet its obligations?
- timely decisions, clarifications, approvals, payments in due time
- delays caused by other contractors in the same facility

Afin d'évaluer le rendement de l'entrepreneur en matière de délai d'exécution, on doit prendre en considération les conditions indépendantes de la volonté de l'entrepreneur, y compris le rendement de la CCN, de l'expert-conseil et du client.

Prendre en considération les conditions indépendantes de la volonté de l'entrepreneur, par exemple :

- disponibilité du chantier et accès au chantier
- modifications des conditions du sol ou du chantier
- température
- grèves
- problèmes d'approvisionnement en matériel et en équipement provenant des manufacturiers/fournisseurs
- qualité des plan et devis
- modifications importantes à l'étendue des travaux
- effets cumulatifs des modifications
- la CCN a-t-elle été capable de remplir ses obligations?
- décisions, clarifications, approbations, paiements en temps opportun
- les retards occasionnés par d'autres entrepreneurs travaillant dans la même installation.

The NCC representative's estimate of a reasonable maximum time allowance resulting from conditions beyond the contractor's control is
L'estimation, par le représentant de la CCN, du temps maximum alloué pour les conditions indépendantes de la volonté de l'entrepreneur est ►

The period of delay attributable to the contractor is
La période de retard attribuable à l'entrepreneur est ►

Did the contractor make an effective effort / Est-ce que l'entrepreneur s'est efforcé :

- to meet the schedule / de respecter l'échéancier des travaux ► ☐ Yes / Oui ☐ No / Non
- to clean up deficiencies in a reasonable time / de corriger les vices dans un délai raisonnable ► ☐ Yes / Oui ☐ No / Non

Have you recommended assessments and damages for late completion under the contract?
Avez-vous recommandé des dédommagements pour retard d'exécution aux termes du marché? ► ☐ Yes / Oui ☐ No / Non

PROJECT MANAGEMENT / GESTION DU PROJET

The extent to which the contractor takes charge of and effectively manages the work has a direct effect on the inputs required of the NCC.

Consideration should be given to: Did the contractor

- employ a knowledgeable site superintendent
- required additional input from the NCC staff above that which is normal for a project of similar size and nature
- promptly commence the work
- provide realistic schedules and updates in accordance with the terms of the contract
- provide a comprehensive work plan and adhere to its milestones
- order material promptly and in such a way as to expedite the progress of the work
- provide shop drawings promptly and were they of sufficient detail

La mesure dans laquelle l'entrepreneur assume efficacement la gestion des travaux a une incidence directe sur les services qu'on attend de la CCN.

Il faut examiner si l'entrepreneur a :

- fait appel aux services d'un surintendant de chantier expérimenté
- demandé au personnel de la CCN une plus grande contribution que ce qui est normal pour un projet de cette importance et de cette nature
- commencé les travaux dans les plus brefs délais
- fourni un calendrier réaliste et des mises à jour conformément aux modalités du contrat
- présenté un plan de travail complet et a respecté les échéances
- commandé le matériel rapidement et de façon à accélérer l'avancement des travaux.
- fourni rapidement des dessins d'atelier comprenant suffisamment de détails

PROJECT MANAGEMENT (cont'd) / GESTION DU PROJET (suite)

- effectively manage and complete all Division 1 work site activities

- promptly provide reasonable quotations for changes to the original scope of work
- cooperate when issued directions by the NCC representative
- interpret the contract documents accurately
- establish effective quality control procedures
- effectively coordinate and manage the work of its subcontractors

- promptly correct defective work as the project progressed
- promptly clean-up all deficiencies and incomplete work after issuance of the Interim Certificate of Completion
- satisfactorily clean the work site periodically and at the completion of the project

- géré et achevé efficacement toutes les activités sur le chantier de la Division 1
- proposé rapidement des prix raisonnables pour les modifications à l'énoncé des travaux initial
- accepté les directives du représentant de la CCN
- interprété les documents contractuels avec exactitude
- mis en place des procédures de contrôle de la qualité efficaces
- coordonné et géré efficacement les travaux confiés à des sous-traitants
- corrigé promptement le travail défectueux en cours de projet
- corrigé rapidement les travaux non acceptables et terminé les travaux incomplets après réception du certificat provisoire d'achèvement
- nettoyé de façon satisfaisante le chantier périodiquement ainsi qu'à la fin du projet.

CONTRACT MANAGEMENT / GESTION DU CONTRAT

The effectiveness of the contractor to administer the contract in accordance with the provisions expressed in the "front end" portion of the contract documents.

Consideration should be given to: Did the contractor

- in the time frame specified, provide its contract security, Insurance Certificate fully executed and WSIB form where applicable
- submit progress claims in the correct format, accurately representing the work successfully completed and material delivered to the site but not yet installed for each payment period
- submit a Statutory Declaration correctly completed with each progress claim
- submit an updated Schedule if so specified
- pay subcontractors and suppliers in a timely fashion in accordance with the terms and conditions of its subcontracts
- promptly appoint a competent site superintendent
- notify the NCC representative of all its subcontracting activities

- apply for, obtain and pay for all necessary permits, licenses and certificates
- cooperate with other contractors sent onto the site of the work

- remove a superintendent or unsuitable worker when requested by the NCC representative to do so
- effectively protect the work and the contract documents provided by the NCC
- comply with all warranty provisions up to the date of the Contractor Performance Evaluation Report Form (CPERF)

- effectively manage the site during a suspension or termination of the work to mitigate any additional costs to the NCC

- deal promptly with any claims from creditors

- maintain complete records of the project
- provide information promptly when requested to do so
- expedite and co-operate in the settlement of all disputes

Efficacité avec laquelle l'entrepreneur a administré le contrat conformément aux dispositions continues dans la partie « prioritaire » des documents contractuels.

Il faut examiner si l'entrepreneur a :

- fourni, dans le délai prescrit, une garantie contractuelle, un certificat d'assurance dûment signés et le formulaire de la CSST, le cas échéant
- présenté des réclamations périodiques dans le bon format, en décrivant avec précision les travaux exécutés et le matériel livré sur le chantier mains non encore installé, pour chaque période de paiement
- présenté une déclaration solennelle correctement remplie avec chaque réclamation périodique
- fourni un calendrier à jour, sur demande
- payé rapidement les sous-traitants et les fournisseurs conformément aux conditions des contrats de sous-traitance
- désigné dans les plus brefs délais un surintendant de chantier qualifié
- tenu au courant le représentant de la CCN de toutes les activités de sous-traitance
- demandé, obtenu et payé tous les permis, licences et certificats nécessaires
- collaboré avec les autres entrepreneurs envoyés sur le lieu des travaux
- remplacé un surintendant ou un travailleur inapte à la demande du représentant de la CCN
- protégé efficacement les travaux et les documents relativement aux travaux et au contrat fournis par la CCN
- respecté toutes les dispositions de garantie jusqu'à la date du Formulaire Rapport d'évaluation du rendement de l'entrepreneur (FRERE)
- géré efficacement le chantier pendant une suspension des travaux ou lors de leur achèvement, afin de limiter tout coût supplémentaire pour la CCN
- traité dans les plus brefs délais les demandes de paiement des créanciers
- tenu des dossiers complets sur le projet
- fourni promptement les renseignements demandés
- accélère et coopère dans le règlement des différends

HEALTH AND SAFETY / SANTÉ ET SÉCURITÉ

The effectiveness to which the contractor managed and administered the occupational health and safety provisions as stipulated in the contract documents and those required by provincial legislation or those that would otherwise be applicable to the site of the work.

Consideration should be given to: Did the contractor

- provide the NCC with a copy of its health and safety program prior to award of contract
- provide the NCC with a copy of its site specific hazardous assessment prior to award of contract
- apply for and obtain the provincial Notice of Project prior to commencement of the work
- apply for and obtain the Building Permit prior to commencement of the work
- provide a competent superintendent who
  - is qualified in health and safety matters because of her/his knowledge, training and experience
  - is familiar with the OH&S Act and its Regulations that apply to the site of the work
  - remedies any potential or actual danger of health and safety to those employed at the work site
- respond in a timely manner to any non-compliance safety issues noted by the NCC or a representative of the authority having jurisdiction
- implement its safety program in a proactive manner

Efficacité avec laquelle l'entrepreneur a géré et administré les dispositions relatives à la santé et à la sécurité au travail telles que stipulées dans les documents contractuels et dans les règlements provinciaux ou ceux s'appliquant normalement au lieu des travaux.

Il faut examiner si l'entrepreneur a :

- fourni à la CCN une copie de son programme en matière de santé et de sécurité avant l'octroi du contrat
- fourni à la CCN une copie de son évaluation des dangers pouvant survenir sur les lieux avant l'octroi du contrat
- demandé et obtenu l'avis de projet provincial avant le début des travaux
- demandé et obtenu le permis de construction avant le début des travaux
- engagé un surintendant qui :
  - est qualifié en matière de santé et de sécurité de par ses connaissances, sa formation et son expérience
  - connaît bien les dispositions de la Loi sur la santé et la sécurité au travail et de son règlement qui s'applique sur le lieu des travaux
  - remédie à tout danger possible ou réel en matière de santé et de sécurité pouvant toucher toutes les personnes travaillant sur le lieu des travaux
- traité rapidement tous les problèmes de non-conformité à la sécurité relevés par la CCN ou par un représentant de l'autorité qui a juridiction
- mis en œuvre son programme de sécurité de façon proactive

GC1.1 INTERPRETATION

GC1.1.1 Headings and References

1) The headings in the contract documents, other than those in the drawings and specifications, form no part of the Contract but are inserted for convenience of reference only.

2) A reference made to a part of the Contract by means of numbers preceded by letters is a reference to the particular part of the Contract that is identified by that combination of letters and numbers and to any other part of the Contract referred to therein.

3) A reference to a paragraph or subparagraph followed by an identifying number, letter or combination thereof is, unless specifically stated otherwise, a reference to the paragraph or subparagraph that forms part of the clause within which the reference is made.

GC1.1.2 Terminology

1) In the Contract

"Contract" means the contract documents referred to as such therein and every other document specified or referred to in any of them as forming part of the Contract, all as amended by agreement of the parties;

"Contract Amount" means the amount set out in the Contract to be payable to the Contractor for the Work, subject to the terms and conditions of the Contract;

"Contract Security" means any security given by the Contractor to the NCC in accordance with the Contract;

"Contractor" means the person contracting with the NCC to provide or furnish all labour, Material and Plant for the execution of the Work under the Contract, and includes the Contractor's superintendent as designated in writing to the NCC;

"Certificate of Completion" means a certificate issued by the NCC when the Work reaches Completion;

"Certificate of Measurement" means a certificate issued by the NCC certifying the correctness of the final quantities, prices per unit and values of labour, Plant and Material performed, used and supplied by the Contractor for the construction of the part of the Work to which a Unit Price Arrangement applies;

"Certificate of Substantial Performance" means a certificate issued by the NCC when the Work reaches Substantial Performance;

"NCC Representative" means the person designated in the Contract, or by written notice to the Contractor, to act as the NCC Representative for the purposes of the Contract, and includes a person, designated and authorized in writing by the NCC Representative to the Contractor;

"herein", "hereby", "hereof", "hereunder" and similar expressions refer to the Contract as a whole and not to any particular section or part thereof;

"Lump Sum Arrangement" means that part of the Contract that prescribes a lump sum as payment for performance of the Work to which it relates;

"Material" includes all commodities, articles, machinery, equipment, fixtures and things required to be furnished in accordance with the Contract for incorporation into the Work;

"NCC" means the National Capital Commission;

"Person" also includes, unless there is an express stipulation in the Contract to the contrary, any partnership, proprietorship, firm, joint venture, consortium or corporation;

"Plant" includes all tools, implements, machinery, vehicles, structures, equipment, articles and things that are necessary for the performance of the Contract, other than Material and those tools customarily provided by a tradesperson in practicing a trade;

"Security screening" is a generic term that applies to all types and levels of personnel security screening including Reliability Status, Site Access, and CONFIDENTIAL, SECRET and TOP SECRET security clearances conducted by the NCC;

"Sensitive Information and Assets" means information or assets that have been identified by the NCC as TOP SECRET, SECRET, CONFIDENTIAL or protected;

"Subcontractor" means a person having a direct contract with the Contractor, subject to GC3.6 SUBCONTRACTING, to perform a part or parts of the Work, or to supply Material customized for the Work;

"Superintendent" means the employee or representative of the Contractor designated by the Contractor to act pursuant to GC2.6 SUPERINTENDENT;

"Supplementary Conditions" means the part of the Contract that amends or supplements the General Conditions;

"Supplier" means a person having a direct contract with the Contractor to supply Plant or Material not customized for the Work;

"Unit Price Arrangement" means that part of the Contract that prescribes the product of a price per unit of measurement multiplied by a number of units of measurement for performance of the Work to which it relates;

"Unit Price Table" means the table of prices per unit set out in the Contract;

"Work" means, subject only to any express stipulation in the Contract to the contrary, everything that is necessary to be done, furnished or delivered by the Contractor to perform the Contract in accordance with the contract documents; and

"Working Day" means a day other than a Saturday, Sunday, or a statutory holiday that is observed by the construction industry in the area of the place of the Work.

GC1.1.3 Application of Certain Provisions

1) Any provisions of the Contract that are expressly stipulated to be applicable only to a Unit Price Arrangement are not applicable to any part of the Work to which a Lump Sum Arrangement applies.

2) Any provisions of the Contract that are expressly stipulated to be applicable only to a Lump Sum Arrangement are not applicable to any part of the Work to which a Unit Price Arrangement applies.

GC1.1.4 Substantial Performance

1) The Work shall be considered to have reached Substantial Performance when:

   (a) the Work or a substantial part thereof has passed inspection and testing and is, in the opinion of the NCC, ready for use by the NCC or is being used for the intended purposes; and

   (b) the Work is, in the opinion of the NCC, capable of completion or correction at a cost of not more than

      (i) 3% of the first $500,000;

      (ii) 2% of the next $500,000; and

      (iii) 1% of the balance

      of the Contract Amount at the time this cost is calculated.

2) Where the Work or a substantial part thereof is ready for use or is being used for the purposes intended and:

   (a) the remainder of the Work or a part thereof cannot be completed by the time specified in the Contract, or as amended in accordance with GC6.5 DELAYS AND EXTENSION OF TIME, for reasons beyond the control of the Contractor; or

   (b) the NCC and the Contractor agree not to complete a part of the Work within the specified time;

the cost of that part of the Work that was either beyond the control of the Contractor to complete or the NCC and the Contractor have agreed not to complete by the time specified, shall be deducted from the value of the Contract referred to in subparagraph 1)(b) of GC1.1.4, and the said cost shall not form part of the cost of the Work remaining to be done in determining Substantial Performance.

GC1.1.5 Completion

1) The Work shall be deemed to have reached Completion when all labour, Plant and Material required have been performed, used or supplied, and the Contractor has complied with the Contract and all orders and directions made pursuant thereto, all to the satisfaction of the NCC.

GC1.2 CONTRACT DOCUMENTS

GC1.2.1 General

1) The contract documents are complementary, and what is required by any one shall be as binding as if required by all.

2) References in the contract documents to the singular shall be considered to include the plural as the context requires.

3) Nothing contained in the contract documents shall create a contractual relationship between the NCC and any Subcontractor or Supplier, their subcontractors or suppliers, or their agents or employees.

GC1.2.2 Order of Precedence

1) In the event of any discrepancy or conflict in the contents of the following documents, such documents shall take precedence and govern in the following order:

   (a) any amendment or variation of the contract documents that is made in accordance with the General Conditions;

   (b) any amendment issued prior to tender closing;

   (c) Supplementary Conditions;

   (d) General Conditions;

   (e) the duly completed Invitation to Tender and Acceptance Form when accepted;

   (f) drawings and specifications.

   later dates shall govern within each of the above categories of documents.

2) In the event of any discrepancy or conflict in the information contained in the drawings and specifications, the following rules shall apply:

   (a) specifications shall govern over drawings;

   (b) dimensions shown in figures on a drawings shall govern where they differ from dimensions scaled from the same drawing; and

   (c) drawings of larger scale govern over those of smaller scale.

GC1.2.3 Security and Protection of Documents and Work

1) The Contractor shall guard and protect all sensitive contract information (TOP SECRET, SECRET, CONFIDENTIAL and PROTECTED) including printed and digital documents, drawings, information, models, copies thereof and processing systems, whether supplied by the NCC or the Contractor, against loss or compromise and damage from any cause.

2) The Contractor shall limit access to sensitive NCC information only to those with a "need-to-know" and who have been successfully security screened to at least the level of sensitivity of the information.

3) The Contractor shall ensure all contract information indicated in paragraph 1) is guarded and protected by any subcontractors, agents or suppliers and access limited only to those with a "need-to-know" and who have been successfully security screened to at least the level of sensitivity of the information.

4) The Contractor shall keep confidential all information provided to the Contractor by or on behalf of the NCC in connection with the Work, and all information developed by the Contractor as part of the Work, and shall not disclose any such information to any person without the written permission of the NCC, except that the Contractor may disclose to a subcontractor, authorized in accordance with the Contract, information necessary to the performance of a subcontract. This section does not apply to any information that:

   (a) is publicly available from a source other than the Contractor; or

   (b) is or becomes known to the Contractor from a source other than the NCC, except any source that is known to the Contractor to be under an obligation to the NCC not to disclose the information.

5) When the Contract, the Work, or any information referred to in paragraph 4) is identified as TOP SECRET, SECRET, CONFIDENTIAL or PROTECTED by the NCC, the Contractor shall, at all times, take all measures reasonably necessary for the safeguarding of the material so identified, including such measures as may be further specified elsewhere in the Contract or provided, in writing, from time to time by the NCC.

6) Without limiting the generality of paragraphs 4) and 5) of GC1.2.3, when the Contract, the Work, or any information referred to in paragraph 4) is identified as TOP SECRET, SECRET, CONFIDENTIAL or PROTECTED by the NCC, the NCC shall be entitled to inspect the Contractor's premises and the premises of its subcontractors or suppliers and any other person at any tier, for security purposes at any time during the term of the Contract, and the Contractor shall comply with, and ensure that any such subcontractors or suppliers comply with all written instructions issued by the NCC dealing with the material so identified, including any requirement that employees of the Contractor and its subcontractors and suppliers and any other person at any tier execute and deliver declarations relating to reliability status, site access security clearances and other procedures.

7) The Contractor shall report any suspected or actual security incidents immediately to the NCC involving loss, compromise or damage of NCC information or assets.

8) The Contractor shall safeguard the Work and the Contract, the specifications, drawings and any other information provided by the NCC to the Contractor, and shall be liable to the NCC for any loss or damage from any causes.

GC1.3 STATUS OF THE CONTRACTOR

1) The Contractor is engaged under the Contract as an independent contractor.

2) The Contractor, its subcontractors and suppliers and any other person at any tier and their employees are not engaged by the Contract as employees, servants or agents of the NCC.

3) For the purposes of the contract the Contractor shall be solely responsible for any and all payments and deductions required to be made by law including those required for Canada or Quebec Pension Plans, Employment Insurance, Worker's Compensation, provincial health or insurance plans, and Income Tax.

GC1.4 RIGHTS AND REMEDIES

1) Except as expressly provided in the Contract, the duties and obligations imposed by the Contract and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights, and remedies otherwise imposed or available by law.

GC1.5 TIME OF THE ESSENCE

1) Time is of the essence of the Contract.

GC1.6 INDEMNIFICATION BY CONTRACTOR

1) The Contractor shall pay all royalties and patent fees required for the performance of the Contract and, at the Contractor's expense, shall defend all claims, actions or proceedings against the NCC charging or claiming that the Work or any part thereof provided or furnished by the Contractor to the NCC infringes any patent, industrial design, copyright trademark, trade secret or other proprietary right enforceable in Canada.

2) The Contractor shall indemnify and save the NCC harmless from and against all claims, demands, losses, costs, damages, actions, suits, or proceedings by any third party, brought or prosecuted and in any manner based upon, arising out of, related to, occasioned by, or attributable to the activities of the Contractor, its subcontractors and suppliers and any other person at any tier, in performing the Work.

3) For the purposes of paragraph 2) of GC1.6, "activities" means any act improperly carried out, any omission to carry out an act and any delay in carrying out an act.

GC1.7 INDEMNIFICATION BY THE NCC

1) Subject to the Crown Liability and Proceedings Act, the Patent Act, and any other law that affects the NCC's rights, powers, privileges or obligations, the NCC shall indemnify and save the Contractor harmless from and against all claims, demands, losses, costs, damage, actions, suits or proceedings arising out of the Contractor's activities under the Contract that are directly attributable to:

   (a) a lack of or a defect in the NCC's title to the Work site if owned by the NCC, whether real or alleged; or

   (b) an infringement or an alleged infringement by the Contractor of any patent of invention or any other kind of intellectual property occurring while the Contractor was performing any act for the purposes of the Contract employing a model, plan or design or any other thing related to the Work that was supplied by the NCC to the Contractor.

GC1.8 LAWS, PERMITS AND TAXES

1) The Contractor shall comply with all federal, provincial and municipal laws and regulations applicable to the performance of the Work or any part thereof including, without limitation, all laws concerning health and labour conditions and the protection of the environment, and shall require compliance therewith by all of its subcontractors and suppliers at any tier as if the Work were being performed for an owner other than the NCC. The Contractor shall furnish evidence of compliance with such laws and regulations to the NCC at such times as the NCC may reasonably request.

2) Unless stipulated otherwise in the Contract, the Contractor shall obtain and maintain all permits, certificates, licences, registrations and authorizations required for the lawful performance of the Work.

3) Prior to the commencement of the Work at the site, the Contractor shall tender to a municipal authority an amount equal to all fees and charges that would be lawfully payable to that municipal authority in respect of building permits as if the Work were being performed for an owner other than the NCC.

4) Within 10 days of making a tender pursuant to paragraph 3) of GC1.8, the Contractor shall notify the NCC of the amount properly tendered and whether or not the municipal authority has accepted that amount.

5) If the municipal authority has not accepted the amount tendered, the Contractor shall pay that amount to the NCC within 6 days after the time stipulated in paragraph 4) of GC1.8.

6) For the purposes of this clause, "municipal authority" means any authority that would have jurisdiction respecting permission to perform the Work if the owner were not the NCC.

7) Notwithstanding the residency of the Contractor, the Contractor shall pay any applicable tax arising from or related to the performance of the Work under the Contract.

8) In accordance with the Statutory Declaration referred to in paragraph 4) of GC5.5 SUBSTANTIAL PERFORMANCE OF THE WORK, a Contractor who has neither residence nor place of business in the province or territory in which work under the Contract is being performed shall provide the NCC with proof of registration with the provincial sales tax authorities in the said province.

9) For the purpose of the payment of any applicable tax or the furnishing of security for the payment of any applicable tax arising from or related to the performance of the Work, and notwithstanding the provision that all Material, Plant and interest of the Contractor in all real property, licences, powers and privileges, become the property of the NCC after the time of purchase in accordance with GC3.10 MATERIAL PLANT AND REAL PROPERTY BECOME PROPERTY OF THE NCC, the Contractor shall be liable, as a user or consumer, for the payment or for the furnishing of security for the payment of any applicable tax payable, at the time of the use or consumption of that Material, Plant or interest of the Contractor in accordance with the relevant legislation.

GC1.9 WORKERS' COMPENSATION

1) Prior to award of contract, at the time of submitting its first progress claim, at the time of Substantial Performance of the Work, and prior to issuance of the Certificate of Completion, the Contractor shall provide evidence of compliance with workers' compensation legislation applicable to the place of the Work, including payments due thereunder.

2) At any time during the term of the Contract, when requested by the NCC, the Contractor shall provide such evidence of compliance by the Contractor, its subcontractors and any other person at any tier and any other person performing part of the Work who is required to comply with such legislation.

GC1.10 NATIONAL SECURITY

1) If the NCC determines that the Work is of a class or kind that involves national security, the NCC may order the Contractor to:

(a) provide the NCC with any information concerning persons employed or to be employed by the Contractor for purposes of the Contract; and

(b) remove any person from the site of the Work if, in the opinion of the NCC, that person may be a risk to the national security;

and the Contractor shall comply with the order.

2) In all contracts with persons who are to be employed in the performance of the Contract, the Contractor shall make provision for the performance of any obligation that may be imposed upon the Contractor under paragraph 1) of GC1.10.

GC1.11 UNSUITABLE WORKERS

1) The NCC shall instruct the Contractor to remove from the site of the Work any person employed by the Contractor for purposes of the Contract who, in the opinion of the NCC, is incompetent or is guilty of improper conduct, and the Contractor shall not permit a person who has been removed to return to the site of the Work.

GC1.12 PUBLIC CEREMONIES AND SIGNS

1) The Contractor shall not permit any public ceremony in connection with the Work without the prior consent of the NCC.

2) The Contractor shall not erect nor permit the erection of any sign or advertising on the Work or its site without the prior consent of the NCC.

GC1.13 CONFLICT OF INTEREST

1) It is a term of the Contract that no individual, for whom the post-employment provisions of the Conflict of Interest and Post-Employment Code for Public Office Holders or the Values and Ethics Code for the Public Service apply, shall derive a direct benefit from the Contract unless that individual is in compliance with the applicable post-employment provisions.

GC1.14 AGREEMENTS AND AMENDMENTS

1) The Contract constitutes the entire and sole agreement between the parties with respect to the subject matter of the Contract and supersedes all previous negotiations, communications and other agreements, whether written or oral, relating to it, unless they are incorporated by reference in the Contract. There are no terms, covenants, representations, statements or conditions binding on the parties other than those contained in the Contract.

2) The failure of either party at any time to require performance by the other party of any provision hereof shall not affect the right thereafter to enforce such provision. Nor shall the waiver by either

party of any breach of any covenant, term or condition hereof be taken to be held to be a waiver of any further breach of the same covenant, term or condition.

3) The Contract may be amended only as provided for in the Contract.

GC1.15 SUCCESSION

1) The Contract shall inure to the benefit of and be binding upon the parties hereto and their lawful heirs, executors, administrators, successors and, subject to GC1.16 ASSIGNMENT, permitted assigns.

GC1.16 ASSIGNMENT

1) The Contractor shall not make any assignment of the Contract, either in whole or in part, without the written consent of the NCC.

GC1.17 NO BRIBE

1) The Contractor represents and covenants that no bribe, gift, benefit, nor other inducement has been nor shall be paid, given, promised or offered directly or indirectly to any official or employee of the NCC or to a member of the family of such a person, with a view to influencing the entry into the Contract or the administration of the Contract.

GC1.18 CERTIFICATION - CONTINGENCY FEES

1) In this clause:

(a) "contingency fee" means any payment or other compensation that is contingent upon or is calculated upon the basis of a degree of success in soliciting or obtaining a Government contract or negotiating the whole or any part of its terms;

(b) "employee" means a person with whom the Contractor has an employer/employee relationship; and

(c) "person" includes an individual or a group of individuals, a corporation, a partnership, an organization and an association and, without restricting the generality of the foregoing, includes any individual who is required to file a return with the registrar pursuant to section 5 of the Lobbyists Registration Act R.S.C. 1985 c.44 (4th Supplement) as the same may be amended from time to time.

2) The Contractor certifies that it has not directly or indirectly paid nor agreed to pay and covenants that it shall not directly or indirectly pay nor agree to pay a contingency fee for the solicitation, negotiation or obtaining of the Contract to any person other than an employee acting in the normal course of the employee's duties.

3) All accounts and records pertaining to payments of fees or other compensation for the solicitation, obtaining or negotiation of the Contract shall be subject to the accounts and audit provisions of the Contract.

4) If the Contractor certifies falsely under this section or is in default of the obligations contained therein, the NCC may either take the Work out of the Contractor's hands in accordance with the provisions of the Contract or recover from the Contractor by way of reduction to the Contract Amount or otherwise, the full amount of the contingency fee.

GC1.19 INTERNATIONAL SANCTIONS

1) Persons and companies in Canada, and Canadians outside of Canada are bound by economic sanctions imposed by the Government of Canada. As a result, the the NCC cannot accept delivery of goods or services that originate, either directly or indirectly, from the countries or persons subject to economic sanctions.
Details on existing sanctions can be found at:
http://www.dfait-maeci.gc.ca/trade/sanctions-en.asp.

2) It is a condition of the Contract that the Contractor not supply to the NCC any goods or services which are subject to economic sanctions.

3) By law, the Contractor must comply with changes to the regulations imposed during the life of the Contract. During the performance of the Contract should the imposition of sanctions against a country or person or the addition of a good or service to the list of sanctioned goods or services cause an impossibility of performance for the Contractor, the Contractor may request that the Contract be terminated in accordance with GC7.3 TERMINATION OF CONTRACT.

GC2 ADMINISTRATION OF THE CONTRACT

GC2.1 NCC REPRESENTATIVE'S AUTHORITY

1) The NCC shall designate an NCC Representative and shall notify the Contractor of the name, address and telephone number of the NCC Representative.

2) The NCC Representative shall perform the NCC's duties and functions under the contract.

3) The NCC Representative shall be authorized to issue notices, instructions and directions to the Contractor and to accept on behalf of the NCC any notice, order or other communication from the contractor relating to the Work.

4) The NCC Representative shall, within a reasonable time, review and respond to submissions made by the Contractor in accordance with the requirements of the Contract.

GC2.2 INTERPRETATION OF CONTRACT

1) If, at any time before the NCC has issued a Certificate of Completion, any question arises between the parties about whether anything has been done as required by the Contract or about what the Contractor is required by the Contract to do, and in particular but without limiting the generality of the foregoing, about:

   (a) the meaning of anything in the drawings and specifications;

   (b) the meaning to be given to the drawings and specifications in case of any error therein, omission therefrom, or obscurity or discrepancy in their wording or intention;

   (c) whether or not the quality or quantity of any Material or workmanship supplied or proposed to be supplied by the Contractor meets the requirements of the Contract;

   (d) whether or not the labour, Plant or Material performed, used and supplied by the Contractor for performing the Work and carrying out the Contract are adequate to ensure that the Work shall be performed in accordance with the Contract and that the Contract shall be carried out in accordance with its terms;

   (e) what quantity of any of the Work has been completed by the Contractor; or

   (f) the timing and scheduling of the various phases of the performance of the Work as specified in the Contract;

   the question shall be decided, subject to the provisions of GC8 DISPUTE RESOLUTION, by the NCC.

2) The Contractor shall perform the Work in accordance with any decisions of the NCC that are made under paragraph 1) of GC2.2 and in accordance with any consequential directions given by the NCC.

3) If the Contractor fails to comply with any instruction or direction issued by the NCC pursuant to the Contract, the NCC may employ such methods as the NCC deems advisable to do what the Contractor failed to do, and the Contractor shall, on demand, pay the NCC an amount that is equal to the aggregate of all costs, expenses and damages incurred or sustained by the NCC by reason of the Contractor's failure to comply with such instruction or direction, including the cost of any methods employed by the NCC in doing what the Contractor failed to do.

GC2.3 NOTICES

1) Subject to paragraph 3) of GC2.3, any notice, order or other communication may be given in any manner, and if required to be in writing, shall be addressed to the party to whom it is intended at the address in the Contract or at the last address of which the sender has received written notice in accordance with this section.

2) Any notice, order or other communication given in writing in accordance with paragraph 1) of GC2.3 shall be deemed to have been received by either party:

   (a) if delivered personally, on the day that it was delivered;

   (b) if forwarded by mail, on the earlier of the day it was received or the sixth day after it was mailed; and

   (c) if forwarded by facsimile or electronic mail, 24 hours after it was transmitted.

3) A notice given under GC7.1 TAKING THE WORK OUT OF THE CONTRACTOR'S HANDS, GC7.2 SUSPENSION OF WORK, and GC7.3 TERMINATION OF CONTRACT shall be given in writing and, if delivered personally, shall be delivered, if the Contractor is a sole proprietor, to the Contractor or, if the Contractor is a partnership or corporation, to an officer thereof.

GC2.4 SITE MEETINGS

1) In consultation with the NCC, the Contractor shall arrange site meetings at regular intervals, with all involved parties who are to attend, in order to ensure, among other things, the proper co-ordination of the Work.

GC2.5 REVIEW AND INSPECTION OF WORK

1) The NCC shall review the Work to determine if it is proceeding in conformity with the Contract and to record the necessary data to make an assessment of the value of Work completed. The NCC shall measure and record the quantities of labour, Plant and Material performed, used or supplied by the Contractor in performing the Work or any part thereof that is subject to a Unit Price Arrangement and, on request, shall inform the Contractor of those measurements, and permit the Contractor to inspect any records pertaining thereto.

2) The NCC shall reject Work or Material which in the NCC's opinion does not conform to the requirements of the Contract, and shall require inspection or testing of Work, whether or not such Work is fabricated, installed, or completed. If such Work is not in accordance with the requirements of the Contract, the Contractor shall correct the Work and shall pay the NCC, on demand, all reasonable costs and expenses that were incurred by the NCC in having the examination performed.

3) The Contractor shall provide the NCC with access to the Work and its site at all times, and at all times shall provide sufficient, safe, and proper facilities for the review and inspection of the Work by persons authorized by the NCC and any representatives of those authorities having jurisdiction. If parts of the Work are in preparation at locations other than the site of the Work, the NCC shall be given access to such Work whenever it is in progress.

4) The Contractor shall furnish the NCC with such information respecting the performance of the Contract as the NCC may require, and render every possible assistance to enable the NCC to verify that the Work is performed in accordance with the Contract, carry out any other duties and exercise any powers in accordance with the Contract.

5) If Work is designated for tests, inspections, or approvals in the Contract or by the NCC's instructions, or by laws or ordinances of the place of the Work, the Contractor shall give the NCC reasonable notice of when such Work shall be ready for review and inspection. The Contractor shall arrange for and shall give the NCC reasonable notice of the date and time of inspections, tests or approvals.

6) If the Contractor covers, or permits to be covered, Work that has been designated for tests, inspections or approvals before such tests, inspections or approvals are made, completed or given, the Contractor shall, if so directed by the NCC, uncover such Work, have the inspections, tests or approvals satisfactorily made, completed or given and make good the covering of the Work at the Contractor's expense.

GC2.6 SUPERINTENDENT

1) Prior to commencing the Work, the Contractor shall designate a Superintendent and shall notify the NCC of the name, address and telephone number of the Superintendent. The Contractor shall keep the Superintendent at the Work site during working hours until the Work has reached completion.

2) The Superintendent shall be in full charge of the operations of the Contractor during the performance of the Work and shall be authorized to accept on behalf of the Contractor any notice, order or other communication given to the Superintendent or the Contractor relating to the Work.

3) Upon request of the NCC, the Contractor shall remove any Superintendent who, in the opinion of the NCC, is incompetent or has been guilty of improper conduct, and shall forthwith designate another Superintendent who is acceptable to the NCC.

4) The Contractor shall not substitute a Superintendent without the written consent of the NCC. If a Superintendent is substituted without such consent, the NCC shall be entitled to refuse to issue any documentation or certification relating to progress payments, Substantial Performance or Completion of the Work until the Superintendent has returned to the Work site or another Superintendent who is acceptable to the NCC has been substituted.

GC2.7 NON-DISCRIMINATION IN HIRING AND EMPLOYMENT OF LABOUR

1) For the purposes of this clause, “persons" include the Contractor, its subcontractors and suppliers at any tier and their respective employees, agents, licensees or invitees and any other individual involved in the performance of the Work or granted access to the Work site. A “person” includes any partnership, proprietorship, firm, joint venture, consortium and corporation.

2) Without restricting the provisions of paragraph 3) of GC2.6, SUPERINTENDENT, the Contractor shall not refuse to employ and shall not discriminate in any manner against any person because:

   (a) of that person's race, national origin, colour, religion, age, sex or marital status;

   (b) of the race, national origin, colour, religion, age, sex, or marital status of any person having any relationship or association with that person; or

   (c) a complaint has been made or information has been given by or in respect of that person relating to an alleged failure by the Contractor to comply with subparagraphs 2)(a) and 2)(b) of GC2.7.

3) Within two Working Days immediately following receipt of a written complaint pursuant to paragraph 2) of GC2.7, the Contractor shall:

(a) cause to have issued a written direction to the person or persons named by the complainant to cease all actions that form the basis of the complaint;

(b) forward a copy of the complaint to the NCC by registered mail or courier service; and

(c) when the Labour Conditions are applicable under the circumstances of the complaint, forward a copy of the complaint to HRSDC - Labour to the attention of the appropriate Director as described in the Labour Conditions ("HRSDC - Labour" means the labour component of the federal Department of Human Resources and Skills Development).

4) Within twenty four (24) hours immediately following receipt of a direction from the NCC to do so, the Contractor shall cause to have removed from the site of the Work and from the performance of Work under the Contract, any person or persons whom the NCC believes to be in breach of the provisions of paragraph 2) of GC2.7.

5) No later than thirty (30) days after receipt of the direction referred to in paragraph 4) of GC2.7, the Contractor shall cause the necessary action to be commenced to remedy the breach described in the direction.

6) If a direction is issued pursuant to paragraph 4) of GC2.7, the NCC may withhold from monies that are due and payable to the Contractor or setoff pursuant to GC5.9 RIGHT OF SETOFF, whichever is applicable, an amount representing the sum of the costs and payment referred to in paragraph 8) of GC2.7.

7) If the Contractor fails to proceed in accordance with paragraph 5) of GC2.7, the NCC shall take the necessary action to have the breach remedied, and shall determine all supplementary costs incurred by the NCC as a result.

8) The NCC may make a payment directly to the complainant from monies that are due and payable to the Contractor upon receipt from the complainant of:

(a) a written award issued pursuant to the federal Commercial Arbitration Act, R.S.C. 1985, c. 17 (2nd Supp.);

(b) a written award issued pursuant to the Canadian Human Rights Act, RS.C. 1985, c. H-6;

(c) a written award issued pursuant to provincial or territorial human rights legislation; or

(d) a judgement issued by a court of competent jurisdiction.

9) If the NCC is of the opinion that the Contractor has breached any of the provisions of this clause, the NCC may take the Work out of the Contractor's hands pursuant to GC7.1 TAKING THE WORK OUT OF THE CONTRACTOR'S HANDS.

10) Subject to paragraph 7) of GC3.6 SUBCONTRACTING, the Contractor shall ensure that the provisions of this clause are included in all agreements and contracts entered into as a consequence of the Work.

GC2.8 ACCOUNTS AND AUDITS

1) The Contractor shall, in addition to the requirements expressed in paragraph 6) of GC3.4 EXECUTION OF THE WORK, maintain full records of the Contractor's estimated and actual cost of the Work together with all tender calls, quotations, contracts, correspondence, invoices, receipts and vouchers relating thereto, and shall make them available on request to audit and inspection by the NCC or by persons designated to act on behalf of the NCC.

2) The Contractor shall allow any of the persons referred to in paragraph 1) of GC2.8 to make copies of and take extracts from any of the records and material, and shall furnish such persons or entities with any information those persons or entities may require from time to time in connection with such records and material.

3) The Contractor shall maintain and keep the records intact until the expiration of two years after the date that a Certificate of Completion has been issued or until the expiration of such other period of time as the NCC may direct.

4) The Contractor shall cause all subcontractors at any tier and all other persons directly or indirectly controlled by or affiliated with the Contractor and all persons directly or indirectly having control of the Contractor to comply with the requirements of this clause as if they were the Contractor.

GC3.1 PROGRESS SCHEDULE

1) The Contractor shall:

   (a) prepare and submit to the NCC, prior to the submission of the Contractor's first progress claim, a progress schedule in accordance with the requirements set out in the Contract;

   (b) monitor the progress of the Work relative to the schedule and update the schedule as stipulated by the contract documents;

   (c) advise the NCC of any revisions to the schedule required as the result of any extension of time for completion of the Contract that was approved by the NCC; and

   (d) prepare and submit to the NCC, at the time of issuance of an Certificate of Substantial Performance, an update of any schedule clearly showing a detailed timetable that is acceptable to the NCC for the completion of any unfinished Work and the correction of all listed defects.

GC3.2 ERRORS AND OMISSIONS

1) The Contractor shall report promptly to the NCC any errors, discrepancies, or omissions the Contractor may discover when reviewing the contract documents. In making a review, the Contractor does not assume any responsibility to the NCC for the accuracy of the review. The Contractor shall not be liable for damage or costs resulting from such errors, discrepancies, or omissions in the contract documents prepared by or on behalf of the NCC that the Contractor did not discover.

GC3.3 CONSTRUCTION SAFETY

1) Subject to GC3.7 CONSTRUCTION BY OTHER CONTRACTORS OR WORKERS, the Contractor shall be solely responsible for construction safety at the place of the Work and for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Work. In any emergency, the Contractor shall either, stop the Work, make changes or order extra work to ensure the safety of life and the protection of the Work and neighbouring property.

2) Prior to commencing the Work, the Contractor shall notify the authorities having jurisdiction for construction safety at the site of the Work with respect to the intended commencement of the Work, and shall provide such authority with whatever additional information may be required by that authority.

GC3.4 EXECUTION OF THE WORK

1) The Contractor shall perform, use or supply and pay for, all labour, Plant, Material, tools, construction machinery and equipment, water, heat, light, power, transportation and other facilities and services necessary for the performance of the Work in accordance with the Contract.

2) The Contractor shall, at all times, perform the Work in a proper, diligent and expeditious manner as is consistent with construction industry standards and in accordance with the progress schedule prepared pursuant to GC3.1 PROGRESS SCHEDULE and shall provide sufficient personnel to fulfil the Contractor's obligations in accordance with that schedule.

3) Subject to paragraph 4) of GC3.4, the Contractor shall have complete care, custody and control of the Work and shall direct and supervise the Work so as to ensure compliance with the Contract. The Contractor shall be responsible for construction means, methods, techniques, sequences and procedures and for co-ordinating the various parts of the Work.

4) When requested in writing by the NCC, the Contractor shall make appropriate alterations in the method, Plant or workforce at any time the NCC considers the Contractor's actions to be unsafe or damaging to either the Work, existing facilities, persons at the site of the Work or the environment.

5) The Contractor shall have sole responsibility for the design, erection, operation, maintenance and removal of temporary structures and other temporary facilities and for the construction methods used in their erection, operation, maintenance and removal. The Contractor shall engage and pay for registered professional engineering personnel, skilled in the appropriate discipline to perform these functions if required by law or by the Contract, and in all cases when such temporary facilities and their methods of construction are of such a nature that professional engineering skill is required to produce safe and satisfactory results.

6) The Contractor shall keep at least one copy of current contract documents, submittals, reports, and records of meetings at the site of the Work, in good order and available to the NCC.

7) Except for any part of the Work that is necessarily performed away from or off the site of the Work, the Contractor shall confine Plant, storage of Material, and operations of employees to limits indicated by laws, ordinances, permits or the contract documents.

GC3.5 MATERIAL

1) Unless otherwise specified in the Contract, all Material incorporated in the Work shall be new.

2) Subject to paragraph 3) of GC3.5, if a specified reused, refurbished, or recycled item of Material is not available, the Contractor shall apply to the NCC to substitute a similar item for the one specified.

3) If the NCC agrees that the Contractor's application for substitution of a reused, refurbished or recycled item is warranted, and that the substitute item is of acceptable quality and value to that specified and is suitable for the intended purpose, the NCC may approve the substitution, subject to the following:

   (a) the request for substitution shall be made in writing to the NCC and shall be substantiated by information in the form of the manufacturer's literature, samples and other data that may be required by the NCC;

   (b) the Contractor shall make the request for substitution in a manner that shall not negatively affect the progress schedule of the Contract and well in advance of the time the item of Material must be ordered;

(c) substitution of Material shall be permitted only with the prior written approval of the NCC, and any substituted items that are supplied or installed without such approval shall be removed from the site of the Work at the expense of the Contractor, and specified items installed at no additional cost to the NCC; and

(d) the Contractor shall be responsible for all additional expenses incurred by the NCC, the Contractor, its subcontractors and suppliers at any tier due to the Contractor's use of the substitute.

GC3.6 SUBCONTRACTING

1) Subject to the provisions of this clause, the Contractor may subcontract any part of the Work but not the whole of the Work.

2) The Contractor shall notify the NCC in writing of the Contractor's intention to subcontract.

3) A notification referred to in paragraph 2) of GC3.6 shall identify the part of the Work and the Subcontractor with whom the Contractor intends to subcontract.

4) The NCC may for reasonable cause, object to the intended subcontracting by notifying the Contractor in writing within six (6) days of receipt by the NCC of a notification referred to in paragraph 2) of GC3.6.

5) If the NCC objects to a subcontracting, the Contractor shall not enter into the intended subcontract.

6) The Contractor shall not change, nor permit to be changed, a Subcontractor engaged by the Contractor, in accordance with this clause, without the written consent of the NCC.

7) The Contractor shall ensure that all the terms and conditions of the Contract that are of general application shall be incorporated in every other contract issued as a consequence of the Contract, at whatever tier, except those contracts issued solely to suppliers at any tier for the supply of Plant or Material.

8) Neither a subcontracting nor the NCC's consent to a subcontracting shall be construed to relieve the Contractor from any obligation under the Contract or to impose any liability upon the NCC.

GC3.7 CONSTRUCTION BY OTHER CONTRACTORS OR WORKERS

1) The NCC reserves the right to send other contractors or workers, with or without Plant and Material, onto the site of the Work.

2) When other contractors or workers are sent on to the site of the Work, the NCC shall:

(a) enter into separate contracts, to the extent it is possible, with the other contractors under conditions of contract that are compatible with the conditions of the Contract;

(b) ensure that the insurance coverage provided by the other contractors is co-ordinated with the insurance coverage of the Contractor as it affects the Work; and

(c) take all reasonable precautions to avoid labour disputes or other disputes arising from the work of the other contractors or workers.

3) When other contractors or workers are sent on to the site of the Work, the Contractor shall:

(a) co-operate with them in the carrying out of their duties and obligations;

(b) co-ordinate and schedule the Work with the work of the other contractors and workers;

(c) participate with other contractors and workers in reviewing their construction schedules when directed to do so;

(d) where part of the Work is affected by or depends upon the work of other contractors or workers for its proper execution, promptly report to the NCC in writing and prior to proceeding with that part of the Work, any apparent deficiencies in such work. Failure by the Contractor to so report shall invalidate any claims against the NCC by reason of the deficiencies in the work of other contractors or workers except those deficiencies that are not then reasonably discoverable; and

(e) when designated as being responsible for construction safety at the place for work, in accordance with the applicable provincial or territorial laws, carry out its duties in that role and in accordance with those laws.

4) If, when entering into the Contract, the Contractor could not have reasonably foreseen nor anticipated the sending of other contractors or workers on to the site of the Work and provided the Contractor:

(a) incurs extra expense in complying with the requirements of paragraph 3) of GC3.7; and

(b) gives the NCC written notice of a claim for that extra expense within thirty (30) days of the date that the other contractors or workers were sent onto the Work or its site,

the NCC shall pay the Contractor the cost of the extra labour, Plant and Material that was necessarily incurred, calculated in accordance with GC6.4 DETERMINATION OF PRICE.

GC3.8 LABOUR

1) The Contractor shall maintain good order and discipline among the Contractor's employees and workers engaged in the Work shall not employ, on the site of the Work, anyone not skilled in the tasks assigned.

GC3.9 TRUCK HAULAGE RATES

CANCELLED

GC3.10 MATERIAL, PLANT AND REAL PROPERTY BECOME PROPERTY OF THE NCC

1) Subject to paragraph 9) of GC1.8 LAWS PERMITS AND TAXES, all Material and Plant and the interest of the Contractor in all real property, licences, powers and privileges purchased, used or consumed by the Contractor for the Work shall, immediately after the time of their purchase, use or consumption be the property of the NCC for the purposes of the Work and they shall continue to be the property of the NCC:

(a) in the case of Material, until the NCC indicates that the Materials shall not be required for the Work; and

(b) in the case of Plant, real property, licences, powers and privileges, until the NCC indicates that the interest vested in the NCC therein is no longer required for the purposes of the Work.

2) Material or Plant, that is the property of the NCC by virtue of paragraph 1) of GC3.10, shall not be taken away from the site of the Work nor used nor disposed of except for the purposes of the Work without the written consent of the NCC.

3) The NCC is not liable for loss of nor damage from any cause to the Material or Plant referred to in paragraph 1) of GC3.10, and the Contractor is liable for such loss or damage notwithstanding that the Material or Plant is the property of the NCC.

GC3.11 DEFECTIVE WORK

1) The Contractor shall promptly remove from the site of the Work and replace or re-execute defective Work whether or not the defective Work has been incorporated in the Work and whether or not the defect is the result of poor workmanship, use of defective Material, or damage through carelessness or other act or omission of the Contractor.

2) The Contractor, at the Contractor's expense, shall promptly make good other work destroyed or damaged by such removals or replacements.

3) If, in the opinion of the NCC, it is not expedient to correct defective Work or Work not performed as provided for in the Contract documents, the NCC may deduct from the amount otherwise due to the Contractor the difference in value between the Work as performed and that called for by the Contract documents.

4) The failure of the NCC to reject any defective Work or Material shall not constitute acceptance of the defective Work or Material.

GC3.12 CLEANUP OF SITE

1) The Contractor shall maintain the Work and its site in a tidy condition and free from an accumulation of waste material and debris.

2) Before the issue of a Certificate of Substantial Performance, the Contractor shall remove waste material and debris, and all Plant and Material not required for the performance of the remaining Work and, unless otherwise stipulated in the Contract Documents, shall cause the Work and its site to be clean and suitable for occupancy by the NCC.

3) Before the issue of a Certificate of Completion, the Contractor shall remove all surplus Plant and Materials and any waste products and debris from the site of the Work.

4) The Contractor's obligations described in paragraphs 1) to 3) of GC3.12 do not extend to waste products and other debris caused by the NCC's servants, or by other contractors and workers referred to in GC3.7 CONSTRUCTION BY OTHER CONTRACTORS OR WORKERS.

GC3.13 WARRANTY AND RECTIFICATION OF DEFECTS IN WORK

1) Without restricting any warranty or guarantee implied or imposed by law or contained in the Contract, the Contractor shall, at the Contractor's expense:

   (a) rectify and make good any defect or fault that appears in the Work or comes to the attention of the NCC with respect to those parts of the Work accepted in connection with the Certificate of Substantial Performance within 12 months from the date of Substantial Performance; and

   (b) rectify and make good any defect or fault that appears in or comes to the attention of the NCC in connection with those parts of the Work described in the Certificate of Substantial Performance within 12 months from the date of the Certificate of Completion;

   (c) transfer and assign, to the NCC, any subcontractor, manufacturer or supplier extended warranties or guarantees implied or imposed by law or contained in the Contract covering periods beyond the 12 months stipulated above. Extended warranties or guarantees referred to

herein shall not extend the 12-month period whereby the Contractor, except as may be provided elsewhere in the Contract, must rectify and make good any defect or fault that appears in the Work or comes to the attention of the NCC;

(d) provide, to the NCC prior to the issuance of the Certificate of Completion, a list of all extended warranties and guarantees referred to in paragraph (c) above.

2) The NCC may direct the Contractor to rectify and make good any defect or fault referred to in paragraph 1) of GC3.13 or covered by any other expressed or implied warranty or guarantee and the Contractor shall rectify and make good such defect within the time stipulated in the direction.

3) A direction referred to in paragraph 2) GC3.13 shall be in writing and shall be given to the Contractor in accordance with GC2.3 NOTICES.

GC4.1 PROTECTION OF WORK AND PROPERTY

1) The Contractor shall protect the Work and its site against loss or damage from any cause and shall similarly protect all Material, Plant and real property under the Contractor's care, custody and control whether or not such Material, Plant and real property are supplied by the NCC to the Contractor.

2) The Contractor shall provide all facilities necessary for the purpose of maintaining security, and shall assist any person authorized by the NCC to inspect or to take security measures in respect of the Work and its site.

3) The NCC may direct the Contractor to do such things and to perform such work as the NCC considers reasonable and necessary to ensure compliance with or to remedy a breach of paragraphs 1) or 2) of GC4.1, and the Contractor, shall comply with such direction.

GC4.2 PRECAUTIONS AGAINST DAMAGE, INFRINGEMENT OF RIGHTS, FIRE AND OTHER HAZARDS

1) The Contractor shall do whatever is necessary to ensure that:

   (a) no person, property, right, easement nor privilege is injured, damaged or infringed upon by reasons of the Contractor's activities in performing the Work;

   (b) pedestrian and other traffic on any public or private road or waterway is not unduly impeded, interrupted nor endangered by the performance or existence of the Work, Material or Plant;

   (c) fire hazards in or about the site of the Work are eliminated and any fire is promptly extinguished;

   (d) the health and safety of all persons employed in the performance of the Work is not endangered by the methods nor means of their performance;

   (e) adequate medical services are available to all persons employed on the Work or its site at all times during the performance of the Work;

   (f) adequate sanitation measures are taken in respect of the Work and its site; and

   (g) all stakes, buoys and marks placed on the Work or its site by the NCC are protected and are not removed, defaced, altered nor destroyed.

2) The NCC may direct the Contractor to do such things and to perform such work as the NCC considers reasonable and necessary to ensure compliance with or to remedy a breach of paragraph 1) of GC4.2, and the Contractor shall comply with the direction of the NCC.

GC4.3 MATERIAL, PLANT AND REAL PROPERTY SUPPLIED BY THE NCC

1) Subject to paragraph 2) of GC4.3, the Contractor is liable to the NCC for any loss of or damage to Material, Plant or real property that is supplied or placed in the care, custody and control of the Contractor by the NCC for use in connection with the Contract, whether or not that loss or damage is attributable to causes beyond the Contractor's control.

2) The Contractor is not liable to the NCC for any loss or damage to Material, Plant or real property referred to in paragraph 1) of GC4.3 if that loss or damage results from and is directly attributable to reasonable wear and tear.

3) The Contractor shall not use any Material, Plant or real property supplied by the NCC except for the purpose of performing the Contract.

4) When the Contractor fails to make good any loss or damage for which the Contractor is liable under paragraph 1) within a reasonable time, the NCC may cause the loss or damage to be made good at the Contractor's expense, and the Contractor shall thereupon be liable to the NCC for the cost thereof and shall, on demand, pay to the NCC an amount equal to that cost.

5) The Contractor shall keep records of all Material, Plant and real property supplied by the NCC as the NCC requires and shall satisfy the NCC, when requested, that such Material, Plant and real property are at the place and in the condition in which they ought to be.

GC4.4 CONTAMINATED SITE CONDITIONS

1) For the purposes of GC4.4, a contaminated site condition exists when a solid, liquid, gaseous, thermal or radioactive irritant or contaminant, or other hazardous or toxic substance or material, including moulds and other forms of fungi, is present at the site of the Work to an extent that constitutes a hazard, or potential hazard, to the environment, property, or the health or safety of any person.

2) If the Contractor encounters a contaminated site condition of which the Contractor is not aware or about which the Contractor has not been advised, or if the Contractor has reasonable grounds to believe that such a site condition exists at the site of the Work, the Contractor shall:

   (a) take all reasonable steps, including stopping the Work, to ensure that no person suffers injury, sickness or death, and that neither property nor the environment is injured or destroyed as a result of the contaminated site condition;

   (b) immediately notify the NCC of the circumstances in writing; and

   (c) take all reasonable steps to minimize additional costs that may accrue as a result of any work stoppage.

3) Upon receipt of a notification from the Contractor, the NCC shall promptly determine whether a contaminated site condition exists, and shall notify the Contractor in writing of any action to be taken, or work to be performed, by the Contractor as a result of the NCC's determination.

4) If the Contractor's services are required by the NCC, the Contractor shall follow the direction of the NCC with regard to any excavation, treatment, removal and disposal of any polluting substance or material.

5) The NCC, at the NCC's sole discretion, may enlist the services of experts and specialty contractors to assist in determining the existence of, and the extent and treatment of contaminated site conditions, and the Contractor shall allow them access and co-operate with them in the carrying out of their duties and obligations.

6) Except as may be otherwise provided for in the Contract, the provisions of GC6.4 DETERMINATION OF PRICE shall apply to any additional work made necessary because of a contaminated site condition.

GC5.1 INTERPRETATION

In these Terms of Payment

1) The "payment period" means a period of 30 consecutive days or such other longer period as may be agreed between the Contractor and the NCC.

2) An amount is "due and payable" when it is due and payable by the NCC to the Contractor according to GC5.4 PROGRESS PAYMENT, GC5.5 SUBSTANTIAL PERFORMANCE OF THE WORK or GC5.6 FINAL COMPLETION.

3) An amount is overdue when it remains unpaid on the first day following the day upon which it is due and payable.

4) The "date of payment" means the date of the negotiable instrument of an amount due and payable by the NCC.

5) The "Bank Rate" means the rate of interest established by the Bank of Canada as the minimum rate at which it makes short term advances to members of the Canadian Payments Association.

6) The "Average Bank Rate" means the simple arithmetic mean of the Bank Rate in effect at 4:00 p.m. Ottawa Time each day during the calendar month which immediately precedes the calendar month in which payment is made.

GC5.2 AMOUNT PAYABLE

1) Subject to any other provisions of the Contract, the NCC shall pay the Contractor, at the times and in the manner hereinafter set out, the amount by which the amounts payable by the NCC to the Contractor in accordance with the Contract exceed the amounts payable by the Contractor to the NCC, and the Contractor shall accept that amount as payment in full satisfaction for everything furnished and done by the Contractor in respect of the Work to which the payment relates.

2) When making any payment to the Contractor, the failure of the NCC to deduct an amount payable to the NCC by the Contractor shall not constitute a waiver of the right to do so, or an admission of lack of entitlement to do so in any subsequent payment to the Contractor.

3) No payment other than a payment that is expressly stipulated in the Contract, shall be made by the NCC to the Contractor for any extra expense or any loss or damage incurred or sustained by the Contractor.

GC5.3 INCREASED OR DECREASED COSTS

1) The Contract Amount shall not be increased nor decreased by reason of any increase or decrease in the cost of the Work that is brought about by an increase or decrease in the cost of labour, Plant, Material or any wage adjustment arising pursuant to the Labour Conditions.

2) Notwithstanding paragraph 1) of GC5.3, if any change, including a new imposition or repeal, of any tax, customs or other duty, charge, or any similar imposition that is imposed under sales, customs or excise tax legislation of the Government of Canada or any Provincial or Territorial legislation, affects the cost of the Work to the Contractor, and occurs:

   (a) after the date of submission by the Contractor of its tender; or

   (b) after the date of submission of the last revision, if the Contractor's tender was revised,

   the Contract Amount shall be adjusted in the manner provided in paragraph 3) of GC5.3.

3) If a change referred to in paragraph 2) of GC5.3 occurs, the Contract Amount shall be increased or decreased by an amount established by an examination by the NCC of the relevant records of the Contractor referred to in GC2.8 ACCOUNTS AND AUDITS to be the increase or decrease in the cost incurred by the Contractor that is directly attributable to that change.

4) For the purpose of paragraph 2) of GC5.3, if a tax is changed after the tender closing, but public notice of the change has been given by the Minister of Finance or the corresponding Provincial or Territorial authority before that closing, the change shall be deemed to have occurred before the solicitation closing.

5) Notwithstanding paragraphs 2) to 4) of GC5.3, no adjustment to the Contract Amount in respect of the Work or a part thereof shall be made for a change in any imposition referred to in this section that occurs after the date required by the Contract for completion of the Work or that part of the Work.

GC5.4 PROGRESS PAYMENT

1) On the expiration of a payment period, the Contractor shall deliver to the NCC:

   (a) a written progress claim in a form acceptable to the NCC that fully describes any part of the Work that has been completed, and any Material that was delivered to the Work site but not incorporated into the Work, during that payment period: and

   (b) a completed and signed statutory declaration containing a declaration that, up to the date of the progress claim, the Contractor has complied with all lawful obligations with respect to the Labour Conditions and that, in respect of the Work, all lawful obligations of the Contractor to its Subcontractors and Suppliers, referred to collectively in the declaration as "subcontractors and suppliers", have been fully discharged.

2) Within 10 days of receipt of a progress claim and statutory declaration from the Contractor, the NCC shall inspect, or cause to have inspected, the part of the Work and the Material described in the progress claim, and shall issue a progress report to the Contractor, that indicates the value of the part of the Work and the Material described in the progress claim that, in the opinion of the NCC:

   (a) is in accordance with the Contract; and

   (b) was not included in any other progress report relating to the Contract.

3) Subject to GC5.2 AMOUNT PAYABLE, and paragraph 5) of GC5.4, the NCC shall pay the Contractor an amount that is equal to:

   (a) 95% of the value that is indicated in the NCC's progress report if a labour and material payment bond has been furnished by the Contractor; or

   (b) 90% of the value that is indicated in the NCC's progress report if a labour and material payment bond has not been furnished by the Contractor.

4) Subject to GC5.2, "Amount Payable", and paragraph 5) of GC5.4, the NCC shall pay the Contractor an amount that is equal to 90% of the value that is indicated in the NCC's progress report

5) In the case of the Contractor's first progress claim, it is a condition precedent to the NCC's obligation under paragraph 3) of GC5.4 that the Contractor has provided all necessary documentation required by the Contract for the first progress claim and has provided evidence of compliance with workers' compensation legislation applicable to the place of the Work in accordance with GC1.9 WORKERS' COMPENSATION.

GC5.5 SUBSTANTIAL PERFORMANCE OF THE WORK

1) If, at any time before the issuance of a Certificate of Completion, the NCC determines that the Work has reached Substantial Performance as described in subparagraph 1) (b) of GC1.1.4 SUBSTANTIAL PERFORMANCE, the NCC shall issue a Certificate of Substantial Performance to the Contractor. The Certificate of Substantial Performance shall state or describe:

   (a) the date of Substantial Performance;

   (b) the parts of the Work not completed to the satisfaction of the NCC; and

   (c) all things that must be done by the Contractor before a Certificate of Completion is issued and before the 12-month warranty period referred to in GC3.13 WARRANTY AND RECTIFICATION OF DEFECTS IN WORK commences for the said parts and all the said things.

2) The issuance of a Certificate of Substantial Performance does not relieve the Contractor from the Contractor's obligations under GC3.11 DEFECTIVE WORK.

3) Subject to GC5.2 AMOUNT PAYABLE and paragraph 4) of GC5.5, the NCC shall pay the Contractor the amount referred to in paragraph 1) of GC5.2 AMOUNT PAYABLE, less the aggregate of:

   (a) the sum of all payments that were made pursuant to GC5.4 PROGRESS PAYMENT;

   (b) an amount that is equal to the NCC's estimate of the cost to the NCC of rectifying defects described in the Certificate of Substantial Performance; and

   (c) an amount that is equal to the NCC's estimate of the cost to the NCC of completing the parts of the Work described in the Certificate of Substantial Performance other than defects listed therein.

4) The NCC shall pay the amount referred to in paragraph 3) of GC5.5 not later than:

   (a) 30 days after the date of issue of a Certificate of Substantial Performance, or

   (b) 15 days after the Contractor has delivered to the NCC:

(i) a statutory declaration containing a declaration by the Contractor that up to the date of the Certificate of Substantial Performance, the Contractor has complied with all lawful obligations with respect to the Labour Conditions, discharged all its lawful obligations to its Subcontractors and Suppliers in respect of the work under the Contract, and discharged its lawful obligations referred to in GC1.8 LAWS, PERMITS AND TAXES;

(ii) evidence of compliance with workers' compensation legislation in accordance with GC1.9 WORKERS' COMPENSATION; and

(iii) an update of the progress schedule in accordance with the requirements of GC3.1 PROGRESS SCHEDULE;

whichever is later.

GC5.6 FINAL COMPLETION

1) When the NCC is of the opinion that the Contractor has complied with the Contract and all orders and directions made pursuant thereto, and that the Work has been completed as described in GC1.1.5 COMPLETION, the NCC shall issue a Certificate of Completion to the Contractor and, if the Work or a portion of the Work is subject to a Unit Price Arrangement, the NCC shall issue a Certificate of Measurement that shall, subject to GC8, be binding upon and conclusive between the NCC and the Contractor as to the quantities referred to therein.

2) Subject to GC5.2 AMOUNT PAYABLE and paragraph 3) of GC5.6, the NCC shall pay the Contractor the amount referred to in GC5.2 AMOUNT PAYABLE, less the aggregate of the sum of all payments that were made pursuant to GC5.4 PROGRESS PAYMENT and GC5.5 SUBSTANTIAL PERFORMANCE OF WORK.

3) The NCC shall pay the amount referred to in paragraph 2) of GC5.6 not later than:

(a) 60 days after the date of issue of a Certificate of Completion; or

(b) 15 days after the Contractor has delivered to the NCC:

(i) a statutory declaration which contains a declaration by the Contractor that all of the Contractor's lawful obligations and any lawful claims against the Contractor that arose out of the performance of the Contract have been discharged and satisfied; and

(ii) evidence of compliance with workers' compensation legislation in accordance with GC1.9 WORKERS' COMPENSATION;

whichever is later.

GC5.7 PAYMENT NOT BINDING ON NCC

1) Neither acceptance of a progress claim or progress report, nor any payment made by the NCC under the Contract, nor partial or entire use or occupancy of the Work by the NCC shall constitute an acceptance by the NCC of any portion of the Work or Material that is not in accordance with the requirements of the Contract.

GC5.8 CLAIMS AND OBLIGATIONS

1) The Contractor shall discharge all the Contractor's lawful obligations and shall satisfy all lawful claims against the Contractor arising out of the performance of the Work at least as often as the Contract requires the NCC to pay the Contractor.

2) Whenever requested to do so by the NCC, the Contractor shall make a statutory declaration declaring to the existence and condition of any obligations and claims against the Contractor arising out of the performance of the Work.

3) In order to discharge lawful obligations of and satisfy lawful claims against the Contractor or its Subcontractors arising out of the performance of the Contract, the NCC may pay an amount that is due and payable to the Contractor directly to the claimant. Such payment is, to the extent of the payment, a discharge of the NCC's liability to the Contractor under the Contract and may be deducted from any amount payable to the Contractor under the Contract.

4) For the purposes of paragraph 3) of GC5.8, and subject to paragraph 6) of GC5.8, a claim or obligation shall be considered lawful when it is so determined by:

   (a) a court of legal jurisdiction;

   (b) an arbitrator duly appointed to arbitrate the claim; or

   (c) the written consent of the Contractor authorizing payment of the claim or obligation.

5) If a claim or obligation would have been subject to the provisions of Provincial or Territorial lien legislation or, in the Province of Quebec, the law relating to legal hypothecs had the Contractor been performing the Work for an entity other than the NCC:

   (a) such amount as may be paid by the NCC pursuant to paragraphs 3) and 4) of GC5.8 shall not exceed the amount that the Contractor would have been obliged to pay had the provisions of such legislation or law been applicable to the Work;

   (b) a claimant need not comply with the provisions of such legislation, setting out the steps by way of notice, registration or otherwise as might have been necessary to preserve or perfect any claim for lien or privilege which the claimant might have had; and

   (c) for the purposes of determining the entitlement of a claimant, the notice required by paragraph 8) of GC5.8 shall be deemed to replace the registration or provision of notice after the performance of work as required by any applicable legislation and no claim shall be deemed to have expired, become void or unenforceable by reason of the claimant not commencing any action within the time prescribed by such legislation.

6) The Contractor shall, at the request of any claimant, submit to binding arbitration those questions that need to be answered to establish the entitlement of the claimant to payment. The arbitration shall have as parties to it any Subcontractor or Supplier to whom the claimant supplied Material, performed work or rented equipment should such Subcontractor or Supplier wish to be adjoined, and the NCC shall not be a party to such arbitration. Subject to any agreement between the Contractor and the claimant, the arbitration shall be conducted in accordance with the governing Provincial or Territorial legislation applicable to the site of the Work.

7) Paragraph 3) of GC5.8 shall apply only to claims and obligations:

   (a) the notification of which has set forth the amount claimed to be owing and the person who by contract is primarily liable and has been received by the NCC in writing before final payment is made to the Contractor pursuant to GC5.6 FINAL COMPLETION, and within 120 days of the date on which the claimant:

(i) should have been paid in full under the claimant's contract with the Contractor, its Subcontractor or Supplier if the claim is for money that was lawfully required to be held back from the claimant; or

(ii) performed the last of the services, work or labour, or furnished the last of the Material pursuant to the claimant's contract with the Contractor or its Subcontractor or Supplier where the claim is for money not lawfully required to be held back from the claimant; and

(b) the proceedings to determine the right to payment of which, pursuant to paragraph 5) of GC5.8, shall have commenced within one year from the date that the notification required by subparagraph 7)(a) of GC5.8 was received by the NCC.

8) Upon receipt of a notice of claim, the NCC may withhold, from any amount that is due and payable to the Contractor pursuant to the Contract, the full amount of the claim or any portion thereof.

9) The NCC shall notify the Contractor in writing in a timely manner of receipt of any claim and of the intention of the NCC to withhold funds. At any time thereafter and until payment is made to the claimant, the Contractor may be entitled to post, with the NCC, security in a form acceptable to the NCC in an amount equal to the value of the claim, and upon receipt of such security the NCC shall release to the Contractor any funds that would be otherwise payable to the Contractor, that were withheld pursuant to the provisions of this clause in respect of the claim of any claimant for whom the security stands.

GC5.9 RIGHT OF SETOFF

1) Without limiting any right of setoff or deduction given or implied by law or elsewhere in the Contract, the NCC may set off any amount payable to the NCC by the Contractor under the Contract, or under any current contract, against any amount payable to the Contractor under the Contract.

2) For the purposes of paragraph 1) of GC5.9, "current contract" means a contract between the NCC and the Contractor:

(a) under which the Contractor has an undischarged obligation to perform or supply work, labour or material; or

(b) in respect of which the NCC has, since the date of the Contract, exercised any right to take the work that is the subject of that contract out of the Contractor's hands.

GC5.10 ASSESSMENTS AND DAMAGES FOR LATE COMPLETION

1) For the purposes of this clause:

(a) the Work shall be deemed to be completed on the date of the Certificate of Completion; and

(b) the "period of delay" means the number of days commencing on the day fixed for completion of the Work and ending on the day immediately preceding the day on which the Work is completed but does not include any day within a period of extension granted pursuant to GC6.5 DELAYS AND EXTENSION OF TIME and any other day on which, in the opinion of the NCC, completion of the Work was delayed for reasons beyond the control of the Contractor.

2) If the Contractor does not complete the Work by the day fixed for its completion but completes it thereafter, the Contractor shall pay the NCC an amount equal to the aggregate of:

(a) all salaries, wages and travelling expenses incurred by the NCC in respect of persons overseeing the performance of the Work during the period of delay;

(b) the cost incurred by the NCC as a result of the inability to use the completed Work for the period of delay; and

(c) all other expenses and damages incurred or sustained by the NCC during the period of delay as a result of the Work not being completed by the day fixed for its completion.

3) The NCC may waive the right of the NCC to the whole or any part of the amount payable by the Contractor pursuant to paragraph 2) of GC5.10 if, in the opinion of the NCC, it is in the public interest to do so.

GC5.11 DELAY IN MAKING PAYMENT

1) Notwithstanding GC1.5 TIME OF THE ESSENCE, any delay by the NCC in making any payment when it is due pursuant to GC5 TERMS OF PAYMENT, shall not be a breach of the Contract by the NCC.

2) Subject to paragraph 3) of GC5.11, the NCC shall pay to the Contractor simple interest at the Average Bank Rate plus 3 percent per annum on any amount that is overdue pursuant to paragraph 3) of GC5.1 INTERPRETATION, and the interest shall apply from and include the day such amount became overdue until the day prior to the date of payment.

3) Interest shall be paid, on demand by the Contractor, except that:

(a) in respect of amounts that are less than 15 days overdue, no interest shall be paid in respect of payment made within such 15 days; and

(b) interest shall not be payable or paid on overdue advance payments, if any.

GC5.12 INTEREST ON SETTLED CLAIMS

1) For the purposes of this clause, a claim means a disputed amount subject to negotiation between the NCC and the Contractor under the Contract.

2) A claim is deemed to have been settled when an agreement in writing is signed by the NCC and the Contractor setting out the amount of the claim to be paid by the NCC and the items of work for which the said amount is to be paid.

3) A settled claim is deemed to be outstanding from the day immediately following the date the said claim would have been due and payable under the Contract had it not been disputed.

4) The NCC shall pay to the Contractor simple interest on the amount of a settled claim at the Average Bank Rate plus 3 per cent per annum from the date the settled claim was deemed to be outstanding until the day prior to the date of payment.

GC5.13 RETURN OF SECURITY DEPOSIT

1) After a Certificate of Substantial Performance has been issued, and if the Contractor is not in breach of nor in default under the Contract, the NCC shall return to the Contractor all or any part of a Security Deposit that, in the opinion of the NCC, is not required for the purposes of the Contract.

2) After a Certificate of Completion has been issued, the NCC shall return to the Contractor the remainder of any security deposit unless the Contract stipulates otherwise.

3) If the security deposit was paid to the NCC, the NCC shall pay interest thereon to the Contractor at a rate established pursuant to section 21(2) of the Financial Administration Act.

GC6.1 CHANGES IN THE WORK

1) At any time before issuance of a Certificate of Completion, Canada may issue orders for additions, deletions or other changes to the Work, or changes in the location or position of the whole or any part of the Work, if the addition, deletion, change or other revision is deemed by Canada to be consistent with the general intent of the Contract.

2) An order referred to in paragraph 1) of GC6.1 shall be in writing and given to the Contractor in accordance with GC2.3 NOTICES.

3) Upon receipt of an order, the Contractor shall promptly perform the work in accordance with the order as if the order had appeared in and been part of the original Contract.

4) If anything done or omitted by the Contractor pursuant to an order increases or decreases the cost of the Work to the Contractor, payment for the work shall be made in accordance with GC6.4 DETERMINATION OF PRICE.

GC6.2 CHANGES IN SUBSURFACE CONDITIONS

1) If, during the performance of the Work, the Contractor encounters subsurface conditions that are substantially different from the subsurface conditions described in the tender documents supplied to the Contractor, or a reasonable assumption of fact based thereon, the Contractor shall give notice to Canada immediately upon becoming aware of the situation.

2) If the Contractor is of the opinion that the Contractor may incur or sustain any extra expense or any loss or damage that is directly attributable to the changed subsurface conditions, the Contractor shall within 10 days of the date the changed subsurface conditions were encountered, give Canada written notice of intention to claim for that extra expense, loss or damage.

3) If the Contractor has given a notice referred to in paragraph 2) of GC6.2, the Contractor shall give Canada a written claim for extra expense, loss or damage no later than 30 days after the date that a Certificate of Substantial Performance is issued.

4) A written claim referred to in paragraph 3) of GC6.2 shall contain a sufficient description of the facts and circumstances of the occurrence that is the subject of the claim to enable Canada to determine whether or not the claim is justified, and the Contractor shall supply such further and other information for that purpose as Canada requires.

5) If Canada determines that a claim referred to in paragraph 3) of GC6.2 is justified, Canada shall make an extra payment to the Contractor in an amount that is calculated in accordance with GC6.4 DETERMINATION OF PRICE.

6) If, in the opinion of Canada, the Contractor effects a saving of expenditure that is directly attributable to a substantial difference between the information relating to subsurface conditions at the site of the Work that is contained in the tender documents, or a reasonable assumption of fact based thereon, and the actual subsurface conditions encountered by the Contractor, the Contract Amount shall be reduced by the amount of the saving of expenditure determined in accordance with GC6.4 DETERMINATION OF PRICE.

7) If the Contractor fails to give a notice referred to in paragraph 2) of GC6.2 and a claim referred to in paragraph 3) of GC6.2 within the times stipulated, an extra payment shall not be made to the Contractor in respect of the occurrence.

8) Canada does not warrant the content expressed in any subsurface report available for the perusal of the Contractor that does not form part of the tender and contract documents.

GC6.3 HUMAN REMAINS, ARCHAEOLOGICAL REMAINS AND ITEMS OF HISTORICAL OR SCIENTIFIC INTEREST

1) For the purposes of this clause

   (a) "human remains" means the whole or any part of a deceased human being, irrespective of the time of death;

   (b) "archaeological remains" are items, artefacts or things made, modified or used by human beings in antiquity and may include, but not be limited to, stone, wood or iron structures or monuments, dump deposits, bone artefacts, weapons, tools, coins, and pottery; and

   (c) "items of historical or scientific interest" are naturally occurring or manufactured objects or things of any age that are not archaeological remains but may be of interest to society because of their historical or scientific significance, value, rarity, natural beauty, or other quality.

2) If, during the course of the Work, the Contractor encounters any object, item or thing which is described in paragraph 1) of GC6.3 or which resembles any object, item or thing described in paragraph 1) of GC6.3, the Contractor shall

   (a) take all reasonable steps, including stopping work in the affected area, to protect and preserve the object, item or thing;

   (b) immediately notify Canada of the circumstances in writing; and

   (c) take all reasonable steps to minimize additional costs that may accrue as a result of any work stoppage.

3) Upon receipt of a notification in accordance with subparagraph 2)(b) of GC6.3, Canada shall promptly determine whether the object, item or thing is one described in, or contemplated by paragraph 1) of GC6.3, and shall notify the Contractor in writing of any action to be performed, or work to be carried out, by the Contractor as a result of Canada's determination.

4) Canada may, at any time, enlist the services of experts to assist in the investigation, examination, taking of measurements or other such recordings, placing of permanent protection around or removing of the object, item or thing encountered by the Contractor, and the Contractor shall, to the satisfaction

of Canada, allow them access and co-operate with them in the carrying out of their duties and obligations.

5) Human remains, archaeological remains and items of historical or scientific interest encountered at the site of the Work shall be deemed to be the property of Canada.

6) Except as may be otherwise provided for in the Contract, the provisions of GC6.4 DETERMINATION OF PRICE and GC6.5 DELAYS AND EXTENSION OF TIME shall apply.

GC6.4 DETERMINATION OF PRICE

GC6.4.1 Price Determination Prior to Undertaking Changes

1) If a Lump Sum Arrangement applies to the Contract or a part thereof, the price of any change shall be the aggregate estimated cost of labour, Plant and Material that is required for the change as agreed upon in writing by the Contractor and Canada plus an allowance for supervision, co-ordination, administration, overhead, margin and the risk of undertaking the work within the stipulated amount, which allowance shall be equal to

   (a) 20% of the aggregate costs referred to herein for that portion of the Work done by the Contractor's own forces, if the aggregate cost of the Work does not exceed $50,000;

   (b) 15% of the aggregate costs referred to herein for that portion of the Work that is done by subcontract, if the aggregate cost of the Work does not exceed $50,000; or

   (c) a negotiated percentage of the aggregate costs referred to herein or a negotiated amount

      (i) if the aggregate cost of the Work exceeds $50,000; or

      (ii) if the Contractor and Canada agree in writing.

2) If a Unit Price Arrangement applies to the Contract or a part thereof, the Contractor and Canada may, by agreement in writing, add items, units of measurement, estimated quantities and prices per unit to the Unit Price Table.

3) A price per unit referred to in paragraph 2) of GC6.4.1 shall be determined on the basis of the aggregate estimated cost of labour, Plant and Material that is required for the additional item as agreed upon by the Contractor and Canada, plus an allowance determined in accordance with paragraph 1) of GC6.4.1.

4) To facilitate approval of the price of the change or the additional price per unit as applicable, the Contractor shall submit a cost estimate breakdown identifying, as a minimum, the estimated cost of labour, Plant, Material, each subcontract amount, and the amount of the allowance.

5) If no agreement is reached as contemplated in paragraph 1) of GC6.4.1, the price shall be determined in accordance with GC6.4.2.

6) If no agreement is reached, as contemplated in paragraphs 2) and 3) of GC6.4.1, Canada shall determine the class and the unit of measurement of the item of labour, Plant or Material and the price per unit shall be determined in accordance with GC6.4.2.

GC6.4.2 Price Determination Following Completion of Changes

1) If it is not possible to predetermine, or if there is failure to agree upon the price of a change in the Work, the price of the change shall be equal to the aggregate of

(a) all reasonable and proper amounts actually expended or legally payable by the Contractor in respect of the labour, Plant and Material that fall within one of the classes of expenditure described in paragraph 2) of GC6.4.2, that are directly attributable to the performance of the Contract;

(b) an allowance for profit and all other expenditures or costs, including overhead, general administration costs, financing and interest charges, in an amount that is equal to 10% of the sum of the expenses referred to in subparagraph 1)(a) of GC6.4.2; and

(c) interest on the amounts determined under subparagraphs 1)(a) and 1)(b) of GC6.4.2 calculated in accordance with GC5.12 INTEREST ON SETTLED CLAIMS;

2) The cost of labour, Plant and Material referred to in subparagraph 1)(a) of GC6.4.2 shall be limited to the following categories of expenditure:

(a) payments to Subcontractors and Suppliers;

(b) wages, salaries, bonuses and, if applicable, travel and lodging expenses of employees of the Contractor located at the site of the Work and that portion of wages, salaries, bonuses and, if applicable, travel and lodging expenses of personnel of the Contractor generally employed at the head office or at a general office of the Contractor provided they are actually and properly engaged on the Work under the Contract;

(c) assessments payable under any statutory authority relating to workers' compensation, employment insurance, pension plan or holidays with pay, provincial health or insurance plans, environmental reviews, and GST / HST collection costs;

(d) rent that is paid for Plant, or an amount equivalent to the said rent if the Plant is owned by the Contractor, that is necessary for and used in the performance of the Work, if the rent or the equivalent amount is reasonable and use of that Plant has been approved by Canada;

(e) payments for maintaining and operating Plant necessary for and used in the performance of the Work, and payments for effecting repairs thereto that, in the opinion of Canada, are necessary for the proper performance of the Contract, other than payments for any repairs to the Plant arising out of defects existing before its allocation to the Work;

(f) payments for Material that is necessary for and incorporated in the Work, or that is necessary for and consumed in the performance of the Contract;

(g) payments for preparation, delivery, handling, erection, installation, inspection, protection and removal of the Plant and Material necessary for and used in the performance of the Contract; and

(h) any other payments made by the Contractor with the approval Canada that are necessary for the performance of the Contract in accordance with the Contract Documents.

GC6.4.3 Price Determination - Variations in Tendered Quantities

1) Except as provided in paragraphs 2), 3), 4) and 5) of GC6.4.3, if it appears that the final quantity of labour, Plant and Material under a price per unit item shall exceed or be less than the estimated tendered quantity, the Contractor shall perform the Work or supply the Plant and Material required to complete the item and payment shall be made for the actual Work performed or Plant and Material supplied at the price per unit set out in the Contract.

2) If the final quantity of the price per unit item exceeds the estimated tendered quantity by more than 15%, either party to the Contract may make a written request to the other party to negotiate an

amended price per unit for that portion of the item which exceeds 115% of the estimated tendered quantity, and to facilitate approval of any amended price per unit, the Contractor shall, on request, provide Canada with

(a) detailed records of the actual cost to the Contractor of performing or supplying the tendered quantity for the price per unit item up to the time the negotiation was requested; and

(b) the estimated unit cost of labour, Plant and Material required for the portion of the item that is in excess of 115% of the tendered quantity.

3) If agreement is not reached as contemplated in paragraph 2) of GC6.4.3, the price per unit shall be determined in accordance with GC6.4.2.

4) If it appears that the final quantity of labour, Plant and Material under a price per unit item shall be less than 85% of the estimated tendered quantity, either party to the Contract may make a written request to the other party to negotiate a change to the price per unit for the item if

(a) there is a demonstrable difference between the unit cost to the Contractor of performing or supplying the estimated tendered quantity and the unit cost to the Contractor for performing or supplying the final quantity; and

(b) the difference in unit cost is due solely to the decrease in quantity and not to any other cause.

5) For the purposes of the negotiation referred to in paragraph 4) of GC6.4.3

(a) the onus of establishing, justifying and quantifying a proposed change lies with the party making the request for negotiation; and

(b) in no event shall the total price for an item that has been amended as a result of a reduction in quantity pursuant to paragraph 4) of GC6.4.3 exceed the amount that would have been payable to the Contractor had 85% of the tendered quantity actually been performed or supplied.

GC6.5 DELAYS AND EXTENSION OF TIME

1) Upon application of the Contractor made before the date first fixed for completion of the Work or before any other date previously fixed under this clause, Canada may extend the time for completion of the Work by fixing a new date if Canada determines that causes beyond the control of the Contractor have delayed its completion.

2) The Contractor's application shall be accompanied by the written consent of the bonding company whose bond forms part of the Contract Security.

3) Subject to paragraph 4) of GC6.5, no payment, other than a payment that is expressly stipulated in the Contract, shall be made by Canada to the Contractor for any extra expense, loss or damage incurred or sustained by the Contractor due to delay, whether or not the delay is caused by circumstances beyond the control of the Contractor.

4) If the Contractor incurs or sustains any extra expense or any loss or damage that is directly attributable to any neglect or delay that occurs after the date of the Contract on the part of Canada in providing any information or in doing any act that the Contract either expressly requires Canada to do or that would ordinarily be done by an owner in accordance with the practice of the trade, the Contractor shall give Canada written notice of intention to claim for that extra expense or loss or damage within ten working days of the date the neglect or delay first occurred.

5) When the Contractor has given a notice referred to in paragraph 4) of GC6.5, the Contractor shall give Canada a written claim for the extra expense, loss or damage no later than 30 days after the date that a Certificate of Completion is issued and not afterwards.

6) A written claim referred to in paragraph 5) of GC6.5 shall contain a sufficient description of the facts and circumstances of the occurrence that is the subject of the claim to enable Canada to determine whether or not the claim is justified and the Contractor shall supply such further and other information for that purpose as Canada may require.

7) If Canada determines that a claim referred to in paragraph 5) of GC6.5 is justified, Canada shall make an extra payment to the Contractor in an amount that is calculated in accordance with GC6.4 DETERMINATION OF PRICE.

8) If the Contractor fails to give a notice referred to in paragraph 4) and a claim referred to in paragraph 5) of GC6.5 within the times stipulated, an extra payment shall not be made to the Contractor in respect of the occurrence.

GC6.6 ALLOWABLE COSTS FOR CONTRACT CHANGES UNDER GC6.4.1

GC6.6.1 General

1) The Contractor shall submit a cost estimate breakdown for each contemplated change, in accordance with paragraph 4) of GC6.4.1 PRICE DETERMINATION PRIOR TO UNDERTAKING CHANGES. The breakdown shall itemize all labour, material, plant and equipment costs estimated by the Contractor and subcontractors, and the amount of each allowance.

2) It is the responsibility of the Contractor to ensure that all prices included in the Contractor's breakdown to the NCC, including those of subcontractors, are fair and reasonable in view of the terms expressed herein.

3) The labour hours required for the contemplated change shall be based on the estimated number of hours to perform the work.

4) Time spent by a working foreman may be included in the number of labour hours, at a rate agreed to in writing by the Contractor and the NCC.

5) Time attributable to material handling, productivity factors and approved rest periods is to be included in the number of hours required by the contemplated change and will not be paid as a separate item under hourly rates.

6) Allowances referred to in section 04 below are not to be included in the hourly labour rates.

7) Credit for work deleted will only be for the work directly associated with the change.

8) When a change deletes work which has not yet been performed, the NCC is entitled to an adjustment in the Contract Amount equal to the cost the Contractor would have incurred had the work not been deleted.

9) Allowances referred to in Section 04 below shall not be applied to any credit amounts for deleted work.

10) In those cases where the change involves additions and deletions to the work, the allowances referred to in section 04 below shall apply only when the cost of the additions minus the cost of the deletions would result in an increase in the Contract Amount. The percentage allowance shall only be applied to that portion of the costs of the additions that is in excess of the cost of the deletions.

11) If the contemplated change in the work necessitates a change in the contract completion date, or has an impact on the work, the Contractor shall identify and include the resulting cost in the breakdown.

GC6.6.2 Hourly Labour Rates

1) The hourly labour rates listed in the Contractor's breakdown shall be determined in accordance with the collective agreements that are applicable at the site of the work and shall include:

   (a) the base rate of pay;

   (b) vacation pay:

   (c) benefits which includes:

      (i) welfare contributions;

      (ii) pension contributions;

      (iii) union dues;

      (iv) training and industry funds contributions; and

      (v) other applicable benefits, if any, that can be substantiated by the Contractor.

   (d) statutory and legislated requirements, assessed and payable under statutory authority, which includes:

      (i) Employment Insurance contributions;

      (ii) Canada Pension Plan or Québec Pension Plan contributions;

      (ii) Worker's Compensation Board or Commission de la santé et de la sécurité du travail premiums;

      (iv) Public Liability and Property Damage insurance premiums; and

      (v) health tax premiums.

2) In the case of nonunion labour, all rates claimed shall be in accordance with the terms of the Labour Conditions forming part of this contract and the Contractor must provide satisfactory proof of the rates actually paid.

GC6.6.3 Material, Plant and Equipment Costs

1) The costs of all purchases and rentals must be based on the actual amount paid to the suppliers by the Contractor or subcontractor and said costs are to include all applicable discounts.

GC6.6.4 Allowance to the Contractor or Subcontractor

1) The allowances determined in accordance with paragraph 1) of GC6.4.1 PRICE DETERMINATION PRIOR TO UNDERTAKING CHANGES shall be considered as full compensation for:

   (a) supervision, co-ordination, administration, overhead, margin and the risk of undertaking the work within the stipulated amount; and

(b) miscellaneous additional costs related to:

(i) the purchase or rental of material, plant and equipment;

(ii) the purchase of small tools and supplies;

(iii) safety and protection measures; and

(iv) permits, bonds, insurance, engineering, as built drawings, commissioning and site office.

GC7.1 TAKING THE WORK OUT OF THE CONTRACTOR'S HANDS

1) By giving notice in writing to the Contractor in accordance with GC2.3 NOTICES, the NCC, without any other authorization, may take all or any part of the Work out of the Contractor's hands, and may employ such means as the NCC sees fit to have the Work completed if the Contractor:

   (a) fails to remedy any delay in the commencement or default in the diligent performance of the Work to the satisfaction of the NCC within six days of the NCC giving notice to the Contractor in writing in accordance with GC2.3 NOTICES;

   (b) defaults in the completion of any part of the Work within the time fixed for its completion by the Contract;

   (c) becomes insolvent, or has committed an act of bankruptcy, and has neither made a proposal to its creditors nor filed a notice of intention to make such a proposal, pursuant to the Bankruptcy and Insolvency Act;

   (d) abandons the work;

   (e) makes an assignment of the Contract without the consent required by GC1.16 ASSIGNMENT; or

   (f) otherwise fails to observe or perform any of the provisions of the Contract.

2) If the whole or any part of the Work is taken out of the Contractor's hands, the Contractor's right to any further payment that is due or accruing due under the Contract is, subject only to paragraph 3) of GC7.1, extinguished, and the Contractor is liable to pay the NCC, upon demand, an amount that is equal to the amount of all loss and damage incurred or sustained by the NCC in respect of the Contractor's failure to complete the Work.

3) If the whole or any part of the Work that is taken out of the Contractor's hands is completed by the NCC, the NCC may pay the Contractor the amount, if any, of the holdback or a progress claim as determined by the NCC that had accrued and was due prior to the date on which the Work was taken out of the Contractor's hands and that is not required for the purposes of having the Work performed or of compensating the NCC for any other loss or damage incurred or sustained by reason of the Contractor's default.

4) The taking of the Work or any part thereof out of the Contractor's hands does not relieve the Contractor from any obligation under the Contract or imposed by law except the obligation to complete the performance of that part of the Work that was taken out of the Contractor's hands.

5) If the Work or any part thereof is taken out of the Contractor's hands, all Plant and Material and the interest of the Contractor, or its suppliers or subcontractors at any tier, in all real property, licences, powers and privileges acquired, used or provided by the Contractor, or its suppliers or subcontractors at any tier, under the Contract shall continue to be the property of the NCC without compensation.

6) When the NCC certifies that any Plant, Material, or any interest of the Contractor is no longer required for the purposes of the Work, or that it is not in the interests of the NCC to retain that Plant, Material, or interest, it shall revert to the Contractor.

7) If the Contractor has become insolvent or has committed an act of bankruptcy, and has either made a proposal to its creditors or filed a notice of intention to make such a proposal, pursuant to the Bankruptcy and Insolvency Act, the Contractor shall immediately forward a copy of the proposal or the notice of intention to the NCC.

GC7.2 SUSPENSION OF WORK

1) When, in the NCC's opinion, it is in the public interest to do so, the NCC may require the Contractor to suspend performance of the Work either for a specified or an unspecified period, by giving a notice of suspension in writing to the Contractor in accordance with GC2.3 NOTICES.

2) When a notice of suspension is received by the Contractor, the Contractor shall suspend all operations in respect of the Work except those that the NCC determines are necessary for the care and preservation of the Work, Plant and Material.

3) During a period of suspension, the Contractor shall not remove any part of the Work, Plant or Material from its site without the consent of the NCC.

4) If a period of suspension is 60 days or less, the Contractor shall resume the performance of the Work on the expiration of that period, and the Contractor is entitled to be paid the extra costs necessarily incurred by the Contractor as a result of the suspension, determined in accordance with GC6.4 DETERMINATION OF PRICE.

5) If a period of suspension is more than 60 days, the NCC and the Contractor may agree that the performance of the Work shall be continued by the Contractor, and the Contractor shall resume performance of the Work subject to any terms and conditions agreed upon by the NCC and the Contractor. If the NCC and the Contractor do not agree that performance of the Work shall be continued by the Contractor, or upon the terms and conditions under which the Contractor shall continue the Work, the notice of suspension shall be deemed to be a notice of termination pursuant to GC7.3 TERMINATION OF CONTRACT.

GC7.3 TERMINATION OF CONTRACT

1) The NCC may terminate the Contract at any time by giving a notice of termination in writing to the Contractor in accordance with GC2.3 NOTICES.

2) If the Contractor receives a notice of termination, the Contractor shall forthwith cease all operations in performance of the Contract, subject to any conditions stipulated in the notice.

3) Subject to paragraph 4) of GC7.3, if the Contract is terminated, the NCC shall pay the Contractor an amount determined to be due to the Contractor pursuant to GC6.4 DETERMINATION OF PRICE less the aggregate of all amounts that were paid to the Contractor by the NCC and all amounts that are due to the NCC from the Contractor pursuant to the Contract.

4) In no event shall the total amount payable by the NCC to the Contractor exceed the amount, calculated in accordance with GC5 TERMS OF PAYMENT, that would have been payable to the Contractor had the Contractor completed the Work.

5) Payment to the Contractor, if any, shall be made as soon as practicable under the circumstances.

GC7.4 SECURITY DEPOSIT - FORFEITURE OR RETURN

1) If the Work is taken out of the Contractor's hands, or the Contractor is in breach of, or in default under, the Contract, the NCC may convert a security deposit to the NCC's own use.

2) If the NCC converts a security deposit, the amount realized shall be deemed to be an amount due from the NCC to the Contractor under the Contract.

3) Any balance of the amount realized that remains after payment of all losses, damage and claims of the NCC and others shall be paid by the NCC to the Contractor if, in the opinion of the NCC, it is not required for the purposes of the Contract.

GC8 DISPUTE RESOLUTION

1) The Contractor may, within 10 days after the communication to the Contractor of any decision or direction referred to in GC6.1 CHANGES IN THE WORK and GC2.2 INTERPRETATION OF CONTRACT, protest that decision or direction.

2) A protest referred to in paragraph 1) of GC8 shall be in writing, contain full reasons for the protest, be signed by the Contractor and be given to the NCC.

3) If the Contractor gives a protest pursuant to paragraph 2) of GC8, any compliance by the Contractor with the decision or direction that was protested shall not be construed as an admission by the Contractor of the correctness of that decision or direction, or prevent the Contractor from taking whatever action the Contractor considers appropriate in the circumstances.

4) The giving of a protest by the Contractor pursuant to paragraph 2) of GC8 shall not relieve the Contractor from complying with the decision or direction that is the subject of the protest.

5) Subject to paragraph 6) of GC8, the Contractor shall take any action referred to in paragraph 3) of GC8 within 3 months after the date of the Certificate of Completion referred to in GC5.6 FINAL COMPLETION and not afterwards, except where it is otherwise provided by law.

6) The Contractor shall take any action referred to in paragraph 3) of GC8 resulting from a direction under GC3.13 WARRANTY AND RECTIFICATION OF DEFECTS IN WORK, within 3 months after the expiry of a warranty or guarantee period and not afterwards, except where it is otherwise provided by law.

7) Subject to paragraph 8) of GC8, if the NCC determines that the Contractor's protest is justified, the NCC shall pay the Contractor the cost of the additional labour, Plant and Material necessarily incurred by the Contractor in carrying out the protested decision or direction.

8) Costs referred to in paragraph 7) of GC8 shall be calculated in accordance with GC6.4 DETERMINATION OF PRICE.

GC9.1 OBLIGATION TO PROVIDE CONTRACT SECURITY

1) The Contractor shall, at the Contractor's expense and within 7 days after the date that the Contractor receives notice that the Contractor's bid was accepted by the NCC, obtain and deliver Contract Security to the NCC in one or more of the forms prescribed in GC9.2 TYPES AND AMOUNTS OF CONTRACT SECURITY.

2) If the whole or a part of the Contract Security provided is in the form of a security deposit, it shall be held and disposed of in accordance with GC5.13 RETURN OF SECURITY DEPOSIT and GC7.4 SECURITY DEPOSIT - FORFEITURE OR RETURN.

3) If a part of the Contract Security provided is in the form of a labour and material payment bond, the Contractor shall post a copy of that bond at the site of the Work.

4) It is a condition precedent to the release of the first progress payment that the Contractor has provided the Contract Security as specified herein.

5) In addition to the limitation imposed in paragraph 4) of GC9.1, the Contractor further acknowledges and agrees that it will not be entitled to have access to the site, nor to commence work pursuant to this contract until it has delivered the Contract Security as specified herein.

GC9.2 TYPES AND AMOUNTS OF CONTRACT SECURITY

1) The Contractor shall deliver to the NCC (a), (b) or (c):

   (a) A performance bond and a labour and material payment bond each in an amount that is equal to not less than 50% of the Contract Amount including taxes

   (b) A labour and material payment bond in an amount that is equal to not less than 50% of the Contract Amount including taxes, and a security deposit in an amount that is equal to not less than 10% of the Contract Amount including taxes.

   (c) A security deposit in an amount prescribed by subparagraph 1)(b) of GC9.2, plus an additional amount that is equal to 10% of the Contract Amount including taxes.

2) The amount of a security deposit referred to in subparagraph 1)(b) of GC9.2 shall not exceed $2,000,000 regardless of the Contract Amount including taxes.

3) A performance bond and a labour and material payment bond referred to in paragraph 1) of GC9.2 shall be in a form and be issued by a bonding or surety company that is approved by the NCC.

   (a) The approved form for the performance bond is enclosed at the end of GC9.

   (b) The approved form for the labour and material payment bond is enclosed at the end of GC9

   (c) The list of approved bonding or surety companies is displayed at the following Website:

   http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=12027 .

4) A security deposit referred to in subparagraphs 1)(b) and 1)(c) of GC9.2 shall be in the form of:

(a) a bill of exchange, bank draft or money order made payable to the NCC and certified by an approved financial institution or drawn by an approved financial institution on itself; or

(b) bonds of, or unconditionally guaranteed as to principal and interest by, the Government of Canada.

5) For the purposes of subparagraph 4)(a) of GC9.2:

(a) a bill of exchange is an unconditional order in writing signed by the Contractor and addressed to an approved financial institution, requiring the said institution to pay, on demand, at a fixed or determinable future time a certain sum of money to, or to the order of, the NCC;

(b) if a bill of exchange, bank draft or money order is certified by or drawn on an institution or corporation other than a chartered bank, it must be accompanied by proof that the said institution or corporation meets at least one of the criteria described in subparagraph 5)(c) of GC9.2, either by letter or by a stamped certification on the bill of exchange, bank draft or money; and

(c) An approved financial institution is:

(i) a corporation or institution that is a member of the Canadian Payments Association as defined in the Canadian Payments Act;

(ii) a corporation that accepts deposits that are insured, to the maximum permitted by law, by the Canada Deposit Insurance Corporation or the Régie de l'assurance-dépôts du Québec;

(iii) a corporation that accepts deposits from the public if repayment of the deposit is guaranteed by Her Majesty the Queen in right of a province;

(iv) a corporation, association or federation incorporated or organized as a credit union or co-operative credit society that conforms to the requirements of a credit union which are more particularly described in paragraph 137(6) of the Income Tax Act; or

(v) Canada Post Corporation.

6) Bonds referred to in subparagraph 4)(b) of GC9.2 shall be provided on the basis of their market value current at the date of the Contract, and shall be:

(a) made payable to bearer; or

(b) accompanied by a duly executed instrument of transfer of the bonds to the NCC in the form prescribed by the Domestic Bonds of Canada Regulations; or

(c) registered as to principal, or as to principal and interest, in the name of the NCC pursuant to the Domestic Bonds of Canada Regulations.

GC9.3 IRREVOCABLE STANDBY LETTER OF CREDIT

1) As an alternative to a security deposit, an irrevocable standby letter of credit is acceptable to the NCC, the amount of which shall be determined in the same manner as a security deposit referred to in GC9.2 TYPES AND AMOUNTS OF CONTRACT SECURITY.

2) An irrevocable standby letter of credit shall:

(a) be an arrangement, however named or described, whereby a financial institution (the “Issuer”) acting at the request and on the instructions of a customer (the “Applicant”) or on its own behalf:

(i) is to make a payment to, or to the order of, the NCC as the beneficiary;

(ii) is to accept and pay bills of exchange drawn by the NCC;

(ii) authorizes another financial institution to effect such payment or accept and pay such bills of exchange; or

(iv) authorizes another financial institution to negotiate against written demand(s) for payment provided that the terms and conditions of the letter of credit are complied with;

(b) state the face amount that may be drawn against it;

(c) state its expiry date;

(d) provide for sight payment to the NCC by way of the financial institution's draft against presentation of a written demand for payment signed by the NCC;

(e) provide that more than one written demand for payment may be presented subject to the sum of those demands not exceeding the face value of the letter of credit;

(f) provide that it is subject to the International Chamber of Commerce (ICC) Uniform Customs and Practice for Documentary Credits, 2007 Revision, ICC Publication No. 600;

(g) clearly specify that it is irrevocable or deemed to be irrevocable pursuant to article 6 c) of the International Chamber of Commerce (ICC) Uniform Customs and Practice for Documentary Credits, 2007 Revision, ICC Publication No. 600; and

(h) be issued or confirmed, in either official language in a format left to the discretion of the issuer or confirmer, by an approved financial institution on its letterhead.

PERFORMANCE BOND

Bond Number _____

Amount $ _____

KNOW ALL MEN BY THESE PRESENTS, that _____ as Principal, hereinafter called the Principal, and _____ as Surety, hereinafter called the Surety, are, subject to the conditions hereinafter contained, held and firmly bound unto the National Capital Commission as Obligee, hereinafter called the NCC, In the amount of _____ dollars ($ _____), lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

SIGNED AND SEALED this _____ day of _____ , _____ . WHEREAS, the Principal has entered into a Contract with the NCC, dated the _____ day of _____ , _____ , for: _____ .

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION are such that if the Principal shall well and faithfully observe and perform all the obligations on the part of the Principal to be observed and performed in connection with the Contract, then this obligation shall be void, otherwise it shall remain in full force and effect, subject, however, to the following conditions:

1. Whenever the Principal shall be, and declared by the NCC to be, in default under the Contract, the Surety shall
   (a) if the work is not taken out of the Principal's hands, remedy the default of the Principal,
   (b) if the work is taken out of the Principal's hands and the NCC directs the Surety to undertake the completion of the work, complete the work in accordance with the Contract provided that if a contract is entered into for the completion of the work,
      (i) it shall be between the Surety and the completing contractor, and
      (ii) the selection of such completing contractor shall be subject to the approval of the NCC,
   (c) if the work is taken out of the Principal's hands and the NCC, after reasonable notice to the Surety, does not direct the Surety to undertake the completion of the work, assume the financial responsibility for the cost of completion in excess of the moneys available to the NCC under the Contract,
   (d) be liable for and pay all the excess costs of completion of the Contract, and
   (e) not be entitled to any Contract moneys earned by the Principal, up to the date of his default on the Contract and any holdbacks relating to such earned Contract moneys held by the NCC, and the liability of the Surety under this Bond shall remain unchanged provided, however, and without restricting the generality of the foregoing, upon the completion of the Contract to the satisfaction of the NCC, any Contract moneys earned by the Principal or holdbacks related thereto held by the NCC may be paid to the Surety by the NCC.

2. The Surety shall not be liable for a greater sum than the amount specified in this Bond.

3. No suit or action shall be instituted by the NCC herein against the Surety pursuant to these presents after the expiration of two (2) years from the date on which final payment under the Contract is payable.

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its authorized signing authority, the day and year first above written.

SIGNED, SEALED AND DELIVERED in the presence of:

Principal _____

Witness _____

Surety _____

Note: Affix Corporate seal if applicable.

LABOUR AND MATERIAL PAYMENT BOND

Bond Number _____

Amount $ _____

KNOW ALL MEN BY THESE PRESENTS, that _____ as Principal,

hereinafter called the Principal, and _____ as Surety, hereinafter

called the Surety, are, subject to the conditions hereinafter contained, held and firmly bound unto the National Capital Commission as Obligee,

hereinafter called the NCC, In the amount of _____ dollars

($ _____), lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety

bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

SIGNED AND SEALED this _____ day of _____ , _____ . WHEREAS, the Principal has entered into a Contract

with the NCC, dated the _____ day of _____ , _____ , for: _____

_____ which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION are such that, if payment is promptly made to all Claimants who have performed labour or services or supplied material in connection with the Contract and any and all duly authorized modifications and extensions of the Contract that may hereafter be made, notice of which modifications and extensions to the Surety being hereby waived, then this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

1. For the purpose of this bond, a Claimant is defined as one having a direct contract with the Principal or any Sub-Contractor of the Principal for labour, material or both, used or reasonably required for use in the performance of the Contract, labour and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone services or rental of equipment (but excluding rental of equipment where the rent pursuant to an agreement is to be applied towards the purchase price thereof) directly applicable to the Contract.

2. For the purpose of this Bond, no payment is required to be made in respect of a claim for payment for labour or services performed or material supplied in connection with the Contract that represents a capital expenditure, overhead or general administration costs incurred by the Principal during the currency or in respect of the Contract.

3. The Principal and the Surety hereby jointly and severally agree with the NCC that if any Claimant has not been paid as provided for under the terms of his contract with the Principal or a Sub-Contractor of the Principal before the expiration of a period of ninety (90) days after the date on which the last of such Claimant's labour or service was done or performed or materials were supplied by such Claimant, the NCC may sue on this bond, have the right to prosecute the suit to final judgment for such sum or sums as may be due and have execution thereon; and such right of the NCC is assigned by virtue of Part VIII of the Financial Administration Act to such Claimant.

4. For the purpose of this bond the liability of the Surety and the Principal to make payment to any claimant not having a contract directly with the Principal shall be limited to that amount which the Principal would have been obliged to pay to such claimant had the provisions of the applicable provincial or territorial legislation on lien or privileges been applicable to the work. A claimant need not comply with provisions of such legislation setting out steps by way of notice, registration or otherwise as might have been necessary to preserve or perfect any claim for lien or privilege which the claimant might have had. Any such claimant shall be entitled to pursue a claim and to recover judgment hereunder subject to the terms and notification provisions of the Bond.

5. Any material change in the Contract between the Principal and the NCC shall not prejudice the rights or interest of any Claimant under this Bond who is not instrumental in bringing about or has not caused such change.

6. No suit or action shall be commenced hereunder by any Claimant:

   (a) Unless such Claimant shall have given written notice within the time limits hereinafter set forth to the Principal and the Surety above named, stating with substantial accuracy the amount claimed. Such notice shall be served by mailing the same by registered mail to the Principal and the Surety at any place where an office is regularly maintained for the transaction of business by such persons or served in any manner in which legal process may be served in the Province or other part of Canada in which the subject matter of the Contract is located. Such notice shall be given

      (i) in respect of any claim for the amount or any portion thereof required to be held back from the Claimant by the Principal or by the Sub-Contractor of the Principal under either the terms of the Claimant's Contract with the Principal or the Claimant's Contract with the Sub-Contractor of the Principal within one hundred and twenty (120) days after such Claimant should have been paid in full under this Contract;

…/2

(ii) in respect of any claim other than for the holdback or portion thereof referred to above within one hundred and twenty (120) days after the date upon which such Claimant did or performed the last of the service, work or labour or furnished the last of the materials for which such claim is made under the Claimant's Contract with the Principal or a Sub-Contractor of the Principal

(b) After the expiration of one (1) year following the date on which the Principal ceased work on the said Contract, including work performed under the guarantees provided in the Contract;

(c) Other than in a court of competent jurisdiction in the province or district of Canada in which the subject matter of the Contract or any part thereof is situated and not elsewhere, and the parties hereto hereby agree to submit to the jurisdiction of such court.

7. The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder.

8. The Surety shall not be entitled to claim any moneys relating to the Contract and the liability of the Surety under this Bond shall remain unchanged and, without restricting the generality of the foregoing, the Surety shall pay all valid claims of Claimants under this Bond before any moneys relating to the Contract held by the NCC are paid to the Surety by the NCC.

9. The Surety shall not be liable for a greater sum that the amount specified in this bond.

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its authorized signing authority, the day and year first above written.

SIGNED, SEALED AND DELIVERED in the presence of:

Principal _____

Witness _____

Surety _____

Note: Affix Corporate seal if applicable.

GC10.1 INSURANCE CONTRACTS

1) The Contractor shall, at the Contractor's expense, obtain and maintain insurance contracts in respect of the work and shall provide evidence thereof to the NCC in accordance with the requirements of GC10.

2) The insurance contracts referred to in paragraph 1) of GC10.1 shall:

   (a) be in a form, of the nature, in the amounts, for the periods and containing the terms and conditions specified in GC10; and

   (b) provide for the payment of claims under such insurance contracts in accordance with GC10.2 INSURANCE PROCEEDS.

GC10.2 INSURANCE PROCEEDS

1) In the case of a claim payable under a Builders Risk/Installation (All Risks) insurance contract maintained by the Contractor pursuant to GC10.1 INSURANCE CONTRACTS, the proceeds of the claim shall be paid directly to the NCC, and:

   (a) the monies so paid shall be held by the NCC for the purposes of the contract; or

   (b) if the NCC elects, shall be retained by the NCC, in which event they vest in the NCC absolutely.

2) In the case of a claim payable under a General Liability insurance contract maintained by the Contractor pursuant to GC10.1 INSURANCE CONTRACTS, the proceeds of the claim shall be paid by the insurer directly to the claimant.

3) If an election is made pursuant to paragraph 1) of GC10.2, the NCC may cause an audit to be made of the accounts of the Contractor and of the NCC in respect of the part of the work that was lost, damaged or destroyed for the purpose of establishing the difference, if any, between:

   (a) the aggregate of the amount of the loss or damage suffered or sustained by the NCC, including any costs incurred in respect of the clearing of the work and its site and any other amount that is payable by the Contractor to the NCC under the contract, minus any monies retained pursuant to subparagraph 1)(b) of GC10.2; and

   (b) the aggregate of the amounts payable by the NCC to the Contractor pursuant to the contract up to the date of the loss or damage.

4) A difference that is established pursuant to paragraph 3) of GC10.2 shall be paid forthwith by the party who is determined by the audit to be the debtor to the party who is determined by the audit to be the creditor.

5) When payment of a deficiency has been made pursuant to paragraph 4) of GC10.2, all rights and obligations of the NCC and the Contractor under the contract shall, with respect only to the part of the work that was the subject of the audit referred to in paragraph 3) of GC10.2, be deemed to have been expended and discharged.

6) If an election is not made pursuant to subparagraph 1)(b) of GC10.2, the Contractor shall, subject to paragraph 7) of GC10.2, clear and clean the work and its site and restore and replace the part of the work that was lost, damaged or destroyed at the Contractor's expense as if that part of the work had not yet been performed.

7) When the Contractor clears and cleans the work and its site and restores and replaces the work referred to in paragraph 6) of GC10.2, the NCC shall pay the Contractor out of the monies referred to in paragraph 1) of GC10.2 so far as they will thereunto extend.

8) Subject to paragraph 7) of GC10.2, payment by the NCC pursuant to paragraph 7) of GC10.2 shall be made in accordance with the contract but the amount of each payment shall be 100% of the amount claimed notwithstanding subparagraphs 3)(a) and 3)(b) of GC5.4 PROGRESS PAYMENT.

GC10.3 INSURANCE TERMS

GC10.3.1 General

GC10.3.1.1 Proof of Insurance

1) Before commencement of the Work, and prior to contract award, the Contractor shall deposit with the NCC a Certificate of Insurance (approved Insurance form is enclosed at the end of this section).

2) Upon request by the NCC, the Contractor shall provide originals or certified true copies of all contracts of insurance maintained by the Contractor pursuant to the provisions contained herein.

3) The insurance policies shall be endorsed to provide the NCC with no less than 30 days notice in writing in advance of a cancellation of insurance or any reduction in coverage.

GC10.3.1.2 Payment of Deductible

1) Any moneys paid or payable in respect of a deductible amount shall be borne exclusively by the Contractor.

GC10.3.2 Commercial General Liability

GC10.3.2.1 Scope of Policy

1) The insurance coverage provided shall not be less than that provided by IBC Form 2100, as amended from time to time, and shall have:

(a) an Each Occurrence Limit of not less than $5,000,000;

(b) a Products/Completed Operations Aggregate Limit of not less than $5,000,000; and

(c) a General Aggregate Limit of not be less than $10,000,000 per policy year, if the policy is subject to such a limit.

2) The policy shall either include or be endorsed to include coverage for the following exposures or hazards if the Work is subject thereto:
   (a) Blasting;

   (b) Pile driving and caisson work;

   (c) Underpinning;

   (d) Removal or weakening of support of any building or land whether such support be natural or otherwise if the work is performed by the insured Contractor.

GC10.3.2.2 Insured

1) The policy shall insure the Contractor and shall include the NCC as an additional Insured, with respect to liability arising out of the operations of the Contractor with regard to the work.

GC10.3.2.3 Period of Insurance

1) Unless otherwise directed in writing by the NCC, or, otherwise stipulated elsewhere herein, the policy required herein shall be in force and be maintained from the date of contract award until the day of issue of the Certificate of Completion except that the coverage for Completed Operations Liability shall, in any event, be maintained for a period of at least six (6) years beyond the date of the Certificate of Substantial Performance.

GC10.3.3 Builder's Risk / Installation Floater

GC10.3.3.1 Scope of Policy

1) The insurance coverage provided by a Builder's Risk policy or an Installation Floater policy shall not be less than that provided by IBC Forms 4042 and 4047, as amended from time to time.

2) The policy shall permit use and occupancy of the project, or any part thereof, where such use and occupancy is for the purposes for which the project is intended upon completion.

3) The policy may exclude or be endorsed to exclude coverage for loss or damage caused by any of the following:

   (a) Asbestos;

   (b) Fungi or spores;

   (c) Cyber;

   (d) Terrorism.

GC10.3.3.2 Amount of Insurance

1) The amount of insurance shall not be less than the sum of the contract value plus the declared value (if any) set forth in the contract documents of all material and equipment supplied by the NCC at the site of the project to be incorporated into and form part of the finished Work. If the value of the Work is changed, the policy shall be changed to reflect the revised contract value.

GC10.3.3.3 Insurance Proceeds

1) The policy shall provide that the proceeds thereof are payable to the NCC may direct in accordance with GC10.2, "Insurance Proceeds".

2) The Contractor shall, without delay, do such things and execute such documents as are necessary to effect payment of the proceeds.

CERTIFICAT OF INSURANCE
ATTESTATION D'ASSURANCE

- **To be completed by the insurer / À être rempli par l'assureur**

CONTRACT / MARCHÉ	
Description and location of work / Description et endroit des travaux	Contract no. / N° de contrat

INSURER / ASSUREUR			
Name / Nom			
Address / Adresse	No., Street / N°, rue		
	City / Ville	Province	Postal code / Code postal

BROKER / COURTIER			
Name / Nom			
Address / Adresse	No., Street / N°, rue		
	City / Ville	Province	Postal code / Code postal

INSURED / ASSURÉ			
Name of contractor / Nom de l'entrepreneur			
Address / Adresse	No., Street / N°, rue		
	City / Ville	Province	Postal code / Code postal

ADDITIONAL INSURED / ASSURÉ ADDITIIONNEL

The National Capital Commission / La Commission de la capitale nationale

This insurer certifies that the following policies of insurance are at present in force covering all operations of the Insured, in connection with the contract made between the named insured and the National Capital Commission.

L'assureur atteste que les polices d'assurances suivantes sont présentement en vigueur et couvrent toutes les activités de l'assuré en fonction du marché conclu entre l'Assuré dénommé la Commission de la capitale nationale

POLICY / POLICE

Type Genre	Number Numéro	Inception Date Date d'effet	Expiry Date Date d'expiration	Limit of Liability Limites de garantie
Commercial General Liability Responsabilité civile des entreprises				
Builder's Risk "All Risks" Assurance des chantiers « tous risques »				
Installation Floater "All Risks" Risques d'installation « tous risques »				
Other (list) / Autre (énumérer)				

Each of these policies includes the coverages and provisions as specified in Insurance Terms and each policy has been endorsed to cover the National Capital Commission as an Additional Insured. The Insurer agrees to notify the National Capital Commission in writing thirty (30) days prior to any material change in, or cancellation of any policy or coverage.	Chacune des présentes polices renferment des garanties et dispositions spécifiées aux Conditions d'assurance, et chaque police a été amendée pour couvrir la Commission de la capitale nationale en tant qu'assuré additionnel. L'assureur convient de donner un préavis de trente (30) jours à la Commission de la capitale nationale en cas de changement visant la garantie d'assurance ou les conditions ou de l'annulation de n'importe quelle police ou garantie.

Name of Insurer's Office or Authorized Employee / Nom du cadre ou de la personne autorisée

Telephone number / Numéro de téléphone

Signature

Date

OCCUPATIONAL HEALTH AND SAFETY REQUIREMENTS

1. General

1.1 In this Contract "OHS" means "occupational health and safety".

1.2 With respect to the work to be performed under the Contract, the Contractor covenants and agrees to perform at, and to enforce conformity with, a standard equivalent to or greater than the best practices prevailing in the construction industry at that time.

1.3 The Contractor acknowledges that, to the extent that the following matters may be affected by conduct of the work, it is responsible for the:

1.3.1 health and safety of persons on site;

1.3.2 safety of property on site;

1.3.3 protection of persons adjacent to the site; and,

1.3.4 protection of the environment.

1.4 Without limiting the generality of section 1.3, the Contractor acknowledges that it is required to, and covenants and agrees to, comply and to enforce compliance with all laws or regulations that may be applicable to the conduct of the work including, without limitation:

(a) the provisions of the *Occupational Health and Safety Act* of Ontario and all regulations, policies or directives issued thereunder for work performed in Ontario;

(b) La *Loi sur la santé et la sécurité du travail* of Québec and all regulations, policies or directives issued thereunder for work performed in Québec;

(c) Applicable provisions of the *Canada Labour Code, Part II;*

(d) Employment standards legislation in the province(s) in which any part of the work is performed; and

(e) Any policies or directives issued by the NCC in respect of the subject matter of the contract.

The NCC will present any such policies or directives referred to in paragraph (e) to the Contractor in written form by not later than the pre-construction meeting. The Contractor is obliged to ensure that the relevant policies and directives have been communicated to and acknowledged by all its employees and that they will be complied with. The NCC reserves the right to require the Contractor to produce evidence satisfactory to the NCC acting reasonably that the Contractor has discharged the foregoing obligations.

1.5 By entering into the Contract with the NCC, the Contractor represents and warrants to the NCC that it has informed itself of and is knowledgeable about the obligations imposed by the legislation referred to in 1.4. above.

1.6 For purposes of the relevant provincial OHS legislative regime the Contractor acknowledges and agrees that it is the "Constructor" and covenants to discharge and accept all liability for the performance of the obligations of the "Constructor" in respect of the work provided for in the Contract. Notwithstanding a determination by the relevant authority having jurisdiction that the NCC is the "Constructor" in the event of a dispute between the Contractor and the NCC, the Contractor acknowledges and agrees that the Contractor shall be financially responsible for the implementation of protective measures necessary to fulfill the obligations of the "Constructor".

1.7 As between the NCC and the Contractor, the NCC's decision as to whether the Contractor is discharging its obligations in respect of OHS issues shall be definitive. Without limiting the generality of the foregoing, in the event of any dispute with respect to instructions given by the NCC's designated representative, the Contractor may note such dispute, but must nevertheless forthwith comply with any such instructions.

1.8 The Contractor hereby indemnifies and agrees to hold harmless the NCC, its agents and employees, from and against any and all claims, demands, losses, costs (including legal fees on a full indemnity basis), damages, actions, suits or proceedings (hereinafter collectively referred to as "claims") by third parties that arise out of or are attributable to the Contractor's errors or omissions in the performance of the Contract. Without limiting the generality of the foregoing, this indemnification extends to any claims related to any violation of any statute or regulation relating to OHS matters.

1.9 The NCC shall provide the contractor:

1.9.1 a written description of every known and foreseeable health and safety hazard to which persons employed in the performance of the work may be exposed because of the nature of the site;

1.9.2 a list of any prescribed materials, equipment, devices and clothing necessary because of the nature of the site;

1.9.3 with written information indicating the prescribed circumstances and manner to use all prescribed materials, equipment, devices and clothing listed pursuant to 1.9.2; and,

1.9.4 with a copy of any NCC policies and procedures that may be applicable in relation to the work site.

1.10 Without limiting the generality of 1.9, prior to the commencement of the work by the contractor, the contractor shall, at the contractor's expense:

1.10.1 take all reasonable care to ensure that all persons employed in the performance of the work or granted access to the work or its site are informed of any health and safety hazard described pursuant to 1.9.1;

1.10.2 provide all persons employed in the performance of the work or granted access to the work or its site with prescribed materials, equipment, devices and clothing listed pursuant to 1.9.2;

1.10.3 take all reasonable care to ensure that all persons employed in the performance of the work or granted access to the work or its site are familiar with the prescribed circumstances and manner all prescribed materials, equipment, devices and clothing listed pursuant to 1.9.2; and

1.10.4 take all reasonable care to ensure that all persons employed in the performance of the work or granted access to the work or its site are familiar with policies and procedures referred to in 1.9.4.

2. Qualifications of Personnel

2.1 By entering into this agreement the contractor represents and warrants the it has the requisite experience, training, formal certification and equipment to enable it to discharge the obligations enumerated in sections 1.3. 1.4, 1.5 and 1.6 above.

2.2 The Contractor represents and warrants that supervisory personnel employed by the Contractor in respect of performance of any part of the work have the requisite experience, authority, training, formal certification and equipment to ensure that the obligations enumerated in sections 1.3 1.4, 1.5

and 1.6 above are discharged and agrees to deliver such evidence as may be required by the NCC from time to time to verify same.

3. Certification

3.1 After receiving notification that its bid has been retained and prior to and as a condition of contract award, the Contractor covenants and agrees to deliver a Worker's Compensation Clearance Certificate. Where the duration of the project is greater than sixty days, the Contractor covenants and agrees to deliver up-dated certificates at least every 60 days. In the event of a failure by the Contractor to deliver up-dated certificates, the NCC shall be entitled to immediately terminate the contract without notice and without incurring any liability to the Contractor.

3.2 After receiving notification that its bid has been retained and prior to and as a condition of contract award, the Contractor covenants and agrees to deliver historical information on its injury experience including any pertinent Worker's Compensation Experience Reports. Such historical information shall report data for the previous three years.

4. Plans Policies and Procedures

4.1 After receiving notification that its bid has been retained and prior to and as a condition of contract award, the Contractor covenants and agrees to deliver for the review and approval of the NCC:

(a) A copy of the contractor's OHS policy;

(b) A safety program and plan specific to the work to be performed pursuant to the Contract which plan shall include a risk assessment and analysis, a description of safe working methods, injury and incident reporting protocols, regular periodic reporting on compliance with OHS obligations including any policies, practices and procedures otherwise provided for herein, and a site-specific contingency and emergency response plan; and

(c) Health and safety training records of personnel and alternates responsible for OHS issues on site.

The Contractor covenants and agrees to deliver the necessary material safety data sheets for the review and approval of the NCC prior to entering the site to perform work related to the relevant material.

Approval by the NCC does not amend the provisions of the Contract with respect to the allocation of liability for discharging or failing to discharge OHS obligations. Such liability remains with the Contractor notwithstanding the granting of such approval.

4.2 The Contractor acknowledges and agrees that prior to commencement of work it must attend a pre-construction briefing at which any special or additional practices and procedures to be followed in completing the work are to be established. Without limiting the provisions of section 1.4(e) above, the representatives of the Contractor attending the briefing will be required to deliver a signed acknowledgement that the practices and procedures set out in the pre-construction briefing have been understood and will be complied with.

4.3 At any time and from time to time during the performance of the work, the NCC shall have the right to audit the manner in which the Contractor is discharging its OHS obligations and to determine whether the project specification and/or OHS policies, practices and procedures are being complied with. In the event that the audit discloses any failure by the Contractor to discharge such OHS obligations , the NCC shall be entitled to forthwith rectify at the Contractor's expense any such deficiency and the NCC shall have the further right to immediately terminate the contract without notice and without incurring any liability to the Contractor.

4.4 The Contractor covenants and agrees to conform with all requirements of the Workplace Hazardous Materials Information System.

4.5 The Contractor acknowledges and agrees that where required by any law or regulation applicable to the performance of the work it must establish and maintain a project health and safety committee. The contractor further acknowledges and agrees that it must enable staff to attend all relevant safety meetings, and that the cost of same, including costs attributable to standing down equipment is included in its bid price and is not independently recoverable.

4.6 Where required by the relevant provincial regulatory regime, the Contractor acknowledges and agrees that it is responsible for delivery of notice of the project to the relevant regulatory authority, and for the performance of any other administrative activity required to meet the obligations imposed in the pertinent provincial regulatory regime.

4.7 **(Optional depending on hazard or scope of project)**. The contractor covenants and agrees that it shall employ and assign to the work, a competent OHS professional as Health and Safety Coordinator that must:

(a) have a minimum two (2) years' site-related working experience specific to activities associated with.(identify specific subject matter)

(b) have basic working knowledge of specified occupational safety and health regulations,

(c) be responsible for completing health and safety training session and ensuring that personnel not successfully completing the required training are not permitted to enter the site to perform the Work,

(d) be responsible for implementing, enforcing daily and monitoring the site-specific Health and Safety Plan, and

(e) be on site during execution of the Work.

The parties acknowledge that in lieu of employing an OHS professional, the Contractor may provide same by sub-contracting for such services.

4.8 Upon completion of the work the Contractor covenants and agrees to participate with the NCC in a post performance interview to evaluate the performance of the Contractor in respect of the OHS obligations under the contract. Without limiting the generality of the foregoing, the interview will identify areas of compliance and non-compliance in terms of:

(a) actual performance of the work;

(b) reporting or procedural requirements;

(c) resolution of deficiencies.

The contractor acknowledges and agrees that the results of the post-completion interview may be relied upon by the NCC in evaluating bids subsequently submitted by the Contractor on other NCC projects.

Security Requirements

The NCC complies with Treasury Board's *Policy on Government Security* and consequently, it will require that the Contractor's employees submit to a personal security screening process (Security Clearance Form TBS/SCT 330-60E). The NCC may also perform a credit check when the duties or tasks to be performed require it or in the event of a criminal record containing a charge/offence of a financial nature.

The NCC reserves the right to not award the Contract until such time as the Contractor's core employees have obtained the required level of security screening as identified by the NCC's Corporate Security. In this case the level of security required will be **Reliability/Site Access/Secret**.

The NCC also reserves the right to request that the Contractor submit to a *Designated Organisation Screening* and/or *Facility Security Clearance*– depending on the nature of the information it will be entrusted with. In the event that the Contractor does not meet the requirements to obtain the requested clearance, the Contractor shall take the corrective measures recommended by the Canadian Industrial Security Directorate (of PWGSC) or by the NCC's Corporate Security in order to meet these requirements. If no corrective measures are possible or if the Contractor fails to take the recommended measures, then the Contractor shall be in default of its obligations under this Contract and the NCC shall have the rights and remedies listed in section 2.14, including the right to terminate the Contract without further notice to the Contractor.

Additional information

As part of their personal screening, individuals may be required to provide evidence of their status as a Canadian citizen or permanent resident as well as any other information/documentation requested by the NCC's Corporate Security in order to complete the screening.

The NCC reserves the right to refuse access to personnel who fail to obtain the required level of security screening.

The NCC reserves the right to impose additional security measures with respect to this Contract as the need arises.

Company Security Representative

The Contractor shall appoint one Company Security Representative (CSR) as well as one alternate (for companies who have more than five employees).

Selection criteria for the CSR and the alternate are the following:

- They must be employees of the Contractor;
- They must have a security clearance (the NCC will process the clearances once the individuals have been identified).

Responsibilities of the Company Security Representative

The CSR's responsibilities are the following:

- Act as liaison between the NCC's Corporate Security and the Contractor to ensure coordination;
- In collaboration with the NCC's Corporate Security, identify the Contractor's employees who will require access to NCC information/assets/sites **as well as any recurring subcontractors** (and their employees) who will require similar access and may not be supervised by the Contractor at all times during such access. Ensure that accurate and complete Personnel Security Screening documentation is

submitted to the NCC's Corporate Security for the employees/subcontractors who have been identified;

- Ensure that employees/subcontractors, upon notification of having been granted a reliability status, sign the *Security Screening Certificate and Briefing Form* and return to the NCC's Corporate Security;
- Ensure that only persons who have been security screened to the appropriate level and who are on a "need-to-know basis" will have access to information and assets;
- Maintain a current list of security screened employees/subcontractors;
- Ensure proper safeguard of all information and assets, including any information/assets entrusted to subcontractors;
- If a Security incident or suspected breach of security occurs, prepare and submit to the NCC an occurrence report as soon as possible.

Contract
DC-5250-6
Specifications
Issued for Tender

END OF SECTION

1 References

.1 Section 01 29 01 Pay Item Descriptions

.2 National Capital Commission (NCC) Standard Drawings

.3 Ontario Provincial Standard Specifications (OPSS) - All references to the Measurement for Payment and Basis for Payment clauses contained within the OPSS are deleted in their entirety. Measurement for Payment and Basis for Payment for all items will be as stated in Section 01 29 01 - Pay Item Descriptions.

.4 Ontario Provincial Standard Drawings (OPSD)

.5 City of Ottawa Special Provisions:

.1 D-0014

.6 It is the Contractor's responsibility to obtain all required reference documents.

.7 All references to "Engineer" or "Contract Administrator" shall be interpreted to mean "NCC Representative".

2 Description of Work

.1 Work under this contract covers the following:

Rideau Canal New Railing and Repair of Localized Wall Sections

New railing upon existing and/or rehabilitated Rideau Canal retaining wall between Hogs Back Road to Dows Lake; approximately 2.4km length of work area. Localized rehabilitation of the Rideau Canal retaining wall.

3 Codes

.1 Perform work in accordance with the contract specifications, the Ontario Provincial Standard Specification (OPSS)

and National Capital Commission Standards and any other code of provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.

.2 Meet or exceed requirements of:

.1 contract documents,
.2 specified standards, codes and referenced documents.

4 Documents Required

.1 Maintain at job site, one copy each of following:

.1 Contract drawings
.2 Specifications
.3 Addenda
.4 Approved work schedule
.5 Approved traffic control plan
.6 Reviewed shop drawings
.7 Change orders
.8 Other modifications to Contract
.9 Field test reports
.10 Manufacturers' installation and application instructions

5 Site Conditions

.1 Not applicable

6 Work Schedule

.1 The contractor shall schedule the work to meet the following construction contract cash-flow requirements, ensuring the NCC’s budgetary constraints are met: from commencement of work until March 31, 2018, the contractor’s value of work completed shall be 100% of the construction contract amount.

.2 Provide, within 7 working days after Contract award, schedule showing anticipated progress stages and final completion of work within time period required by Contract documents.

.3 Interim reviews of work progress based

		on work schedule will be conducted as decided by Engineer and schedule updated by Contractor in conjunction with and to approval of Engineer.
	.4	It is anticipated that in order to meet the contract cash-flow requirements, winter work will be required. The Contractor shall include the cost of any necessary winter working provisions in the price of the affected pay items, including but not limited to cold weather protection. The Contractor shall not make any claims due to winter weather.
7 Measurement for Payment	.1	Notify Engineer sufficiently in advance of operations to permit required measurements for payment.
8 Contractor's Use of Site	.1	Use areas as directed by the Contract Administrator for storage.
	.2	Obtain and pay for use of additional storage or work areas.
	.3	Limit construction activity to the limits identified on the contract drawings.
9 Project Meetings	.1	Engineer will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.
10 Setting Out of Work	.1	Prior to the start of construction, the contractor shall accurately survey the existing retaining wall to determine precise post layout. The post layout shall be set so as to provide as consistent spacing as possible while avoiding obstacles such as wall joints and recesses in the top of wall. Layout to be provided to the Engineer for review prior to the start of construction activities.

.2 Set grades and lay out work in detail from control points established by Contractor.

.3 Assume full responsibility for and execute complete lay out of work to locations, lines and elevations indicated.

.4 Provide devices needed to lay out and construct work.

.5 Supply such devices as straight edges and templates required to facilitate Engineer's inspection of work.

.6 Supply stakes and other survey markers required for laying out work.

11 Existing Utilities

.1 Locations of existing utilities are to be considered as approximate. Contractor shall arrange for utility locations prior to commencing work.

.2 Where work involves breaking into or connecting to existing services, carry out work at times directed by authorities having jurisdiction, with minimum of disturbance to pedestrian and vehicular traffic.

.3 Where unknown services are encountered, immediately advise Engineer and confirm findings in writing.

.4 Record locations of maintained, re-routed and abandoned service lines.

.5 Contractor is responsible for any damage to any existing utility.

12 Additional Drawings

.1 Engineer may furnish additional drawings for clarification. These additional drawings have same meaning and intent as if they were included with plans

referred to in Contract documents.

13 Payment

.1 Any minor or miscellaneous items indicated on the drawing as being part of the work of this Contract and for which there are no specific pay items listed on the unit price table must be included by the Contractor in his overhead and indirect charges and incorporated into the unit prices which are listed on the unit price tables.

.2 No separate payment will be made for work performed in respect to any of the specifications for which there is no specific pay item on the unit price table. The cost of these works must be appropriated among, and included in, the unit prices bid for the pay items listed.

.3 Included in the unit prices bid for the respective items shall be, in addition to the actual cost of construction, all other items of work required to complete the Contract to the extent indicated on the drawings and specified herein.

.4 Measurement of quantities will be either by Actual Measurement or by Plan Quantity principles as indicated in the Contract. Those items identified on the Tender by the notation (P) in the unit column shall be paid according to the Plan Quantity. Items where the notation (P) does not occur shall be paid according to Actual Measurement or lump sum.

14 Damages

.1 Existing plant material, landscaping, roadways, curbs, pathways, structures, finishes and public utilities damaged during the execution of the work of this Contract, will be restored to their original condition, replaced, or adequate compensation made to affected

parties by the Contractor.

.2 It is understood that restored or replaced work includes labour, equipment and material costs.

15 Permits and By-Laws

.1 The Contractor shall make himself fully acquainted with all Provincial, Local and other By-laws relating to the work of this Contract, as he will be required to comply with such by-laws without extra compensation of any nature.

.2 Obtain and pay for permits, factory inspector's approval, and other licenses required for this project and also pay any other charges incidental to such permits.

16 Taxes

.1 Include in the tender amount all sales taxes and other taxes levied by the Federal, Provincial and Municipal government or other Authority. There will be no refunds made by the National Capital Commission to the Contractor for taxes paid by him.

17 Weighing of Materials

.1 Unit Price Items, measured by the tonne for payment purposes, must be accompanied by delivery tickets issued by the supplier of the material, indicating type of material and net weight in tonnes. Upon arrival at site and before off loading, the loads must be approved and delivery ticket signed by the Commission's authorized on-site representative. A duplicate copy of the signed ticket will be retained by the Commission's representative, the original of which shall be retained by the Contractor for submission with invoices at time of payment.

.2 Weight shown on the delivery ticket must be the net weight of the materials only as weighed on a scale which is tested

and approved by the weight inspectors of the Government of Canada at least once a year. The Engineer retains the right to require the Contractor to provide on-site scales without additional charge to the Commission if, in his opinion, he considers the method being followed unsatisfactory.

18 Compaction of Materials

.1 The thickness of asphalt, granular material and topsoil shown on the drawings shall be the real thickness after the materials have been compacted as specified.

19 Measurement for Payment

.1 The Engineer shall take measurements prior to commencement in all areas and additional measurements as required in determining pay quantities. The Engineer and Contractor shall take measurements at the same time (when practical) and endeavour to agree on all quantities prior to the submission of invoices.

.2 The Contractor shall notify the Engineer two (2) full work days in advance of any requirements for survey work to be done by the Engineer.

.3 The Contractor shall ensure that the Engineer has obtained the necessary measurements prior to commencement of subsequent operations.

20 Site Visit

.1 Parties intending to submit tenders on the work must visit the site and obtain for themselves all information pertaining to existing conditions affecting the proper execution and completion of the work. The tender submission shall be deemed as proof that the Bidder, and his sub trades, have complied with this requirement. Claims for additional compensation will not be considered for any items of labour,

equipment or materials required to complete the work that could have been reasonably ascertained by a Site Examination.

21 Interpretation of Bilingual Documents

.1 If the two (2) language versions of these specifications differ, the preference shall be given to the version thereof, that according to the true spirit, intent and meaning of the text best insures the attainment of its objective.

22 Construction Schedule Canal Dates

WATER LEVELS

.1 Information on the control of water levels and canal flows may be obtained from Departmental Representative.

.2 The contractor will be required to work in areas where water is present. Repairs are not anticipated to be required below water level.

.3 The normal range of water levels during the navigation period, which runs ***approximately*** from May 15 through October 16, ranges from 64.03 m to 64.08 m.

.4 The normal water level during the drawdown period is 61.92 m. Operations to lower the water Level starts approximately the week after the October long weekend (thanksgiving) and, under normal circumstances, a drawdown level of 61.92 m is attained within a week (7 calendar days). The duration of the initial drawdown period is two weeks. Water levels are increased typically after the first week in November until a water level of 62.83 m is attained. This level is maintained until the end of the NCC skating season. Depending on weather conditions, skating season usually ends by mid-March. The Spring drawdown water level of 61.92 m is ***usually*** achieved

by the end of March until the water level is raised typically two weeks prior to the start of the navigation season (end of April before the first long weekend of the summer). Since weather conditions affect water levels in the canal during the month of April, the contractor is to assume that the duration of the drawdown level in April is 10 calendar days.

.5 Dates indicated in subsections 9.3 and 9.4 are not firm commitments and approximations only and are based on previous years practice. Exact dates for the 2017/2018 season will be provided to the Contractor, as soon as Rideau Canal Operations establish a schedule for the upcoming season.

.1 2017 Confirmed dates for lowering of Northern Sector water levels: Water levels to be decreased in the sections below Hog's Back, including Dow's Lake are to be confirmed by the NCC Representative, after which the water level will be raised approximately 1 meter between Hartwells Lock and Ottawa Locks to prepare for the Rideau Canal skate way.

.2 Ice Thickness: Rideau Canal skate way consists of at minimum 310mm of ice during the month of December and January and progressively thickens up to 560 to 610mm in the month of February. The values provided are only averages.

.6 If the water level rises above or drops below these ranges because of precipitation, operating problems or any other cause, it shall be brought back within described range as soon as reasonably possible.

.7 The Departmental Representative endeavors to control the water level. However, the Departmental Representative

cannot be held responsible for events, or the results of events that are not under its control.

23 Construction Schedule Constraints

.1 See also Section 01 35 00.06 Special Procedures for Traffic Control.

.2 Traffic control shall be in accordance with the OTM and the contract documents.

.3 Construction operations shall be scheduled to ensure a minimal duration of time required that traffic be subjected to driving on a surface other than a smooth asphalt surface.

.4 The Contractor is permitted to close up to a 1.8m width of pathway along the canal wall. This leaves 1.2m of remaining hard surfaced width for use by pedestrians and cyclists. The adjacent grassed area can facilitate passing. Due to the anticipated conflicts between users, the Contractor shall post "dismount and walk your bike" signs at each end of the work zone. The length of the narrowing shall be limited to 30m, as this is the maximum length permitted by the Accessibility for Ontarians with Disabilities Act (AODA) without the addition of passing zones. The Contractor may use the grassed area east of the MUP for material storage as the work progresses along the length of the wall. However, all material shall be kept a minimum of 1.2 m away from the MUP so as to leave room for passing.

.1 Prior to construction in any given area, the Contractor shall prune adjacent trees and shrubs as required to provide a minimum clear width of 1.8m between them and the closed width of pathway.

.2 During winter months, the Contactor shall clear snow adjacent to the work zone such that a minimum clear

width of 1.8m is provided between the snow bank and the closed width of the pathway.

.5 The Contractor shall provide a minimum of two weeks advance notice prior to the closure or detouring of any roadway to the Engineer. The Contractor shall provide details regarding the length of the closure or detour and the affected areas. The Engineer shall immediately inform the NCC Media Relations office, who will prepare a media release to inform the public of the upcoming closure or detour.

.6 Construction is permitted on Saturdays but must adhere to the City of Ottawa noise by-law for construction. The Contractor shall not carry out operations under the Contract on Sundays without permission in writing from the Engineer.

.8 The Contractor is to complete the work during the following times:
From date of contract award to February 16, 2018

.9 The Rideau Canal Eastern Pathway is utilized during the Winter. Winter maintenance operations occur along this section of pathway. The Contractor shall be responsible for winter maintenance activities in the vicinity of any active work zone(s).

24 Construction Haul Routes

.1 The Contractor is permitted to utilize the Colonel By Drive between Bronson Avenue and Hogs Back Road as haul routes for this contract. The use of all other roadways is subject to local restrictions.

25 Relics and Antiquities

.1 Protect relics, archaeological evidence, antiquities, items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, and similar objects found during course of work.

.2 Give immediate notice to Engineer and await Engineer's written instructions before proceeding with work in this area.

.3 Relics, antiquities and items of historical or scientific interest remain her Majesty's property.

General

ITEM No. A1
Mobilization and
General Requirements

.1 This item includes all the general requirements to complete the project including general Instructions, mobilization/demobilization activities, shop drawings, health and safety measures, environmental protection, installation of temporary construction fencing, temporary facilities (including temporary access roads where required), management and disposal of excess materials, cleaning, removals, tree and shrub preservation and site reinstatement at completion of project.

.2 Included in the lump sum price are all the general requirements identified on the drawings and specifications and all those required to complete the work of this contract not covered under specific items. (Including the removal of all objects and materials required to undertake the work of this contract not incorporated in into the proposed works).

.3 Included in lump sum price is the completion of record drawings at the end of the Contract for provision to the NCC representative.

.4 This item will not be measured but will be paid on a lump sum basis upon the following schedule:
.1 25% for mobilization
.2 50% prorated over the term of the works up to substantial completion
.3 10% for substantial completion
.4 15% for completion and supply of approved by NCC representative Contract record drawings.

ITEM No. A2
Traffic Control

.1 The work under this item consists of all traffic control required to construct the roadways and associated works. Control and protection of vehicular, pedestrian and cyclist traffic is included under this item. The Contractor shall supply, locate, relocate, erect, operate, maintain and remove all temporary traffic control

devices and supply flag persons as required by the construction operations. The supply, placement and maintenance of advanced warning signs, sign boards and lighted changeable message signs are included as part of the work. The number, configuration and location of all traffic control devices shall be in accordance with the Ontario Traffic Manual, Book 7, Latest Edition, and the Traffic Management Plan and shall be in both official languages. The preparation of a detailed Traffic Control Plan for approval by the Engineer is included in the work.

.2 The work under this item also includes the reinstatement of any grass disturbed due to the traffic control setup with a minimum 100mm topsoil and sod.

.3 There will be no measurement for payment. Payment at the contract lump sum price shall be full compensation for all labour, materials and equipment to do the work.

Item A-3
Allowance for_
Unforeseen Work

1. This item is an allowance for unforeseen work that may be deemed necessary throughout the project activities but is not included in the current work of the contract. The requirements for use of the allowance may be due to unforeseen site conditions and/or changes in the scope of work. There will be no measurement for payment. Payment from the allowance shall be authorized by the Engineer, through a change order, and shall be full compensation for all labour, materials and equipment to do the additional work.

Item No. A4
Temporary Access
Work

.1 This item includes the supply, construction and placement of equipment and material required to gain access and execute/complete the work associated with the new railings and retaining wall rehabilitation as deemed necessary by the Contractor. Refer to all NCC General Conditions including GC3 for Contractor’s sole responsibility for the design, erection, operation, maintenance and

removal of temporary structures and other temporary facilities and for the construction methods.

.2 The work under this item also includes the reinstatement of any grass disturbed for temporary access reasons with a minimum 100mm topsoil and sod.

.3 This item will not be measured for payment.

.4 Payment at the lump sum price bid shall be full compensation for supply, delivery, and placing of materials, equipment and labour for all associated works.

Item No. A5
Removal and Restoration of Temporary Access Work

.1 This item includes the removal of all materials and equipment used for temporary access work as per item no. A4 as well as the restoration of all areas impacted by the temporary access work materials, equipment, or associated activities to original conditions or better.

.2 This item will not be measured for payment.

.3 Payment at the lump sum price bid shall be full compensation for supply, delivery, and placing of materials, equipment and labour for all associated works.

Item No. A6
Advance Notice PVMS Signs

.1 This work includes the supply, installation, maintenance and removal of all advance notice and PVMS signs as identified on the traffic control plans. Signs shall be supplied and installed in accordance with OTM Book 6.

.2 This item will be measured in actual number of each sign installed.

.3 Payment at the unit price bid shall be full compensation for supply, delivery, installation, and all associated works.

ITEM No. L1
Pruning

.1 The work under this section shall include the pruning of existing plant material as

specified elsewhere.

.2 This item will not be measured for payment.

.3 Payment at the lump sum price bid shall be full compensation for supply, delivery, and placing of materials, equipment and labour for all associated works.

ITEM No. L2 and L3 Tree Protection Fencing and Trunk Protection

.1 The work under this section shall include the supply and installation of temporary tree protection fencing, trunk protection planking and the removal off site after completion of this contract.

.2 This item will not be measured for payment.

.3 Payment at the lump sum price bid shall be full compensation for supply, delivery, and placing of materials, equipment and labour for all associated works.

ITEM No. R-1 Earth Excavation

.1 The work under this section shall include the removal of earth at repair areas which extend below the asphalt paving and earth elevations.

.2 Measurement shall be in cubic meters of earth removed.

.3 Payment at the contract price shall be full compensation for all labour, equipment, and material used to complete the work.

ITEM No. R-2 Removal of Asphalt pathway

.1 The work under this section shall include the removal of asphalt, including saw-cutting.

.2 Measurement shall be in square meters of asphalt removed.

.3 Payment at the contract price shall be full compensation for all labour, equipment, and material used to complete the work.

ITEM No. R-3

.1 The work under this section shall include

		the supply and placement of asphalt.
HL3F mix with PGAC 58-34 for Pathway Reinstatement (50mm thickness)	.2	Measurement for payment for asphalt paving will be in square meters of asphalt placed.
	.3	Payment at the contract price shall be full compensation for all labour, equipment, and material used to complete the work including the grading required to match or blend to the existing/proposed grades and supplying, hauling, placing and compacting the hot mix.
ITEM No. R-4 Supply and place Granular 'A' base - Pathway	.1	The work under this section shall include the supply and placement of granular 'A' base to reinstate the canal pathway.
	.2	Measurement shall be in tonnes of granular 'A' placed.
	.3	Payment at the contract price shall be full compensation for all labour, equipment, and material used to complete the work.
ITEM No. R-5 Line Posts	.1	The work under this section shall include the supply and installation of line posts, including any required winter working provisions.
	.2	Measurement shall be in actual number of each line post installed.
	.3	Payment at the contract price shall be full compensation for all labour, equipment, and material used to complete the work.
ITEM No. R-6 Expansion Posts	.1	The work under this section shall include the supply and installation of expansion posts, including any required winter working provisions.
	.2	Measurement shall be in actual number of each expansion post installed.
	.3	Payment at the contract price shall be

full compensation for all labour, equipment, and material used to complete the work.

ITEM No. R-7
1.5" Nominal ID Railing

.1 The work under this section shall include the fabrication, supply and installation of railing, including all coating treatments specified in the contract documents.

.2 Measurement shall be in linear meters of railing installed.

.3 Payment at the contract price shall be full compensation for all labour, equipment, and material used to complete the work.

ITEM No. R-8
Aluminum Posts

.1 The work under this section shall include the fabrication, supply and installation of aluminum posts, including all coating treatments specified in the contract documents and any required winter working provisions.

.2 Measurement shall be in actual number of posts installed.

.3 Payment at the contract price shall be full compensation for all labour, equipment, and material used to complete the work.

ITEM No. R-9
Pavement markings

.1 The work under this section shall include the supply and placement of pavement markings.

.2 Measurement shall be in Lump Sum of pavement markings placed.

.3 Payment at the contract price shall be full compensation for all labour, equipment, and material used to complete the work.

ITEM No. S-1
Access to work area, work platform and scaffolding

.1 The work under this section shall include all access to work area, work platform and scaffolding required to complete the work specified in the contract documents.

.2 Measurement for payment for concrete removal will be as specified in OPSS.MUNI 928

.3 Basis of payment for access to work area, work platform and scaffolding will be as specified in OPSS.MUNI 928 and as amended herein.

.1 Subsection 928.10.02 of OPSS.MUNI 928 is amended by the addition of the following Clause:

928.10.02 Access to Work Area, Work Platform, and Scaffolding - Item

No additional payment will be made for interim removal and re-installation of platforms, scaffolding and containment systems.

ITEM No. S-2 Concrete removal - partial depth - Type A

.1 The work under this section shall include all concrete removals.

.2 Measurement for payment for concrete removal will be as specified in OPSS.MUNI 928.

.3 Basis of payment for concrete removal will be as specified in OPSS.MUNI 928.

ITEM No. S-3 and S-4 Abrasive blast cleaning of concrete surface and Abrasive blast cleaning of reinforcing steel

.1 The work under this section shall include abrasive blast cleaning of concrete surfaces and reinforcing steel.

.2 Measurement for payment for abrasive blast cleaning will be as specified in OPSS 929.

.3 Basis of payment for abrasive blast cleaning will be as specified in OPSS 929.

ITEM No. S-5 Dowels into concrete - 15M

.1 The work under this section shall include the supply, surface preparation, installation and testing of dowels into concrete, including any required winter

working provisions.

.2 Measurement for payment for dowels into concrete will be as specified in OPSS.MUNI 904.

.3 Basis of payment for dowels into concrete will be as specified in OPSS.MUNI 904.

ITEM No. S-6
Galvanized reinforcing steel

.1 The work under this section shall include the supply and installation of galvanized reinforcing steel.

.2 Measurement for payment for concrete reinforcement will be as specified in OPSS.MUNI 905.

.3 Basis of payment for concrete reinforcement will be as specified in OPSS.MUNI 905. When the Contractor is required to supply placing drawings and/or reinforcing steel bar schedules, payment at the contract price shall include providing these drawings.

ITEM No. S-7
Galvanized welded wire fabric

.1 The work under this section shall include the supply and installation of galvanized welded wire fabric.

.2 Measurement for payment for welded wire fabric will be as specified in OPSS.MUNI 905.

.3 Basis of payment for welded wire fabric will be as specified in OPSS.MUNI 905. When the Contractor is required to supply placing drawings and/or reinforcing steel bar schedules, payment at the contract price shall include providing these drawings.

ITEM No. S-8
Concrete patches, formed surface

.1 The work under this section shall include the surface preparation, and the placing, finishing, texturing, and curing of concrete and latex modified concrete used in structure rehabilitation, including any required winter working provisions.

.2 Measurement for payment for concrete patches will be as specified in OPSS.MUNI 930.

.3 Basis of payment for concrete patches will be as specified in OPSS.MUNI 930.

ITEM No. S-9
Crack injection

.1 The work under this section shall include the pressure injection, routing, and sealing of cracks in concrete, including any required winter working provisions.

.2 Measurement for payment for crack injection will be as specified in OPSS 932.

.3 Basis of payment for crack injection will be as specified in OPSS 932.

PART 1 -GENERAL

1.1 Related Requirements Specified Elsewhere

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Engineer are specified under various sections.

2 Appointment and Payment

.1 Engineer will appoint and pay for services of testing laboratory. Where tests or inspections by designated testing laboratory reveal work not in accordance with contract requirements, the Contractor shall pay costs for additional tests or inspections as Engineer may require to verify acceptability of corrected work.

3 Contractor's Responsibilities

.1 Furnish labour and facilities to:

- .1 Provide access to work to be inspected and tested.
- .2 Facilitate inspections and tests.
- .3 Make good work disturbed by inspection and test.
- .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

.2 Notify Engineer sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

.3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.4 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Engineer.

PART 1 - GENERAL

1.1 Section Includes

.1 Shop drawings and product data.

.2 Samples.

.3 Certificates and transcripts.

1.2 Administrative

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

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

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Engineer. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and shall be considered rejected.

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

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

1.2 Administrative (cont'd)

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

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

.10 Keep one reviewed copy of each submission on site.

.11 Make any changes in submissions which Engineer may require consistent with Contract Documents and resubmit as directed by Engineer.

.12 Notify Engineer, in writing, when resubmitting, of any revision other than those requested by the Engineer.

1.3 Shop Drawings and Product Data

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

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

.3 Allow five days for Engineer's review of

each submission.

1.3 Shop Drawings and Product Data (cont'd)

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

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

.6 Accompany submissions with transmittal letter, in duplicate, containing:

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

.7 Submissions shall include:

.1 Date and revision dates.
.2 Project title and number.
.3 Name and address of:
.1 Subcontractor.
.2 Supplier.
.3 Manufacturer.
.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
.5 Details of appropriate portions of Work as applicable:
.1 Fabrication.
.2 Layout, showing dimensions, including identified field dimensions, and clearances.

1.3 Shop Drawings and Product Data (cont'd)

.3 Setting or erection details.
.4 Capacities.
.5 Performance characteristics.
.6 Standards.
.7 Operating weight.
.8 Wiring diagrams.
.9 Single line and schematic diagrams.
.10 Relationship to adjacent work.

.8 After Engineer's review, distribute copies.

.9 Submit in digital format prints of shop drawings for each requirement requested in specification Sections and as consultant may reasonably request.

.10 Submit in digital format copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Engineer where shop drawings will not be prepared due to standardized manufacture of product.

.11 Delete information not applicable to project.

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

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

.14 Cross-reference shop drawings and product data information to applicable portions of Contract Documents.

1.4 Samples	.1	Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
1.4 Samples (cont'd)	.2	Deliver samples prepaid to Engineer's business address.
	.3	Notify Engineer in writing, at time of submission of deviations in samples from requirements of Contract Documents.
	.4	Where colour, pattern or texture is criterion, submit full range of samples.
	.5	Adjustments made on samples by Engineer are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Engineer prior to proceeding with Work.
	.6	Make changes in samples which Engineer may require, consistent with Contract Documents.
	.7	Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.
1.5 Progress Photographs	.1	Submit progress photographs as may be required.
1.6 Certificates and Transcripts	.1	Immediately after award of Contract, submit Workers' Compensation Board status.

PART 1 - GENERAL

1.1 Related Work

.1 Section 01 29 01 Pay Item Descriptions

.2 Section 02 41 13.14 Removal of Existing Asphalt Pavement

.3 Section 31 23 33.01 Excavation Trenching & Backfill

.4 Section 32 11 23 Granular Base

.5 Section 32 12 16 Asphalt Paving

.6 Section 32 17 23 Painted Traffic Lines and Markings

.7 Section 03 30 00 Cast-in-Place Concrete

.8 Section 05 52 00 Handrail System

1.2 References

.1 Ontario Traffic Manual, Latest Edition (OTM)

1.3 Protection of Public Traffic

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

.2 When working on traveled way:

.1 Place equipment in position to present minimum of interference and hazard to traveling public.

.2 Keep equipment units as close together as working conditions permit and preferably on same side of traveled way.

1.3 Protection of Public Traffic

.3 Do not leave equipment on traveled

(cont'd)

way overnight.

.3 Do not close any lanes of road without approval of Engineer. Before re-routing traffic erect suitable signs and devices in accordance with instructions contained in the OTM.

.4 Keep traveled way graded, free of pot holes and of sufficient width for required number of lanes of traffic.

.1 Provide minimum 1.8m wide lane for pathways. A minimum of 1.2m of that width must be hard surfaced. Lane closure lengths shall be maximum 30m in length plus 6m tapers at each end.

.5 Provide and maintain road access and egress to properties fronting along work under Contract and in other areas as indicated, unless other means of road access exist that meet approval of Engineer.

1.4 Informational and Warning Devices

.1 Provide and maintain signs, flashing warning lights, temporary signals and other devices required to indicate construction activities or other temporary and unusual conditions resulting from project work which requires road user response.

.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in the OTM. All signs to be bilingual.

.3 Place signs and other devices in locations recommended in the OTM.

.4 Meet with Engineer prior to commencement of work to review list of signs and other devices required for project. If situation on site changes, revise list

to approval of Engineer.

.5 Continually maintain traffic control devices in use by:

.1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.

.2 Removing or covering signs which do not apply to conditions existing from day to day.

1.5 Control of Public Traffic

.1 Provide flag persons, trained in accordance with, and properly equipped as specified in the OTM in the following situations:

.1 When public traffic is required to pass working vehicles or equipment which block all or part of traveled roadway.

.2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use. Flag persons shall be provided (one at each access point to the site) during peak periods when one-way traffic is operational.

.3 When workmen or equipment are employed on traveled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.

.4 Where temporary protection is required while other traffic control devices are being erected or taken down.

.5 For emergency protection when other traffic control devices are not

Public Traffic (cont'd)

readily available.

.6 In situations where complete protection for workmen, working equipment and public traffic is not provided by other traffic control devices.

1.6 Operational Requirements

.1 The Contractor shall be permitted to reduce the width of the Rideau Canal Eastern pathway as specified elsewhere in the Contract documents and in accordance the OTM.

.2 All short duration works shall be re-opened to full width at the end of each day's work.

.3 Drainage along the pathway must be maintained at all times.

.4 The final surface course paving shall be placed in accordance with OPSS 331 section 331.07.04 and shall be completed within two (2) days of granular base grading.

.5 No hot mix paving shall occur between sunset and sunrise for the entire duration of this contract.

1.7 Ground Mounted Signs

.1 Contractor shall provide bilingual information signs as follows:

.1 Along the Rideau Canal Eastern Pathway "Lane Reductions on Pathway, [dates and times to be confirmed]"

.2 The locations of all signage shall be shown on the Contractor's Traffic Control Plan. The text to appear on the signs shall be approved by the Engineer prior to fabrication of the signs.

.3 Signs to remain in place for the duration of the construction period.

1.8 Portable Variable Message Signs (PVMS)

.1 Seven days (7) advanced notice of construction using lighted changeable bilingual message signs is required.

.1 Two signs are required and shall be located along the Eastern Canal Pathway at locations indicated by the NCC representative. Contractor shall inform the NCC representative with a minimum five days (5) notice for the date of intended PVMS installation

.2 These signs are to be removed at the completion of construction.
   a. The Contractor may remove these signs for periods during which no construction is proceeding on site, provided that they are reinstalled so as to provide a minimum seven (7) days advanced notice of the recommencement of work. No additional payment will be made if the Contractor elects to temporarily remove the signs.

.3 The wording/messages for the signs shall be supplied by the NCC.

1.9 Traffic Control Plan

.1 The Contractor shall provide a detailed Traffic Control Plan within 7 working days after Contract award showing all required traffic control and protection systems to be installed, operated, maintained and removed by the Contractor. The Contractor shall be responsible to ensure that the proposed traffic control and protection is to the satisfaction of the NCC representative and shall comply with Ministry of Labour requirements, Occupational Health and Safety Act regulations and the OTM.

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 33 00 - Submittal Procedures

1.2 References

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

.2 Province of Ontario Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 2004.

.3 CSA S269.1 1975 Falsework for Construction Purposes.

.4 CAN/CSA S269.2 M87 Access Scaffolding for Construction Purposes.

.5 FCC No. 301 1982 Standard for Construction Operations.

1.3 Submittals

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

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
.1 Results of site specific safety hazard assessment.
.2 Results of safety and health risk or hazard analysis for site tasks and operation.

.3 Submit 6 copies of Contractor's authorized representative's work site health and safety inspection reports to Engineer and authority having jurisdiction.

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

.5 Submit copies of incident and accident

reports.

.6 Submit Material Safety Data Sheets (MSDS) to Engineer.

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

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

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

1.4 Filing of Notice

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

1.5 Safety Assessment

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

1.6 Meetings

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

1.7 General requirements

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

	.2	Engineer may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.
1.8 Construction Safety Measures	.1	Observe construction safety measures of National Building Code 1995 Part 8, Provincial Government, Workers'/Workmen's Compensation Board and municipal authority provided that in any case of conflict or discrepancy more stringent requirements shall apply.
	.2	Comply with requirements of FCC No. 301.
1.9 Responsibility	.1	Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
	.2	Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
1.10 Compliance Requirements	.1	Comply with Ontario Health and Safety Act and Regulations for Construction Projects.
	.2	Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.
1.11 Unforeseen Hazards	.1	Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, and follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction. Advise Engineer verbally and in writing.

1.12 Overloading	.1	Ensure no part of Work is subjected to loading that will endanger its safety or will cause permanent deformation.
1.13 Falsework	.1	Design and construct falsework in accordance with CSA S269.1.
1.14 Scaffolding	.1	Design and construct scaffolding in accordance with CSA S269.2
1.15 WHMIS	.1	Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada and Health and Welfare Canada.
	.2	Deliver copies of WHMIS data sheets to Engineer on delivery of materials.
1.16 Posting of Documents	.1	Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Engineer.
1.17 Correction of Non-Compliance	.1	Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Engineer.
	.2	Provide Engineer with written report of action taken to correct non-compliance of health and safety issues identified.
	.3	Engineer may stop Work if non-compliance of health and safety regulations is not corrected.
1.18 Work Stoppage	.1	Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

1.19 Health and Safety Co-ordinator	.1	Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must: .1 Have minimum 2 years' site-related working experience specific to activities associated with the scope of work. .2 Have working knowledge of occupational safety and health regulations. .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work. .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan. .5 Be on site during execution of Work and report directly to and be under direction of site supervisor.
1.20 Blasting	.1	Blasting or other use of explosives is not permitted.

PART 1 - GENERAL

1.1 Fires

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

1.2 Disposal of Wastes

.1 Do not bury rubbish and waste materials on site unless approved by Engineer.

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

.3 Do not allow any rubbish or waste material to fall or be disposed of down the shoreline slope.

1.3 Drainage

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

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

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

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

1.4 Site Clearing and Plant Protection

.1 Protect trees and plants on site and adjacent properties.

.2 Wrap in burlap, trees and shrubs within working area, storage areas and trucking lanes, and encase with protective wood

framework from grade level to height of 2 m.

.3 Protect roots of designated trees to their drip line during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas indicated or designated by Engineer.

1.5 Work Adjacent to Waterways

.1 Do not operate construction equipment in waterways.

.2 Do not use waterway beds for borrow material.

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

.4 Refer to the Ontario Operational Statement – Bridge Maintenance document prepared by the Department of Fisheries and Oceans (Canada) for additional mitigation measures to protect fish and fish habitat.

1.6 Pollution Control

.1 Maintain temporary erosion and pollution control features installed under this contract.

.2 Control emissions from equipment and plant to local authority's emission requirements.

.3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

.4 Refuel equipment on flat impervious surfaces at least 50 metres away from

catch basins or drainage channels.

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 33 00 - Submittal Procedures.

1.2 References

.1 Canadian Construction Documents Committee (CCDC)
.1 CCDC 2-94, Stipulated Price Contract.

1.3 Inspection

.1 Refer to CCDC 2, GC 2.3.

.2 Allow Engineer access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.3 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Engineer instructions, or law of Place of Work.

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

.5 Engineer may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Engineer shall pay cost of examination and replacement.

1.4 Independent Inspection Agencies

.1 Independent Inspection/Testing Agencies will be engaged by Engineer for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Engineer.

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

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Engineer at no cost to Engineer. Pay costs for retesting and reinspection.

1.5 Access to Work

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

.2 Co-operate to provide reasonable facilities for such access.

1.6 Procedures

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

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

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

1.7 Rejected Work

.1 Refer to CCDC, GC 2.4.

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

Contract Documents.

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

.4 If in opinion of Engineer it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Engineer.

1.8 Reports

.1 Submit in digital format and 4 copies of inspection and test reports to Engineer.

.2 Provide copies to Subcontractor of work being inspected or tested.

1.9 Tests and Mix Designs

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

.2 The cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Engineer and may be authorized as recoverable.

1.10 Mock-ups

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

.2 Construct in all locations acceptable to Engineer.

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

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

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

.6 Mock-ups may remain as part of Work.

1.11 Mill Tests .1 Submit mill test certificates as requested.

1.12 Equipment and Systems .1 Submit adjustment and balancing reports for mechanical and electrical systems.

PART 1 - GENERAL

1.1 Section Includes

.1 Office and sheds.

.2 Parking.

.3 Project identification.

1.2 Related Sections

.1 Section 01 56 00 - Temporary Barriers and Enclosures.

1.3 References

.1 Canadian Construction Documents Committee (CCDC)
.1 CCDC 2-94, Stipulated Price Contract.

.2 Canadian General Standards Board (CGSB)
.1 CGSB 1-GP-189M-84, Primer, Alkyd, Wood, Exterior.
.2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.3 Canadian Standards Association (CSA International)
.1 CAN3-A23.1-/A23.2-94, Concrete Materials and Methods for Concrete Construction/Method of Test for Concrete.
.2 CSA-0121-M1978, Douglas Fir Plywood.
.3 CAN/CSA-Z321-96, Signs and Symbols for the Occupational Environment.

1.4 Installation and Removal

.1 Provide construction facilities in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.5 Site Storage/Loading

.1 Refer to CCDC 2, GC 3.12

.2 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.3 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.6 Construction Parking	.1	Parking will not be permitted on site.
	.2	Provide and maintain adequate access to project site.
	.3	Build and maintain temporary roads where indicated or directed by Engineer and provide snow removal during period of Work.
	.4	If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.
1.7 Equipment, Tool and Materials Storage	.1	Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
	.2	Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.
1.8 Sanitary Facilities	.1	Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
	.2	Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.
1.15 Construction Signage	.1	No signs or advertisements, other than warning signs, are permitted on site.
	.2	Signs and notices for safety and instruction shall be in both official languages Graphic symbols shall conform to CAN3-Z321.
	.3	Post informational sign boards provided by the owner at the specified locations.
	.4	Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or earlier if directed by Engineer.

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 52 00 - Construction Facilities.

1.2 Installation and Removal

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

.2 Remove from site all such work after use.

1.3 Hoarding

.1 Erect temporary site enclosure using new 1.2 m high snow fence wired to rolled steel "T" bar fence posts spaced at 2.4 m oc. where required for safety.

.2 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

.3 The Contractor shall design, erect and maintain a barrier to prevent construction materials and equipment from falling outside of the limits of work. The Contractor shall retrieve all materials from the barrier and those that may break through the barrier as directed by the Engineer and at no cost to the owner.

1.4 Guard Rails and Barricades

.1 Provide secure, rigid guard rails, temporary concrete barriers and barricades around deep excavations and all areas currently being protected as directed by the Engineer.

.2 Provide as required by governing authorities.

1.5 Access to Site

.1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access and to maintain pedestrian and vehicular traffic around site.

1.6 Public Traffic Flow

.1 Provide and maintain competent signal flag operators (TCPs), barricades and flares, lights, or lanterns as required to perform

Work and protect the public.

1.7 Fire Routes	.1	Maintain access to property including overhead clearances for use by emergency response vehicles.
1.8 Protection for Off-Site and Public Property	.1	Protect surrounding private and public property from damage during performance of Work.
	.2	Be responsible for damage incurred.

PART 1 – GENERAL

1.1 General

.1 Use new material and equipment unless otherwise specified

.2 Within 7 days of written request by Engineer, submit following information for materials and equipment proposed for supply:

.1 Name and address of manufacturer;
.2 Trade name, model and catalogue number;
.3 Performance, descriptive and test data;
.4 Manufacturer's installation or application instructions;
.5 Evidence of arrangements to procure.

.3 Use products of one manufacturer for material and equipment of same type or classification unless otherwise specified.

1.2 Manufacturers Instructions

.1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.

.2 Notify Engineer in writing of any conflict between these specifications and manufacturers instructions. Engineer will designate which document is to be followed.

1.3 Delivery and Storage

.1 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.

.2 Prevent damage, adulteration and soiling of material and equipment during delivery, handling and storage. Immediately remove rejected material and equipment from site.

.3 Store material and equipment in accordance with suppliers instructions.

.4 Touch-up damaged factory finished surfaces to Engineer's satisfaction. Use primer or enamel to match original. Do not paint over nameplates.

1.4 Contractor's Options for Selection of Materials for Tendering

.1 Materials specified by referenced standard, select any material that meets or exceeds the specified standard.

.2 Where materials are required to be listed on the "Canadian General Standards Board, Qualified Products List" select any manufacturer so listed.

.3 Materials specified by "Prescriptive" or "Performance" specification, select any material meeting or exceeding specification.

.4 Materials specified by naming one or more materials, select any material named. For the purpose of these specifications, the term "Acceptable Material" is deemed to be a complete and working commodity as described by a manufacturer's name, catalogue number, trade name or any combination thereof.

.5 When materials are specified by a Standard, Prescriptive or Performance specifications, upon request of the Engineer, obtain from manufacturer an independent testing laboratory reporting, showing that the material or equipment meets or exceeds the specified requirements.

1.5 Construction Equipment and Plant

.1 On request, prove to the satisfaction of Engineer that the construction equipment and plant are adequate to manufacture, transport, place and finish work to quality and production rates specified. If inadequate, replace or provide additional equipment or plant as directed.

.2 Maintain construction equipment and plant in good operating order.

PART 1 - GENERAL

1.1 Section Includes

.1 List significant generic types of products, work, or requirements specified. Do not include procedure, process, preparatory work, or final adjusting and cleaning. Include Waste Audit, Waste Reduction Workplan, Materials Source Separation Program, and Cost/Revenue Analysis Workplan. Plus:

.1 Section 02 41 13.14 Removal of Existing Asphalt Pavement.

.3 Section 31 23 33.01 Excavating, Trenching and Backfill

1.2 Precedence

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 Definitions

.1 Waste Audit (WA): Relates to projected waste generation. Involves measuring and estimating quantity and composition of waste, reasons for waste generation, and operational factors which contribute to waste.

.2 Waste Reduction Workplan (WRW): Written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA (Schedule A).

.3 Demolition Waste Audit (DWA): Relates to actual waste generated from project.

.4 Materials Source Separation Program (MSS P): Consists of a series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.

.5 Cost/Revenue Analysis Workplan (CRAW):

Based on information from WRW, and intended as financial tracking tool for determining economic status of waste management practices.

.6 Waste Management Coordinator (WMC): Designate individual who is in attendance on-site, full-time. Designate, or have designated, individuals from each Subcontractor to be responsible for waste management related to their trade and for coordinating activities with WMC.

.7 Separate Condition: Refers to waste sorted into individual types.

1.4 Documents

.1 Maintain at job site, one copy of following documents:

.1 Waste Audit
.2 Waste Reduction Workplan
.3 Material Source Separation Plan
.4 Schedules completed for project

1.5 Use of Site and Facilities

.1 Execute work with least possible interference or disturbance to normal use of premises.

.2 Maintain security measures established by existing facility.

1.6 Submittal

.1 Submit requested submittals in accordance with Section 01330 - Submittal Procedures.

.2 Prepare and submit the following submittals prior to project start-up:

.1 Submit 2 copies of completed Waste Audit (WA): Schedule A.
.2 Submit 2 copies of completed Waste Reduction Workplan (WRW): Schedule B.
.3 Submit 2 copies of completed Demolition Waste Audit (DWA): Schedule C.
.4 Submit 2 copies of Cost/Revenue Analysis Workplan (CRAW): Schedule D.

.5 Submit 2 copies of Materials Source Separation Program description.

1.7 Waste Audit

.1 Conduct WA prior to project start-up.

.2 Prepare Waste Audit: Schedule A.

.3 Record, on Waste Audit - Schedule A, extent to which materials or products used consist of recycled or reused materials or products.

1.8 Waste Reduction Workplan

.1 Prepare WRW prior to project start-up.

.2 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.

.3 Describes management of waste.

.4 Identify opportunities for reduction, reuse, and/or recycling (3Rs) of materials. Based on information acquired from WA.

.5 Post workplan or summary where workers at site are able to review its content.

1.9 Demolition Waste Audit

.1 Prepare Demolition Waste Audit (DWA) prior to project start-up.

.2 Complete Demolition Waste Audit (DWA): Schedule C.

1.10 Cost/Revenue Analysis Workplan

.1 Prepare CRAW: Schedule D.

1.11 Materials Source Separation Program

.1 Prepare MSS P and have ready for use prior to project start-up.

.2 Implement MSS P for waste generated on project in compliance with approved methods and as approved by Engineer.

.3 Provide on-site facilities for collection,

handling, and storage of anticipated quantities of reusable and/or recyclable materials.

.4 Provide containers to deposit reusable and/or recyclable materials.

.5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.

.6 Locate separated materials in areas which minimize material damage.

.7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition. Transport to approved and authorized recycling facility.

.8 Collect, handle, store on-site, and transport off-site, salvaged materials in combined condition. Ship materials to site operating under Certificate of Approval. Materials must be immediately separated into required categories for reuse of recycling.

1.12 Waste Processing Sites

.1 Contractor shall identify the approved waste processing site he plans on using during the project pertaining to reuse and/or recycling of materials.

1.13 Cleaning During Construction

.1 Provide on-site containers for collection of waste materials, and debris.

.2 Dispose of waste materials, and debris off site.

.3 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.14 Disposal of Wastes

.1 Burying of rubbish and waste materials is prohibited unless approved by Engineer.

.2 Disposal of waste, volatile materials, mineral spirits, oil and paint thinner into waterways, storm, or sanitary sewers is prohibited.

1.15 Storage, Handling and Protection

.1 Store, materials to be reused, recycled and salvaged in locations as directed by Owner.

.2 Unless specified otherwise, materials for removal become Contractor's property.

.3 Protect, stockpile, store and catalogue salvaged items.

.4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.5 Protect structural components not removed for demolition from movement or damage.

.6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Engineer.

.7 Protect surface drainage, mechanical and electrical from damage and blockage.

1.16 Scheduling

.1 Coordinate work with other activities at site to ensure timely and orderly progress of the work.

1.17 Final Cleaning

.1 Remove grease, dust dirt, stains, labels, fingerprints, and other foreign materials, from interior and exterior finished surfaces.

.2 Clean lighting reflectors, lenses, and other lighting surfaces.

.3 Broom clean paved surfaces; rake clean other surfaces of grounds.

.4 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

PART 2 - PRODUCTS

2.1 Not Used .1 Not Used.

PART 3 - EXECUTION

3.1 Application .1 Do work in compliance with WRW.

.2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 Cleaning .1 Remove tools and waste materials on completion of work, and leave work area in clean and orderly condition.

.2 Clean-up work area as work progresses.

.3 Source separate materials to be reused/recycled into specified sort areas.

3.3 Diversion of Materials .1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, to approval of Engineer, and consistent with applicable fire regulations. Mark containers or stockpile areas. Provide instruction on disposal practices.

.2 On-site sale of recyclable materials is not permitted.

.3 Demolition Waste

Material Type	Recommended Diversion %	Actual Diversion %
Acoustic Tile	[50]	[]
Acoustical Insulation	[100]	[]
Carpet	[100]	[]
De-mountable Partitions	[80]	[]
Doors and Frames	[100]	[]

Electrical Equipment	[80]	[]
Furnishings	[80]	[]
Marble Base	[100]	[]
Mechanical Equipment	[100]	[]
Metals	[100]	[]
Rubble	[100]	[]
Wood (uncontaminated)	[100]	[]
Other		[]

.4 Construction Waste

Material Type	Recommended Diversion %	Actual Diversion %
Cardboard	[100]	[]
Plastic Packaging	[100]	[]
Rubble	[100]	[]
Steel	[100]	[]
Wood (uncontaminated)	[100]	[]
Other		[]

3.4 Waste Audit .1 Schedule A

(1) Material Category	(2) Material Quantity Unit	(3) Estimated Waste %	(4) Total Quantity of Waste (unit)	(5) Generation Point	(6) % Recycled	(7) % Reused
Wood and Plastic Materials						
Off-cuts						
Warped						
Pallet						
Forms						
Plastic Packaging						
Cardboard Packaging						
Other						
Doors and Windows Material						
Painted Frames						

Glass
Wood
Metal
Other

3.5 Waste Reduction Workplan .1 Schedule B

(1) Material Category	(2) Person(s) Responsible	(3) Total Quantity of Waste (unit)	(4) Actual Reused Amount (units) Projected	(5) Actual Recycled Amount (unit) Projected	(6) Material (s) Destination
Wood and Plastics Material					
Chutes					
Warped					
Pallet					
Forms					
Plastic					
Packaging					
Card-board					
Packaging					
Other					
Doors and Windows Material					
Painted					
Frames					
Glass					
Wood					
Metal					
Other					

3.6 Demolition Waste Audit .1 Demolition Waste Audit

(1) Material Descrip.	(2) Quantity	(3) Unit	(4) Total	(5) Volume (cum)	(6) Weight (cum)	(7) Remarks and Assump-tions
Wood						
Wood Stud						
Plywood						
Baseboard – Wood						
Door Trim - Wood						
Cabinet Doors and Windows Panel						
Laminate Byfold - Closet						
Glazing						

3.7 Cost/Revenue Analysis Workplan .1 Schedule D

(1) Material Descriptio n	(2) Total Quantity (unit)	(3) Volume (cum)	(4) Weight (cum)	(5) Disposal Cost/ Credit $(+/-)	(6) Category Sub-Total $(+/-)
Wood					
Wood Stud					
Plywood					
Baseboard – Wood					
Door Trim - Wood					
Cabinet Doors and Windows Panel					
Laminate Byfold - Closet					
Glazing					
					$
		(7) Cost (-) / Revenue (+)			$

3.8 Canadian Governmental .1 Schedule E

Departments Chief Responsibility for the Environment

Province	Address	General Inquires	Fax
Ontario	Ministry of Environment and Climate change 8th floor, 5775 Yonge St. North York, ON M2M 4J1	(416) 325-4000 (800) 565-4923	(416) 314-6713
	Environment Canada Toronto, ON	(416) 734-4494	

PART 1 - GENERAL

1.1 Record Drawings

.1 Engineer will provide two sets of white prints for record drawing purposes.

.2 Maintain project record drawings and record accurately deviations from Contract documents.

.3 Record changes in red. Mark on one set of prints and at completion of project and prior to final inspection, neatly transfer notations to second set and submit both sets to Engineer.

.4 Record field information:

.1 Field changes of dimension and detail.
.2 Changes made by Change Order or Field Order.
.3 Depths of various elements.
.4 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement.

.5 Other project record documents:

.1 Maintain a record of all other construction documents in an easily accessible (by Engineer) format such as:
- testing results
- product data
- telephone and fax numbers of all suppliers, subcontractors and testing agencies and contact persons for each.

.2 Copies of material tickets for all items paid by unit weight or volume.
.3 Copies of all correspondence with utilities concerned.
.4 Updated schedule.
.5 All Engineer’s written approvals

issued as permission to use alternative equipment, etc.

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 78 00 - Closeout Submittals.

1.2 References

.1 Canadian Construction Documents Committee (CCDC)
.1 CCDC 2-94, Stipulated Price Contract.

1.3 Inspection and Declaration

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
.1 Notify Engineer in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
.2 Request Engineer's Inspection.

.2 Engineer's Inspection: Engineer and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:
.1 Work has been completed and inspected for compliance with Contract Documents.
.2 Defects have been corrected and deficiencies have been completed.
.3 Equipment and systems have been tested, adjusted and balanced and are fully operational.
.4 Work is complete and ready for Final Inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Engineer and Contractor. If Work is deemed incomplete by Engineer, complete outstanding items and request re-inspection.

1.4 Inspection and Declaration (cont'd)

.5 Declaration of Substantial Performance: when Engineer consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance. Refer to CCDC 2, General Conditions Article for specifics to application.

.6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment: When Engineer consider final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. Refer to CCDC 2. If Work is deemed incomplete by Engineer, complete outstanding items and request re-inspection.

.8 Payment of Holdback: After issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount in accordance with CCDC 2.

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 45 00 - Quality Control.

.2 Section 01 77 00 - Closeout Procedures.

1.2 As-builts and Samples

.1 In addition to requirements in General Conditions, maintain at the site for Engineer one record copy of:
.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Change Orders and other modifications to the Contract.
.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.
.9 Record documents

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Engineer.

1.3 Recording Actual Site Conditions

.1 Record information in red on a set of white print drawings, provided by Engineer.

.2 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.3 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
.1 Measured depths of elements of foundation in relation to finish first floor datum.
.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
.4 Field changes of dimension and detail.
.5 Changes made by change orders.
.6 Details not on original Contract Drawings.
.7 References to related shop drawings and modifications.

.4 Specifications: legibly mark each item to record actual construction, including:
.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
.2 Changes made by Addenda and change orders.

.5 Other Documents: maintain inspection certifications and field test records, required by individual specifications sections.

1.4 Final Survey

.1 Not required.

1.5 Spare Parts

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to NCC warehouse located at 1740 Woodroffe, Ottawa; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Engineer. Include

approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.6 Maintenance Materials

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to NCC warehouse located at 1740 Woodroffe, Ottawa; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Engineer. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.7 Special Tools

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to NCC warehouse located at 1740 Woodroffe, Ottawa; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Engineer. Include approved listings in Maintenance Manual.

1.8 Storage, Handling and Protection

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a

heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Engineer.

1.9 Warranties and Bonds

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.

.4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties and bonds until time specified for submittal.

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 00 60 Pay Item Descriptions

.2 Section 02 22 60 Removal of Existing Asphalt Pavement

.3 Section 31 23 33.01 Excavating, Trenching and Backfilling

1.2 Measurement Procedures

.1 No separate measurement will be made for removals unless otherwise identified as items in the Contract.

1.3 Storage and Protection

.1 Perform all work in accordance with Section 01 35 43 - Environmental Procedures.

.2 Protect in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.3 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Engineer at no cost to Owner.

1.4 Regulatory Requirements

.1 Ensure all work is performed in compliance with all applicable provincial regulations.

PART 2 - PRODUCTS

.1 Not Used.

PART 3 - EXECUTION

3.1 Preparation

.1 Inspect site with Engineer and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.3 Notify and obtain approval of utility companies before starting demolition.

3.2 Sequences of Operation

.1 Removal and salvage

.1 Remove and salvage items as indicated.
.2 Do not disturb items designated to remain in place.
.3 In removal of pavements, curbs and gutters:

.1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Engineer.
.2 Protect adjacent joints and load transfer devices.
.3 Protect underlying and adjacent granular materials.
.4 Remove only as many trees as required. Obtain written approval of Engineer prior to removal of any trees.
.5 All trees identified by Engineer specified for removal are to be disposed of. Grind, chip, or shred all other vegetation for mulching and composting.

.2 Disposal of Material

.1 Dispose of materials not designated for salvage or re-use in work off-site in accordance with OPSS 180.

.2 All material destined for alternate disposal must be hauled to authorized disposal sites or facilities listed in waste reduction work plan. Deviation from waste reduction work plan must be approved in writing by Engineer.

.3 Backfill

.1 Backfill in areas as indicated and in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3.3 Restoration

.1 Restore areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas.

3.4 Cleanup

.1 Upon completion of work, remove debris, trim surfaces and leave work site clean.

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 29 01 Pay Item Descriptions

.2 Section 01 74 21 Construction / Demolition Waste Management And Disposal

1.2 Protection

.1 Protect existing pavement not designated for removal, light units and structures from damage. In event of damage, immediately replace or make repairs to approval of Engineer at no additional cost.

1.3 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management And Disposal.

.2 Divert unused asphalt materials from landfill to local facility approved by Engineer.

PART 2 - EXECUTION

2.1 Preparation

.1 Prior to commencing removal operation, inspect and verify with Engineer areas, depths and lines of asphalt pavement to be removed.

.2 Prior to commencing removal operation, remove crack sealant in areas with map or alligator cracking as directed by Engineer.

2.2 Protection

.1 Protect existing pavement not designated for removal, light units and structures from damage. In event of damage, immediately replace or make repairs to approval of Engineer at no additional cost.

2.3 Removal

.1 Remove existing asphalt pavement to lines, grades and details indicated or established by Engineer in field.

.2 Use equipment and methods of removal and hauling which do not tear, gouge, break or otherwise damage or disturb underlying or adjacent pavement.

.3 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.

.4 Provide for suppression of dust generated by removal process.

.5 Dispose off-site at no cost to owner.

.6 Pavement shall be cut for neat removal. Suitable mechanical sawing equipment or pavement milling equipment capable of producing a straight clean vertical face shall be used for cutting the pavement.

2.4 Sweeping

.1 Sweep remaining surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooms as required.

2.5 Finish Tolerances

.1 Finished surfaces in areas where asphalt pavement has been removed to be within +/- 5 mm of grade specified but not uniformly high or low.

PART 1 - GENERAL

1.1 Related Sections

.1 Section 03 30 00 - Cast-in-Place Concrete.

.2 Section 01 29 01 - Pay Item Descriptions.

.3 Section 01 74 21 - Construction Demolition Waste Management and Disposal

1.2 References

.1 Ministry of Transportation Ontario (MTO)
.1 OPSS.MUNI 905

1.3 Measurement and Payment

.1 Measurement for payment and basis of payment for concrete reinforcement will be as specified in Section 01 29 01 - Pay Item Descriptions.

1.4 Design and Submission Requirements

.1 Design and submission requirements will be as specified in OPSS.MUNI 905

1.5 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 Materials

.1 Materials for concrete reinforcement will be as specified in OPSS.MUNI 905.

.2 Galvanizing of reinforcing steel bars where required, shall conform to:

- CAN/CSA-G164-M
- ASTM A767M Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
- ASTM A123M - 15 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

Only Type W reinforcing bars shall be galvanized.

2.2 Processes

.1 For fabricated reinforcing steel bar assemblies, the minimum average coating

thickness of the galvanizing shall be 0.10 mm. For separate reinforcing steel bars, the mass (weight) of zinc coating shall be Class 1.

.2 Prior to galvanizing, the material shall have all grease, dirt, mortar, mill scale, injurious rust (rust which is difficult to remove) or any other foreign substance removed.

.3 Materials galvanized in accordance with these specifications shall be free from any build-up of unadhered wet storage stains (white rust). These corrosion deposits, if present shall be removed in a manner satisfactory to the Contract Administrator prior to incorporation of the material in the work. After removal of these deposits, the coating shall have a uniform appearance free from uncoated spots, lumps, blisters, gritty areas, acid flux and black spots. Materials with these defects, or not meeting the finish and adherence of coating requirements as defined in the above ASTM specification, will be rejected and immediately removed from the work site. Acceptable material will be provided to replace the rejected material at no additional cost to the Owner.

2.3 Quality Assurance .1 Quality assurance requirements for concrete reinforcement will be as specified in OPSS.MUNI 905.

PART 3 - EXECUTION

3.1 Construction .1 Construction of concrete reinforcement will be as specified in OPSS.MUNI 905.

.2 All hooks shall be in accordance with MTO Structural Manual standard drawing SS12-1.

.3 Galvanized bars or galvanized wire fabric shall not be bent in the field more than 10 degrees, regardless of the diameter of

the bend.

3.2 Field Repair

.1 Zinc-rich paint used for the field repair of galvanized coating shall meet the following requirements:

a) One application of the material shall provide a dry coating thickness of at least 0.051mm.
b) The applied coating shall provide barrier protection and shall preferably be anodic to steel.
c) Application of the coating material shall be possible under shop or field conditions.
d) The dried film shall have a minimum zinc dust content equal to 94% (by weight).
e) The brand of material used shall be approved by the galvanizer, and shall be compatible with the galvanizing, and inert in concrete.

.2 The Contractor shall be required to field repair any damage to the galvanized coating done during shipping and handling, and to replace bars exhibiting severely damaged coatings. Repairable damage is defined as any bare or loose spots, or breaks in the coating, which affect an area smaller than 2500mm square.

.3 Field repairs shall be allowed only when the total number of repairable damaged areas in any 3000mm length of bar is less than 6. Any material with a total number of damaged areas greater than the amount specified above, or material with any damaged area greater than 2500mm square, shall be rejected, immediately removed from the work site, and replaced by the Contractor at no cost to the Owner.

.4 The galvanized coating is to be repaired with a zinc-rich paint by the following method:

1) Clean the damaged area by power disk, wire brushing, sand or grit blasting,

or any other suitable method approved by the Engineer to a near-white metal condition in accordance with SSPC-SP10 (0.025 to 0.050mm anchor pattern), as a minimum. The surface shall also be clean, dry and free of oil, grease, flux residue, corrosion products, and any other foreign substance.

2) Using a minimum of two coats, and the methods recommended by the manufacturer of the zinc-rich paint, spray or brush apply the zinc-rich paint to the area in a manner to achieve the applicable ASTM adherence and quality requirements of the original coating, and a minimum dry film thickness of 0.100mm.

These repair procedures are allowed only for those field repairs directed by the Contract Administrator. This method shall not be allowed for shop repairs. All repairs shall be made at no cost to the Owner.

PART 1 - GENERAL

1.1 Related Sections

.1 Section 03 20 00 - Concrete Reinforcement.

.2 Section 01 29 01 - Pay Item Descriptions.

.3 Section 01 74 21 - Construction Demolition Waste Management and Disposal

1.2 References

.1 Ministry of Transportation Ontario (MTO)
- .1 OPSS.MUNI 904
- .2 OPSS.MUNI 928
- .3 OPSS 929
- .4 OPSS.MUNI 930
- .5 OPSS 932

1.3 Measurement and Payment

.1 Measurement for payment and basis of payment will be as specified in Section 01 29 01 - Pay Item Descriptions.

1.4 Design and Submission Requirements

.1 Design and submission requirements for dowels will be as specified in OPSS.MUNI 904 and as amended herein.

.1 Subsection 904.04.01 of OPSS.MUNI 904 is amended by the addition of the following Clause:

904.04.01.06 Dowel Adhesive Product Data

At least one week prior to the trial installation of a dowel type, the Contractor shall submit the product data sheets and specifications for the epoxy adhesive to be used for that dowel type to the Contract Administrator. The following shall be included:

a) Name, address, and telephone number for the manufacturer and supplier of the epoxy adhesive;
b) Detailed mixing and placement procedures, including hole preparation;

c) Allowable temperature range, ambient and concrete, for installation of the epoxy adhesive;
d) Curing time to obtain full capacity of the dowel.

For each dowel type in the Contract, the Contractor shall identify any and all locations where the hole diameter and embedment as recommended by the epoxy adhesive manufacturer is different from that specified in the Contract drawings.

.2 Design and submission requirements for concrete removal will be as specified in OPSS.MUNI 928.

.1 Subsection 928.04.01 of OPSS.MUNI 928 is amended by the addition of the following:

928.04.01 Design Requirements

All temporary platforms and containment systems shall be designed in accordance with OPSS 919, CSA S269.1-1975 (R1988), Occupational Health and Safety Act, the latest edition of CHBDC, all regulations pertaining to the work, and other relevant standards for materials proposed to be used by the Contractor. The temporary platforms shall be capable of sustaining all loads arising from workmen, materials, and equipment as well as concrete debris and impact forces.

.2 Subsection 928.04.02.01 of OPSS.MUNI 928 is amended by the addition of the following:

928.04.02.01 Design Requirements

At least three (3) weeks prior to commencement of work, the Contractor shall submit six (6) copies of written

descriptions, working drawings and schedules to the Contract Administrator that provide following:

a) The sequence and method of control measures during:
i) Removal of concrete;
ii) Structure repair including concrete placement; and
iii) Concrete sawcutting.

b) The details of any construction loads imposed on the existing structure by the control measures.

Working drawings shall be signed and sealed by design and checking Engineers who have a minimum of five (5) years' experience on projects of a similar nature and scope to the required work.

The Contractor shall be solely responsible for the structural adequacy, stability and integrity of the work platform and for safe access by the construction personnel to the work areas for the entire duration of the work.

.3 Design and submission requirements for concrete patches will be as specified in OPSS.MUNI 930 and as amended herein.

.1 Subsection 930.04.02 of OPSS.MUNI 930 is amended by the addition of the following Clause:

930.04.02.05 Proprietary Repair Products

The Contractor shall submit to the Contract Administrator four copies of the Manufacturer's product data sheet for review and approval at least one week prior to the placement of the proprietary concrete repair material.

.4 Design and submission requirements for concrete crack repair will be as specified in OPSS 932.

1.5 Quality Assurance

.1 Quality assurance requirements for dowels be as specified in OPSS.MUNI 904.

.2 Quality assurance requirements for concrete removal will be as specified in OPSS.MUNI 928.

.3 Quality assurance requirements for abrasive blast cleaning will be as specified in OPSS 929.

.4 Quality assurance requirements for concrete patches will be as specified in OPSS.MUNI 930.

.5 Quality assurance requirements for concrete crack repair will be as specified in OPSS 932.

1.6 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction Demolition Waste Management and Disposal.

1.7 Access to work area, work platform and scaffolding

.1 Access to work area, work platform and scaffolding requirements will be as specified in OPSS.MUNI 928 and as amended herein.

PART 2 - PRODUCTS

2.1 Materials

.1 Material requirements for dowels will be as specified in OPSS.MUNI 904 and as amended herein.

.1 Subsection 904.05.14 of OPSS.MUNI 904 is deleted and replaced with the following subsection:

904.05.14 Dowel Adhesive

The dowel adhesive shall be an epoxy adhesive; the epoxy adhesive shall be HILTI HIT-RE 500 V3 or an Approved equivalent. The epoxy adhesive shall be a material listed in the MTO

Designated Source for Materials (DSM) suitable for the application. The dowel adhesives portion of the DSM is available online at the following address: www.roadauthority.com/mpl/mplListVersion.asp?MPICatId=1A4B4366-6CD3-4E44-943D-16040CF65070

.2 Section 904.05 of OPSS.MUNI 904 is amended by the addition of the following Clause:

904.05.15 Non-Shrink Grout for Repair of Holes

Holes that are started but not completed shall be repaired with a non-shrink grout from the following list:

1. MasterFlow 713 by Master Builders
2. Sika Grout 212 by Sika
3. In-Pakt Construction Grout by King Packaged Materials Company
4. Planigrout 755 by Mapei
5. CPD Non-Shrink by CPD

.2 Material requirements for payment and basis of payment for concrete patches will be as specified in OPSS.MUNI 930 and as amended herein.

.1 Section 930.05 of OPSS.MUNI 930 is amended by the addition of the following subsection:

930.05.14 Proprietary Repair Products

Proprietary repair product shall be SikaTop 123 PLUS or an approved equivalent.

.3 Material requirements for concrete crack repair will be as specified in OPSS 932 and as amended herein.

.1 Subsection 932.05.01.03 of OPSS.MUNI 932 is amended by the addition of the following:

All cracks repaired by crack injection shall be undertaken with epoxy resin. SikaDur 52 by Sika Canada Inc. or an Approved Equivalent shall be used.

PART 3 - EXECUTION

3.1 Construction

.1 Construction of dowels will be as specified in OPSS.MUNI 904 and as amended herein.

.1 Subsection 904.07.05.03 of OPSS.MUNI 904 is amended by the addition of the following:

The Contractor shall notify the Contract Administrator if the concrete in the vicinity of the dowel locations is cracked, delaminated or otherwise not structurally sound prior to drilling the holes. All such deteriorated concrete shall be repaired prior to drilling holes.

All debris resulting from the operation shall be disposed of as specified in the Contract documents.

.2 Subsection 904.07.06.01 of OPSS.MUNI 904 is amended by the addition of the following:

The top surface of new or repaired concrete shall

.2 Construction of concrete removal will be as specified in OPSS.MUNI 928.

.1 Subsection 928.07.02.01 of OPSS.MUNI 928 is amended by the addition of the following:

928.07.02.01 General

The Contractor shall construct containment systems to prevent materials, debris and effluent arising from the work from entering or falling into the watercourse below:

a) Materials resulting from the concrete removal;

b) Materials resulting from structure repair; and

c) Effluent from sawcutting.

Excess materials resulting from concrete removal and structure repair, and effluent from sawcutting shall be managed as specified elsewhere in the Contract.

.3 Construction of abrasive blast cleaning will be as specified in OPSS 929.

.4 Construction of concrete patches will be as specified in OPSS.MUNI 930 and as amended herein.

.1 Section 930.07 of OPSS.MUNI 930 is amended by the addition of the following subsection:

930.07.09 Proprietary Repair Products

Surface preparation, placing, and curing procedures shall be in accordance with the Manufacturer's recommendations.

.5 Construction of concrete crack repair will be as specified in OPSS 932.

3.2 Equipment

.1 Equipment used for dowels will be as specified in OPSS.MUNI 904.

.2 Equipment used for concrete removal will

be as specified in OPSS.MUNI 928.

.3 Equipment used for abrasive blast cleaning will be as specified in OPSS 929.

.4 Equipment used for concrete patches will be as specified in OPSS.MUNI 930.

.5 Equipment used for concrete crack repair will be as specified in OPSS 932.

PART 1 - GENERAL

1.1 Description

.1 This section specifies requirements for the installation of the handrail system and includes:

.1 Supply and installation of new pedestrian handrail system including all associated work described in contract drawings. These items include supply and installation of the pre-cast concrete posts for Line Posts and Expansion Posts, the Aluminum Posts and the 1 ½" Nominal ID railing and associated fittings (sleeves, couplers, etc.).

1.2 Related Work Specified Elsewhere

.1 Site work, demolition and removals: Section 02 22 50.

.2 Cast-in-Place Concrete: Section 03 30 00.

.3 Painting: Section 09 90 00.

1.3 Shop Drawings

.1 Contractor is to make all necessary field measurements, prepare detailed shop drawings and submit in accordance with Section 01 33 00.

.2 Shop Drawings:

.1 Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

1.4 Measurement for Payment

.1 All work described in this section will be paid for under the following payment items:

.1 pedestrian handrail system: This item covers the work described in subsection 1.1.1.3. It will be measured per Line Posts, Expansion Posts, Aluminum Posts and linear metre of 1 ½" Nominal ID railing.

.2 All other work, necessary to the completion of the work of this section,

will not be measured separately for payment, but will be considered as incidental to the work of this section.

.3 No separate measurement will be made for railing anchorage systems. The fabrication, supply and installation of anchorage systems shall be considered incidental to the Tender Items "Line Posts", "Expansion Posts", and "Aluminum Posts".

1.5 Samples

.1 Submit two (2) – 300mm Long finished samples of 1 ½" Nominal ID railing with insert sleeves installed on one end of each sample.

PART 2 – PRODUCTS

2.1 Precast Concrete Posts (Line Posts and Expansion Posts):

.1 Cement: to CAN/CSA-A3001, Type GU.
.2 Supplementary cementing materials: to CAN/CSA-A3001.
.3 Water: to CAN/CSA-A23.1.
.4 Aggregates; to CAN/CSA-A23.1/A23.2.
.5 Air-Entraining admixtures: to ASTM C260.
.6 Chemical admixtures: to ASTM C494.
.7 Superplasticizer: to ASTM C1017.
.8 Anchor bolt for line and expansion posts: high-strength bolts to ASTM A325M-97, hot dip zinc coating.
.9 Adhesive type anchors with epoxy acrylate resin. Polyester resins will not be accepted.
.10 Reinforcing steel: billet steel, grade 400W, deformed bars to CAN/CSA-G30.18, unless indicated otherwise, Galvanized.
.11 Cold-drawn annealed steel wire ties: to CSA G30.3.
.12 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.
.13 Galvanized reinforcement: in accordance to:
.1 ASTM A123/A123M-09
.2 ASTM A767/A767M-09

2.2 Concrete Mix for Concrete Precast Posts

.1 The concrete mix will be in accordance with CAN/CSA-A23 and as per the

(Line Posts and Expansion Posts)

following

.1 Exposure class: C-1

.2 Aggregates: No.2 Green Madoc Aggregate with river wash sand or mortar sand.

.3 Minimum compressive strength: 35MPa @ 28 days.

.4 Minimum cement content: 360 kg/m3

.5 Maximum Water/Cement ration: 0.4.

.6 Sump: 70 (+-) 20 regardless of location of placement.

.7 Air content: 6.5% (+-) 1.5%

.8 Admixtures subject to Departmental Representative's approval.

.9 Cement: type GU Portland cement.

2.3 1 ½" Nominal ID Railing and Aluminum Posts

.1 Aluminum pipe to ASTM B221, seamless, schedule 80. Strength design shall be in accordance to CSA S157-05/S157.1-05 (R2015) – Strength Design in Aluminum.

.2 All handrail and shall be subsequently top coated with black Protective Fusion-Bonded Epoxy coatings.

.3 ASTM B429 – Specification for Aluminum and Aluminum-alloy Drawn tubes for general purpose Applications

.4 ASTM B210 – Specification for Aluminum and Aluminum-Alloy drawn Seamless tubes.

2.4 1 ½" Nominal ID Railing and Aluminum Posts Paint System

.1 Refer to Section 09900 – Painting

2.5 Non-shrink grout

.1 CPD Non-Shrink Construction Grout (Hi-FLO).

.2 Sternson M-Bed Standard Grout.

.3 Sika Grout 212.

.4 Master Builders Set Non-Shrink Grout.

.5 Westar Burke 621 Standard Grout.

.6 CC Chemicals In-Pakt Grout.

PART 3 - EXECUTION

3.1 Fabrication

.1 Obtain the pre-cast concrete post forms from a location in the Ottawa Gatineau area specified by NCC Representative.

.1 A total of one (1) expansion post form and ten (10) line post forms are available for use under this contract.

.2 Fabricate the handrail system, as indicated in the shop drawings pre-approved by NCC Representative.

.3 The aggregates shall be exposed aggregate and the texture of the required finish will be inspected prior to casting. The fabricator will submit two sample panels (300x300x25) to the Departmental Representative for approval to compare them with the texture of the cast units.

.4 The reinforcing shall be epoxy coated, 4-#15M vertical and #10M tie bars @ 300 c/c minimum, plus 2 extra ties at bottom . Refer to drawing No. C-10 for details. Ensure that 50 mm of concrete cover is maintained.

.1 Bar bending shall be done prior to galvanizing and conform to standard ASTM A767/A767M-09.

.2 Zinc coating thickness shall be a minimum mass of 610g/m2 per surface coated.

.3 All galvanized reinforcement must receive a chromate treatment.

.4 Provide PVC cast-in-place insert openings through posts as shown on drawings to accept 1.5" Nominal pipe diameter used as handrail.

.5 All edges shall be chamfered as provided

for in the mold supplied.

.6 Touch up reinforcing bars with Organic zinc rich paint prior to casting, as required to ASTM A780 and CAN/CGSB-1.181.

.7 Texturing: Should be normally accomplished using a chemical retardant and pressure wash; other methods of exposing the aggregate will only be allowed on special approval by the Departmental Representative.

3.2 Installation

.1 Install precast concrete line and expansion posts as indicated on the drawings with the base flush with coping surface. Grind base of post or surface of coping as required to ensure full contact and prevent posts from rocking after installation. Maintain same number of line posts between expansion posts, and space them equidistance.

.1 For line and expansion posts: install and provide housing and heating for anchors as per epoxy grout manufacturer's recommendations.

.2 Install anchor to minimum embedment shown on the drawings.

.3 Take appropriate steps during installation of anchor to ensure that there are no trapped air bubbles in the epoxy adhesive.

.4 Install handrail connections and system

.2 Weld aluminum pipe railing sections using a butt weld all around, grinded flush with the surface.

.3 Install the Aluminum posts as indicated on the drawings,

.1 core, clean, insert posts and then grout into the existing retaining wall for the aluminum posts to line and grade

.2 Install handrail connections

.3 Install handrail system

.4 Install handrail system as indicated on the shop drawings.

.5 Proof that the bolts and associated hardware meet the chemical composition, mechanical properties, dimensions, workmanship, and head burst as required by ASTM A1554 shall be submitted to the NCC Representative.

3.3 Aluminum Welding .1 Supplier to be qualified under CSA W47.2-(R2015)

.2 Weld to CSA W59.2

PART 1 - GENERAL

1.1 References

.1 The work covered under this section includes the surface preparation and the supply and the application of coatings including but not limited to the following:
.1 All new handrail systems (Aluminum Posts and 1 ½" Nominal ID railing and associated fittings).

1.2 Environmental Protection

.1 Do not apply coatings in areas where dust is being generated.

.2 Minimum temperature for painting, 10°C, or as specified by coating manufacturer. Aluminum surfaces shall be a minimum of 3°C above dew-point or as specified by the coating manufacturer.

.3 Surfaces must be dry, clean, free from dust, grease, oil or other contaminants which will affect the work of this Section.

1.3 Delivery, Storage

.1 Deliver packaged materials in original, unopened, labelled and sealed containers.

.2 Keep stored materials covered at all times and take necessary precautions against fire.

1.4 Protection

.1 Use sufficient drop cloths and protective coverings to protect concrete and work of others not being painted.

.2 Areas assigned for storage and preparation of materials shall be fully protected.

.3 Keep waste rags in metal drums containing water and remove from site at end of each working shift.

.4 Protect work during coating and drying, from direct sunlight and winds.

1.5 Quality Assurance

.1 Painting shall be in accordance with Steel

Structures Painting Council (SSPC), System and Specifications.

PART 2 - PRODUCTS

2.1 Handrail Paint System:

.1 Environmental conditions: moderate to severe exterior exposure.

.2 Surface preparation:
- .1 Mechanically prepare the aluminum according to SSPC-SP6; alternatively, manufacture's recommendation of chemical pretreatment.
- .2 Power tool cleaning to bare metal shall be prepared according to the SSPC-SP11
- .3 The brush-off blast cleaning of the aluminum shall be according to SSPC-SP-7 and per manufactures recommendations.
- .4 Railing to be painted black with a powder coating as noted below.

.3 Handrail Powder Coatings
- .1 The powder coating system shall be comprised of the following powder coating system manufactured by Protech. Polyarmor G17; or approved alternative, shall be used.

PART 3 - EXECUTION

3.1 Inspections

.1 Report to the NCC Representative in writing those surfaces not in proper condition for covering and other conditions liable to adversely affect the finished appearance or performance of the coating systems and which cannot be put into acceptable condition by the work specified herein.

.2 Failure to make such inspection and report, or the covering of defective work, will in either event entail re-executing the work affected without additional cost to the Owner.

.3 Do not proceed with surface preparation and application until the surface is acceptable, or authorization to proceed is given by the NCC Representative.

.4 The surface preparation and coating application shall be inspected by a third-party inspector as and if designated by the NCC. This work shall include surface profile measurements, visual inspection, and dry film thickness coating measurements of the paint system.

3.2 Handrail Surface Preparation

.1 Ensure all surfaces that are to be coated are dry, clean, free of frost, dust, dirt, oil, grease of other contaminates immediately prior to painting.

.2 Prepare the aluminum surfaces by blast cleaning to meet SSPC-SP6 2-3 mil anchor profile, and brush-off abrasive blast to meet SSPC-SP7. Care shall be taken to roughen surface.

.3 Prepare bare aluminum surfaces at welds by solvent cleaning as per SSPC-SP1 and power tool cleaning of the bare steel to meet SSPC-SP11. Any weld splatter or sharp edges shall be removed prior to coating application by filing or grinding.

3.3 Handrail Coating Application

.1 Comply with the recommendations and directions of the manufacturer whose materials are being used.

.2 Arrange for the Coating Manufacturer’s technical representatives to visit the application facilities, at no cost to the Owner, prior to commencement of the coating to meet with the Contractor and the NCC Representative to ensure that surfaces are properly prepared for receipt of the specified materials, specification and manufacturer’s requirements are clearly

understood, conditions and equipment to be employed in the work are satisfactory and to the approval of the Coating Manufacturer.

.3 Applied coat specified is intended to cover surfaces completely. The total thickness of the powder coat shall be a minimum of 8 mils DFT and up to a maximum of 14 mils DFT.

.4 Apply materials in strict accordance with manufacturer's directions and specifications and be familiar with those directions and specifications. Do not use adulterants.

.5 Coating shall be uniform in sheen, colour and texture free from brush or roller marks, sags, runs or other defects.

3.5 Handrail Coating Warranty

.1 10 years, limited; commencing at completion of work.

PART 1 - GENERAL

1.1 Summary

.1 This Section defines correction to maximum dry density to take into account aggregate particles larger than 19 mm.

1.2 References

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C 127-88(2001), Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.

.2 ASTM D 1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

.3 ASTM D 4253-00, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

1.3 Definitions

.1 Corrected maximum dry density is defined as:

.1 D = D1xD2/((F1 x D2) + (F2 x D1))

.2 Where: D = corrected maximum dry density kg/m^3.

.1 F1 = fraction (decimal) of total field sample passing 19 mm sieve

.2 F2 = fraction (decimal) of total field sample retained on 19 mm sieve (equal to 1.00 - F1)

.3 D1 = maximum dry density, kg/m^3 of material passing 19 mm sieve determined in accordance with Method C of ASTM D 698.

.4 D2 = bulk density, kg/m^3, of material retained on 19 mm sieve, equal to 1000G where G is bulk specific gravity (dry basis) of material when tested to ASTM C 127.

.4 For free draining aggregates, determine D1 (maximum dry density) to ASTM D 4253 dry method when directed by Engineer.

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 29 01 Pay Item Descriptions

.3 Section 32 11 23 Aggregate Base Courses

.4 Section 32 12 16 Asphalt Paving

.5 Section 03 30 00 Cast-in-place Concrete

1.2 References

.1 ASTM D4791-99, Test Method for Flat or Elongated Particles in Coarse Aggregate.

.2 OPSS 1001 Material Specifications for Aggregates – General.

1.3 Samples

.1 Provide Engineer with access to source and processed material for sampling.

.2 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

PART 2 - PRODUCTS

2.1 Materials

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.

.2 Flat and elongated particles of coarse aggregate: to ASTM D4791.

.1 Greatest dimension to exceed five times least dimension.

.3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:

.1 Natural sand.
.2 Manufactured sand.
.3 Screenings produced in crushing of quarried rock, boulders, gravel.

.4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:

.1 Crushed rock.

2.2 Source Quality Control

.1 Inform Engineer of proposed source of aggregates and provide access for sampling at least 4 weeks prior to commencing production.

.2 If, in opinion of Engineer, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.

.3 Advise Engineer 4 weeks in advance of proposed change of material source.

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

PART 3 - EXECUTION

3.1 Preparation

.1 Processing

.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
.2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Engineer.
.3 Wash aggregates, if required to

meet specifications. Use only equipment approved by Engineer.

.4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.

.2 Handling

.1 Handle and transport aggregates to avoid segregation, contamination and degradation.

.3 Stockpiling

.1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Engineer. Do not stockpile on completed pavement surfaces.

.2 Stockpile aggregates in sufficient quantities to meet project schedules.

.3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into work.

.5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Engineer within 48 h of rejection.

.7 Stockpile materials in uniform

layers of thickness as follows:

.1 Max 1.5 m for coarse aggregate and base course materials.
.2 Max 1.5 m for fine aggregate and sub-base materials.
.3 Max 1.5 m for other materials.

.8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
.9 Do not cone piles or spill material over edges of piles.
.10 Do not use conveying stackers.
.11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.2 Cleaning

.1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.

.2 Dispose of any unused aggregates as directed by Engineer.

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 29 01 - Pay Item Descriptions

.2 Section 01 35 00.06 - Special Procedures: Traffic Control

.3 Section 01 74 21 - Waste Management and Disposal

.4 Section 01 56 00 - Temporary Barriers and Enclosures

.5 Section 01 35 43 - Environmental Procedures

.6 Section 31 05 16 - Aggregate Material

.7 Section 31 05 10 - Corrected Maximum Dry Density.

.8 Section 31 01 90.33 - Tree Protection

1.2 References

.1 ASTM C117-95, Standard Test Method for Material Finer Than 0.075 mm No. 200 Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-96a, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D422-98, Standard Test Method for Particle-Size Analysis of Soils.

.4 ASTM D698-00a, Standard Test Method for Laboratory Compaction Characteristics of soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).

.5 ASTM D1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3) (2,700 kN-m/m^3).

1.2 References (cont'd)

.6 ASTM D4318-00, Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.7 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.8 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.9 CAN/CSA-A23.1-00, Concrete Materials and Methods of Concrete Construction.

1.3 Definitions

.1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.

.1 Rock excavation: excavation of material from solid masses of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders or rock fragments having individual volume in excess of 1 m.

.2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.2 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.3 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.4 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.5 Unsuitable materials:

.1 Weak and compressible materials under excavated areas.

.2 Frost susceptible materials under excavated areas.

.3 Frost susceptible materials:

.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D 4318, and gradation within limits specified when tested to ASTM D 422 and ASTM C 136: Sieve sizes to CAN/CGSB-8.1

1.4 Protection of Existing Features

.1 Existing buried utilities and structures:

.1 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

.2 Prior to commencing excavation work, notify applicable owner or authorities having jurisdiction, establish location and state of use of buried utilities and structures. Owners or authorities having jurisdiction to clearly mark such locations to prevent disturbance during work.

.3 Confirm locations of buried utilities by careful test excavations.

.4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.

.5 Where utility lines or structures exist in area of excavation, obtain direction of Engineer before re-routing. Costs for such work to be paid by Owner.

1.5 Protection of Existing Features (cont'd)

.6 Record location of maintained, re-routed and abandoned underground lines.

.2 Existing surface features:

.1 Conduct, with Engineer, condition survey of trees and other plants, lawns, fencing, service poles, wires, pavement, survey bench marks and monuments which may be affected by work.

.2 Where required for excavation, cut roots or branches as approved by Engineer in accordance with Section 01 56 10 – Environmental Protection.

1.6 Shoring, Bracing and Underpinning

.1 Protect existing features in accordance with applicable local regulations.

.2 Where required, engage services of qualified professional engineer who is registered or licensed in province of Ontario, Canada in which work is to be carried out to design and inspect shoring, bracing and underpinning required for work.

.3 Submit design and supporting data at least 2 weeks prior to commencing work.

.4 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in province of Ontario, Canada.

PART 2 - PRODUCTS

2.1 Materials

.1 Type 1 and Type 2 fill: properties to section 02701 - Aggregates: General and the following requirements:

.1 Crushed, pit run or screened stone, gravel or sand.

.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.

.2 Type 3 fill: selected material from excavation or other sources, approved by Engineer for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

.3 Unshrinkable fill: proportioned and mixed to provide:

.1 Maximum compressive strength of 0.4 MPa at 28 days.
.2 Maximum Portland cement content of 25 kg/m.
.3 Minimum strength of 0.07 MPa at 24 h.
.4 Concrete aggregates: to CAN/CSA-A23.1.
.5 Portland cement: Type 10.
.6 Slump: 160 to 200 mm.

PART 3 - EXECUTION

3.1 Site Preparation

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.2 Stripping of Topsoil

.1 Strip topsoil to depths as directed by Engineer. Do not mix topsoil with subsoil.

.2 Stockpile in locations as directed by Engineer. Stockpile height not to exceed 2 m.

.3 Dispose of unused topsoil off site.

3.3 Stockpiling

.1 Stockpile fill materials in areas designated by Engineer. Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

3.4 Shoring, Bracing and Underpinning

.1 Construct temporary works to depths, heights and locations as required.

.2 During backfill operation:

.1 Unless otherwise as indicated or as directed by Engineer, remove sheeting and shoring from excavations.
.2 Do not remove bracing until backfilling has reached respective levels of such bracing.
.3 Pull sheeting in increments that will ensure compacted backfill is maintained at an elevation at least 500 mm above toe of sheeting.

3.5 Dewatering and Heave Prevention

.1 Keep excavations free of water while work is in progress.

.2 Submit for Engineer's review details of proposed dewatering or heave prevention methods, such as dikes, well points, and sheet pile cut-offs.

.3 Avoid excavation below groundwater table if quick condition or heave is likely to occur. Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

.4 Protect open excavations against flooding and damage due to surface run-off.

.5 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures and in manner not detrimental to public and private property, or any portion of work completed or under construction.

3.5 Dewatering and Heave Prevention (cont'd)

3.6 Excavation

.1 Excavate to lines, grades, elevations and dimensions as indicated by Engineer or drawings.

.2 Remove concrete, paving, walks, and other obstructions encountered during excavation in accordance with Section 02 22 50 - Sitework, Demolition and Removal.

.3 Excavation must not interfere with normal 45° splay of bearing from bottom of any footing.

.4 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

.5 For trench excavation, unless otherwise authorized by Engineer in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

.6 Dispose of surplus and unsuitable excavated material off site.

.7 Do not obstruct flow of surface drainage or natural watercourses.

.8 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.9 Notify Engineer when bottom of excavation is reached.

.10 Obtain Engineer approval of completed excavation.

.11 Remove unsuitable material from trench

bottom to extent and depth as directed by Engineer.

.12 Correct unauthorized over-excavation as follows:

.1 Fill under bearing surfaces and footings with concrete specified for footings.
.2 Fill under other areas with Type 2 fill compacted to not less than 95% of corrected maximum dry density.

.13 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil. Clean out rock seams and fill with concrete mortar or grout to approval of Engineer.

3.7 Fill Types and Compaction

.1 Use fill of types as indicated on drawings. Compaction densities are percentages of maximum densities obtained from ASTM D698 ASTM D1557.

3.8 Bedding and Surround of Underground Services

.1 Place bedding and surround material in unfrozen condition.

3.9 Backfilling

.1 Do not proceed with backfilling operations until Engineer has inspected and approved installations.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing

succeeding layer.

.5 Backfill around installations.

.6 Place bedding and surround material as specified elsewhere.

.7 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.

3.10 Restoration

.1 Upon completion of work, remove waste materials and debris, trim slopes, and correct defects as directed by Engineer.

.2 Replace topsoil as directed by Engineer.

.3 Reinstate lawns to elevations which existed before excavation.

.2 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

.3 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.

.4 Clean and reinstate areas affected by Work as directed by Engineer.

PART 1 - GENERAL

1.1 Section Includes

.1 This work item includes the installation of snow fences to protect existing trees from damage during construction and methods to be used for compensation due to damage.

1.2 Related Sections

.1 Section 01 29 01 – Pay Item Descriptions

.2 Section 32 91 19.13 - Topsoil Placement

.3 City of Ottawa General Special Provision D-014

PART 2 - PRODUCTS

2.1 Materials

.1 Tree protection shall be wood slat snow fencing. Minimum 1500 mm height supported by steel staking spaced at maximum 3000 mm on centre.

.2 Silt fencing is to be attached to base of snow fencing to form a continuous barrier as shown in civil and landscape contract drawings. Ensure no gaps at base of barrier.

.3 Existing specimen trees to be protected with minimum five (5) wood planks bound tightly to trunk with heavy gauge wire, top, and bottom. Do not damage the bark during installation.

PART 3 - EXECUTION

3.1 Identification and protection

.1 Identify plants and limits of root systems to be protected to the satisfaction of the Contract Administrator.

.2 Protect plant and root systems from damage, compaction and contamination using continuous line of snow fencing in location as shown in contract drawings.

3.2 Root Pruning

.1 In locations where the grade will be lowered than adjacent existing trees, the Contractor will expedite the work of this section to reduce the exposure of the root system.

.2 Cut roots over l2 mm diameter with a clean pruning instrument. Do not paint.

.3 Any exposed roots more than 12 mm that will be exposed longer than 48 hours, before backfilling will be covered with a landscape fabric and watered daily.

3.3 Removal of Protection

.1 After all construction is complete, all tree protection measures are to be dismantled and removed off site including; snow fencing, steel support stakes, silt fencing and trunk protection for individual specimen trees.

.2 Ensure temporary postholes are filled in and all additional support weights are removed off site.

3.4 Damages

.1 The Contractor will compensate the client for any trees damaged by the Contractor during construction.

.2 Damages will include:
- .1 Any physical damage on tree bark;
- .2 Broken branches;
- .3 Storage of equipment or materials within the protected areas and beyond the limits of the contract.

.3 The Contractor will supply, install, maintain and warranty trees of the same species as indicated by the Contract Administrator:
- .1 Coniferous Trees: 1.8 metre height
- .2 Deciduous Trees: 50 mm cal.

.4 The exact location of the replacement trees will be staked out to the approval of the Contract Administrator before commencement of work.

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 29 01 Pay Item Descriptions

.2 Section 31 05 16 Aggregate Material

.3 Section 31 05 10 Corrected Maximum Dry Density for Fill

1.2 References

.1 ASTM C 117-95, Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.

.2 ASTM C 131-96, Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.3 ASTM C 136-96a, Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D 698-00a, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).

.5 ASTM D 1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3) (2,700 kN-m/m^3).

.6 ASTM D 1883-99, Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.

.7 ASTM D 4318-00, Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.8 CAN/CGSB-8.1-88, Sieves Testing, Woven Wire, Inch Series.

.9 CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.

.10 OPSS.MUNI 314 Construction Specification for Untreated Granular, Subbase, Base,

Surface, Shoulder and Stockpiling.

.11 OPSS.MUNI 1010 Material Specifications for Aggregates – Base, Subbase, Select Subgrade and Backfill Material.

1.3 Delivery, Storage, and Handling

.1 Deliver and stockpile aggregates in accordance with Section 31 05 16 - Aggregate Material.

PART 2 - PRODUCTS

2.1 Materials

.1 Granular base: material to Section 31 05 16 - Aggregate Material and following requirements:

.1 OPSS Granular A.
.2 Gradations to be within limits specified OPSS 1010.
.3 Liquid limit: to ASTM D 4318, maximum 25
.4 Plasticity index: to ASTM D 4318, maximum 6
.5 Los Angeles degradation: to ASTM C 131. Max. % loss by weight: 45
.6 Crushed particles: at least 60% of particles by mass within each of following sieve designation ranges to have at least 1 freshly fractured face. Material to be divided into ranges using methods of ASTM C 136.

Passing		Retained on
50 mm	to	25 mm
25 mm	to	19.0 mm
19.0 mm	to	4.75 mm

.7 Soaked CBR: to ASTM D 1883, min 100, when compacted to 100% of ASTM D 1557.

PART 3 - EXECUTION

3.1 Sequence of Operation

.1 Place granular base after sub-base or subgrade surface is inspected and approved by Engineer.

.2 Placing

.1 Construct granular base to depth and grade in areas indicated.
.2 Ensure no frozen material is placed.
.3 Place material only on clean unfrozen surface, free from snow and ice.
.4 Place material using methods which do not lead to segregation or degradation of aggregate.
.5 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Engineer may authorize thicker lifts if specified compaction can be achieved.
.6 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
.7 Remove and replace that portion of layer in which material becomes segregated during spreading.

.3 Compaction Equipment

.1 Compaction equipment to be capable of obtaining required material densities.

.4 Compacting

.1 Compact to 100% Standard Proctor maximum dry density to ASTM D698.
.2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
.3 Apply water as necessary during compacting to obtain specified density.
.4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Engineer.
.5 Correct surface irregularities by

loosening and adding or removing material until surface is within specified tolerance.

.5 Dust Control

.1 Apply water as necessary or as directed by Engineer to control dust.

3.2 Site Tolerances

.1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.3 Protection

.1 Maintain finished base in condition conforming to this section until succeeding material is applied or until acceptance by Engineer.

PART 1 - GENERAL

1.1 Related Sections	.1	Section 01 29 01 - Pay Item Descriptions
	.2	Section 01 33 00 - Submittal Procedures
	.3	Section 31 05 16 - Aggregate Material
1.2 References	.1	Ministry of Transportation Ontario (MTO) .1 OPSS 311
1.3 Measurement and Payment	.1	Measurement for payment and basis of payment for asphalt paving will be as specified in Section 01 29 01 - Pay Item Descriptions.
1.4 Design and Submission Requirements	.1	Design and submission requirements for asphalt paving will be as specified in OPSS 311.
1.5 Quality Assurance	.1	Quality assurance requirements for asphalt paving will be as specified in OPSS 311.

PART 2 - PRODUCTS

2.1 Materials	.1	Materials for asphalt paving will be as specified in OPSS 311.

PART 3 - EXECUTION

3.1 Equipment	.1	Equipment for asphalt paving will be as specified in OPSS 311.
3.2 Construction	.1	Construction of asphalt paving will be as specified in OPSS 311.
	.2	Reinstated asphalt paving shall match the elevation of existing pavement immediately adjacent to the limits of the repaired areas.

PART 1 - GENERAL

1.1 Related Work

.1 Section 01 29 01 Pay Item Descriptions

.2 Section 01 35 00.06 Special Procedures for Traffic Control

1.2 References

.1 CAN/CGSB-1.5-M91, Low Flash Petroleum Spirits Thinner.

.2 CGSB 1-GP-12c-93, Standard Paint Colours.

.3 CGSB 1-GP-71-83, Method, of Testing Paints and Pigments.

.4 CGSB 1-GP-74M-79, Paint, Traffic, Alkyd.

PART 2 - PRODUCTS

2.1 Materials

.1 Paint:

.1 To CGSB 1-GP-74M, alkyd traffic paint.

.2 Colour: to CGSB 1-GP-12C, yellow 505-308 black 512-301 white 513-301.

.3 Upon request, Engineer will supply a qualified product list of paints applicable to work. Qualified paints may be used but Engineer reserves right to perform further tests.

.2 Thinner: to CAN/CGSB-1.5.

PART 3 - EXECUTION

3.1 Equipment Requirements

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

3.2 Condition of Surfaces	.1	Pavement surface to be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.
3.3 Application	.1	Pavement markings to be laid out by the Contractor.
	.2	Pavement markings shall be reinstated as soon as possible following final paving.
	.3	Unless otherwise approved by Engineer, apply paint only when air temperature is above 10°C, wind speed is less than 60 km/h and no rain is forecast within next 4 h.
	.4	Apply traffic paint evenly.
	.5	Do not thin paint unless approved by Engineer.
	.6	Symbols and letters to conform to dimensions indicated.
	.7	Paint lines to be of uniform colour and density with sharp edges.
	.8	Thoroughly clean distributor tank before refilling with paint of different colour.
3.4 Tolerance	.1	Paint markings to be within plus or minus 12 mm of dimensions indicated.
3.5 Protection of Completed Work	.1	Protect pavement markings until dry.

PART 1 - GENERAL

1.1 Related Sections

.1 Section 32 01 90 - Tree and Shrub Protection

.2 Section 01 29 01 – Pay Item Descriptions

1.2 References

.1 Canadian Council of Ministers of the Environment (CCME).

CCME PN 1340 'Guidelines for Compost Quality' issued January 1996 (Revision 2005), Category (A) unrestricted, Category (B) restricted.'

1.3 Source Quality Control

.1 An independent testing laboratory will carry out inspection and testing of topsoil. Landscape Contractor will pay for costs of tests.

.2 Test topsoil from source for clay, sand and silt, Nitrogen (N), phosphorous (P), potassium (K) and magnesium (Mg), (N, P, K, Mg,) soluble salt content, pH value, growth inhibitors, soil sterilants organic matter and conductivity. Submit 0.5 kg a sample of topsoil to a testing laboratory and indicate present use, intended use, type of subsoil and quality of drainage. Prepare and ship the sample in accordance with provincial regulations and testing laboratory requirements.

.3 Determine required limestone treatment to bring pH value of soil ranges between 5.5 to 7.5 levels.

.4 Submit two copies of soil analysis and recommendations for corrections to Consultant.

1.4 Scheduling of Finish Work

.1 Schedule the placing of the topsoil and grading to permit sodding and seeding within seven days.

1.5 Definitions

.1 Friable: Soil, which is easily crumbled through fingers when held by hand.

PART 2 - PRODUCTS

2.1 Topsoil

.1 Topsoil to be imported:

.1 Friable, neither heavy clay nor very light sandy nature consisting of 45% sand, 35% silt, 20% clay and pH value of 5.5 to 7.5. Free from subsoil, roots, vegetation, debris, toxic materials, and stones.

.2 Organic Matter, 4% for clay loams, and 2% for sandy loams too maximum of 20% by volume.

.3 Contain no toxic elements or growth inhibiting materials.

.4 Finished surface free from:

.1 Debris and stones more than 50mm=s diametre.

.2 Course vegetative material, 10mm diametre and 100 mm length, occupying more than 2% of soil volume.
.3 Consistency: friable when moist.

2.2 Soil Amendments

.1 Peatmoss:
.1 Derived from partially decomposed fibrous or cellular stems and leaves of species of Sphagnum Mosses.
.2 Elastic and homogeneous, brown in colour.
.3 Free of wood and deleterious material, which could prohibit growth.
.4 Shredded particle minimum size 5 mm.

.2 Sand: washed course silica sand, medium to course textured.

.3 Limestone:
.1 Ground agricultural limestone containing minimum calcium carbonate equivalent of 85%.
.2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

2.3 Source Quality Control

.1 Advise Contract Administrator topsoil sources to be utilized with sufficient lead-time for testing.

.2 Contractor is responsible for amendments to supply topsoil as specified.

.3 Soil testing by recognized testing facility for pH, P and K, and organic matter.

.4 A testing laboratory designated by the Contract Administrator will carry out testing of topsoil. Soil sampling, testing and analysis to be in accordance with Provincial standards.

PART 3 - EXECUTION

3.1 Preparation of Existing Grade

.1 Verify that grades are correct. If discrepancies occur, notify the Contract Administrator and do not commence work until instructions have been received.

.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage. Remove soil contaminated with toxic materials. Dispose of removed materials as directed by Consultant.

.3 Remove debris, roots, branches, stones in excess of 50mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris, which protrudes more than 75 mm above surface. Dispose of removed material off site.

.4 Cultivate entire area that is to receive topsoil to

depth of minimum 25 mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.2 Place and Spreading of Topsoil - Planting Soil

.1 Spread topsoil after subgrade has been approved. Refer to Drawings for direction of surface drainage.

.2 Spread topsoil with adequate moisture in uniform layers not exceeding 150 mm, over approved, unfrozen subgrade, where sodding, seeding and planting is indicated.

.3 Spread topsoil to following minimum depths after settlement, **80%** compaction:
.1 100 mm for sodded areas

.4 Apply planting soil as indicated on drawings.

.5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.3 Soil Amendments

.1 Apply soil amendments at rate as specified and as determined from soil sample test.

.2 Apply planting soil as indicated on drawings and details.

3.4 Finish Grading

.1 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by the Contract Administrator. Leave surfaces smooth, uniform and firm against deep foot printing.

3.5 Acceptance

.1 Contract Administrator will inspect topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.6 Surplus Material

.1 Dispose of materials, except topsoil off site or as directed by the Contract Administrator

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 32 91 19.13 - Topsoil Placement and Grading.

.2 Section 01 29 01 – Pay Item Descriptions

1.2 SCHEDULING

.1 Schedule sod laying to coincide with preparation of soil surface.

.2 Schedule sod installation when frost is not present in ground.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.

.1 Turf Grass Nursery Sod types:

.1 Number One Kentucky Bluegrass Sod: Nursery Sod grown solely from seed of cultivars of Kentucky Bluegrass, containing the following cultivars:

25% Sudden Impact Kentucky Bluegrass
25% Bluechip Kentucky Bluegrass
25% Rush Kentucky Bluegrass
25% Cheetah Kentucky Bluegrass

.2 Water:

.1 Water must be free of impurities that would inhibit germination and growth.

2.2 SOURCE QUALITY CONTROL

.1 Obtain approval from Engineer of sod at source.

.2 When proposed source of sod is approved, use no other source without written authorization from Engineer

PART 3 - EXECUTION

3.1 PREPARATION

.1 Verify that grades are correct and prepared in accordance with Section 32 91 19.13 - Topsoil Placement and Grading. If discrepancies occur, notify Engineer and do not commence work until instructed by Engineer.

.2 Do not perform work under adverse field conditions

such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.

.3 Fine grade surface free of humps and hollows to smooth, even grade, to elevations indicated, to tolerance of plus or minus 8 mm, for Turf Grass Nursery Sod, surface to drain naturally.

.4 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site in location as directed by Engineer.

3.2 SOD PLACEMENT

.1 Lay sod within 24hours of being lifted if air temperature exceeds 20 degrees C.

.2 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

.3 Roll sod as directed by Engineer. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.5 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following operations from time of installation until acceptance.

.2 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.

.3 Cut grass to 50mm when or prior to it reaching height of 75 mm. Remove clippings which will smother grassed areas.

.4 Maintain sodded areas weed free

3.6 ACCEPTANCE

.1 Turf Grass Nursery Sod areas will be accepted by Contract Administrator provided that:
.1 Sodded areas are properly established.
.2 Sod is free of bare and dead spots.
.3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50mm.
.4 Sodded areas have been cut minimum 2 times prior to acceptance.

.2 Areas sodded in fall will be accepted in following spring one month after start of growing season (May 15 commencement) provided acceptance conditions are fulfilled.

SPECIAL PROVISION - GENERAL

No. D-014

CONSTRUCTION ACTIVITIES AROUND TREES
FIELD PRACTICES & BY-LAWS

Subsection GC7.14, Limitations of Operations, of the Modified OPS General Conditions is supplemented by the following:

Construction Activities Around Trees

1. Through out the complete duration of the project the Contractor shall ensure that all equipment stays within the confines of the work area so as not to disrupt any turf or tree roots. The storage of equipment and vehicles around any trees within the right of way is prohibited.

2. The Contractor shall remove all excavated material immediately and not place it on grass or near trees for any length of time. This also applies to imported material, *i.e.* topsoil, granulars, trench boxes, or any construction related materials.

3. The contractor shall reinstate all disturbed turf to its original state immediately upon completion of work.

4 The Contractor shall protect all trees whose driplines are within five (5) metres of the work area by installing snow fence outside of the tree's dripline/rootzone.

5 The contractor shall protect the trunk of the trees with wood lath fence to a height of 2.4 metres, or as prescribed by the City Forester.

6. The Contractor shall not store fuel within the dripline of any tree, and exhaust fumes from all equipment must NOT be directed towards any tree's canopy.

7. The Contractor shall take all steps necessary to avoid mechanical damage when operating raised dump boxes or large excavating equipment in proximity to trees which overhang the road allowance.

8. The Contractor shall consult with the City Forester to minimize tree related conflicts. Where damage does occur it must be reported immediately to the office of the City Forester.

9 During the period between 15 May and 15 September of each year, the Contractor shall water all plants and shall be carried out no less than 3 times weekly, in accordance with the watering schedule submitted to the City's Forestry Office for review each week during this period.

10 The contractor shall protect the exposed tree roots. Wet filter cloth shall be used to temporarily cover and protect the exposed tree roots. Filter cloth shall be installed immediately following root exposure, and shall be held in place with approved pins or spikes until backfilling occurs. Exposed roots shall be kept continuously moist while exposed during construction activities.

Applicable City of Ottawa By-laws:

Section 20.2 states that no permit holder shall carry out work within the dripline of a City owned tree.

Section 20.3 states that if the permit holder must carry out work within the dripline of a City owned tree, the permit holder shall tunnel or bore under the dripline area.

Section 20.4 states that the permit holder shall protect the trees from materials, equipment and changes in the grade of soil within the dripline area by the placement of protective fencing.

Section 20.5 states that no permit holder shall remove, trim or alter any tree unless authorization is first received from the General Manager.

Section 20.6 states that If a tree is removed, or damaged and must be replaced, as determined by the General Manager, the permit holder shall be responsible for removing and replacing the tree at its expense and shall pay to the City the value of the removed tree.

Section 20.7 states that for the purposes of subsection (6), a replacement tree shall have a minimum diameter of 70 millimetres measured at a point 0.3 metres above ground level and be of a species approved by the General Manager, and the value of the tree to be replaced will be determined by City staff in accordance with the latest edition of the International Society of Arboriculture Tree Evaluation Guide, or at values determined by the City and in effect at the time the damage took place.

Section 20.8 states that where the physical conditions are such that the permit holder cannot comply with the provisions of subsections (2), (3) or (4), the General Manager may approve alternative methods of work to maximize the protection of trees.

Additional information refer to the City's *Tree Protection* Guidelines available at Ottawa.ca or at the following web link*:* http://www.ottawa.ca/en/residents/water-and-environment/trees-and-community-forests/protecting-trees

The Contractor shall not make any claim for extra compensation for the cost of fulfilling the obligations set out in this Special Provision.

Warrant: On all Contracts

CONSTRUCTION SPECIFICATION FOR ASPHALT SIDEWALK, DRIVEWAY, AND BOULEVARD AND FOR SIDEWALK RESURFACING

TABLE OF CONTENTS

311.01 SCOPE

This specification covers the requirements for the construction of asphalt sidewalk, driveway, and boulevard on prepared base and for the resurfacing of existing sidewalk.

311.01.01 Specification Significance and Use

This specification has been developed for use in provincial- and municipal-oriented Contracts. The administration, testing, and payment policies, procedures, and practices reflected in this specification correspond to those used by many municipalities and the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

311.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

311.02 REFERENCES

When the Contract Documents indicate that provincial-oriented specifications are to be used and there is a provincial-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.PROV, unless use of a municipal-oriented specification is specified in the Contract Documents. When there is not a corresponding provincial-oriented specification, the references below shall be considered to be to the OPSS listed, unless use of a municipal-oriented specification is specified in the Contract Documents.

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 510 Removals

Ontario Provincial Standard Specifications, Material

OPSS 1103 Emulsified Asphalt
OPSS 1150 Hot Mix Asphalt

311.05 MATERIALS

311.05.01 Hot Mix Asphalt

The hot mix asphalt (HMA) for this work shall be according to OPSS 1150. The type of HMA shall be as specified in the Contract Documents.

311.05.02 Emulsified Asphalt

The emulsified asphalt shall be undiluted SS-1 according to OPSS 1103.

311.06 EQUIPMENT

311.06.01 Roller

A hand-operated roller weighing not less than 135 kg or a self-propelled roller shall be used.

311.07 CONSTRUCTION

311.07.01 General

The HMA shall be placed on the prepared base or on the surface of the existing sidewalk to the line, grade, dimensions, and thickness shown in the Contract Documents. The prepared base shall be dry, well compacted, and approved by the Contract Administrator before work commences.

HMA shall not be placed unless the surface is dry and the air temperature is at least 7 °C and rising. HMA shall not be placed faster than it can be properly raked and screeded.

Areas inaccessible to a roller shall be compacted with hand operated hot tampers.

The sidewalks, driveways, and boulevards and the resurfaced sidewalks shall not be opened to pedestrians or vehicles until the mix has cooled sufficiently to prevent deformation.

Forms or other approved means shall be used to obtain proper line and neat uniform edges.

311.07.02 Sidewalk Resurfacing

The surface of the existing sidewalk on which asphalt is to be placed shall be thoroughly cleaned. Loose and broken material shall be removed from locations designated in the Contract Documents. Removals shall be according to OPSS 510.

Sound concrete or asphalt surfaces that are to remain shall be uniformly sprayed with emulsified asphalt at the rate of 0.5 kg/m^2. The emulsified asphalt shall form a continuous film over the surface and shall be allowed to dry until it reaches the required state of tackiness before the resurfacing course is laid.

311.07.03 Tolerances

The surface, after compaction, shall be smooth and true to the established grade and of a uniform texture.

The surface of the finished sidewalk, driveway, and boulevard shall be free from depressions exceeding 5 mm as measured with a 3 m straight edge placed anywhere on the sidewalk, parallel to the centreline.

311.07.04 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

311.09 MEASUREMENT FOR PAYMENT

311.09.01 Actual Measurement

311.09.01.01 Asphalt Sidewalk
Asphalt Driveway
Asphalt Boulevard
Sidewalk Resurfacing

Measurement of asphalt placed shall be by area in square metres.

311.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

311.10 BASIS OF PAYMENT

311.10.01 Asphalt Sidewalk - Item
Asphalt Driveway - Item
Asphalt Boulevard - Item
Sidewalk Resurfacing - Item

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

311.10.02 Hot Mix Asphalt

HMA designated for this work shall be paid for at the Contract price for the appropriate hot mix tender item.

Appendix 311-A, November 2009
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- The type of HMA to be used. The Contract Documents should contain an HMA item for use with this specification. (311.05.01)

- The line, grade, dimensions, and thickness of HMA to be placed. (311.07.01)

- The areas of sidewalk to be removed. (311.07.02)

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

No information provided here.

CONSTRUCTION SPECIFICATION FOR ABRASIVE BLAST CLEANING - CONCRETE CONSTRUCTION

TABLE OF CONTENTS

929.01 SCOPE

This specification covers the requirements for abrasive blast cleaning of concrete surfaces and reinforcing steel.

929.01.01 Specification Significance and Use

This specification has been developed for use in provincial- and municipal-oriented Contracts. The administration, testing, and payment policies, procedures, and practices reflected in this specification correspond to those used by many municipalities and the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

929.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

929.02 REFERENCES

When the Contract Documents indicate that provincial-oriented specifications are to be used and there is a provincial-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.PROV, unless use of a municipal-oriented specification is specified in the Contract Documents. When there is not a corresponding provincial-oriented specification, the references below shall be considered to be to the OPSS listed, unless use of a municipal-oriented specification is specified in the Contract Documents.

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

ASTM International

D 4285-83 (R2006) Standard Test Method for Indicating Oil or Water in Compressed Air

The Society for Protective Coatings (SSPC)

VIS 1-2002 Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning

Joint Publications of the Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE)

SSPC-SP 6/NACE No. 3-2007 Commercial Blast Cleaning

929.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Abrasive means a solid substance capable of grinding or wearing down.

Fiber Reinforced Polymer (FRP) Reinforcement means a structural reinforcing bar made from glass fibers or carbon fibers held in a polymeric resin matrix binder. FRP includes dowels, reinforcing bars and grids.

Layer, Reinforcing Steel means two or more reinforcing bars placed in a plane parallel to a concrete face.

Mat, Reinforcing Steel means transverse and longitudinal layers of reinforcing steel tied together.

Structure means any bridge, culvert, tunnel, retaining wall, wharf, dock, guideway or any part thereof, or other reinforced concrete component designed to carry loads, including high mast pole footings and sign support footings.

929.06 EQUIPMENT

929.06.01 Air Compressor

The air compressor for abrasive blast cleaning shall be capable of delivering material at a pressure of 620 kPa. The air pressure shall be measured in the delivery system at a distance not greater than 3 m from the nozzle end.

The compressed air shall be clean, dry, and free of oil residue when tested according to ASTM D 4285.

Nozzles used for abrasive blast cleaning shall have a minimum diameter of 8 mm and the size shall be indicated on the nozzle.

Hoses used for abrasive blast cleaning shall have an internal diameter not less than 40 mm.

929.07 CONSTRUCTION

929.07.01 General

Abrasive blast cleaning shall only be permitted when the concrete and reinforcing steel are surface dry.

Areas and components not designated for abrasive blast cleaning shall be protected from adjacent abrasive blast cleaning operations.

All new epoxy coated reinforcing steel and any FRP reinforcement in the vicinity of the abrasive blast cleaning operations shall be protected from damage.

Adequate access to the work area shall be provided to facilitate the work and for any inspection or measurement required by the Contract Administrator.

929.07.02 Abrasive Blast Cleaning of Reinforcing Steel

Abrasive blast cleaning of existing reinforcing steel applies to both epoxy coated and uncoated reinforcing steel.

All existing epoxy coated reinforcing steel within a concrete removal area shall be abrasive blast cleaned to remove the epoxy coating. Reinstatement of the epoxy coating on the existing reinforcing steel is not required.

The full circumference of the existing exposed reinforcing steel shall be abrasive blast cleaned to a commercial blast cleaned finish according to SSPC-SP 6/NACE No. 3, and the blast cleaned steel surfaces shall be according to the applicable visual standards specified in SSPC-VIS 1.

When silica sand is used as the abrasive material, the subsequent placement of concrete or shotcrete shall be done within 72 hours or the reinforcing steel shall be reblasted. When other types of abrasive materials are used, the subsequent placement of concrete or shotcrete shall be done within 36 hours or the reinforcing steel shall be reblasted.

929.07.03 Abrasive Blast Cleaning of Structural Steel in Contact with Concrete

All surfaces of existing structural steel against which new concrete is to be placed for the rehabilitation of a concrete structure component shall be abrasive blast cleaned to a commercial blast cleaned finish according to SSPC-SP6/NACE No. 3, and the blast cleaned steel surfaces shall be according to the applicable visual standards specified in SSPC-VIS 1.

The abrasive blast cleaning of structural steel shall be done immediately prior to placing coated reinforcing steel or FRP reinforcement.

Enclosure shall be provided during abrasive blast cleaning of structural steel to prevent escape of dust from the immediate work area into the natural environment, live traffic, waterways, and beyond the right-of-way.

929.07.04 Abrasive Blast Cleaning of Concrete Surfaces

929.07.04.01 General

All new and existing concrete surfaces against which new concrete is to be placed shall be abrasive blast cleaned.

The abrasive blast cleaning shall be of an extent to expose and clean the coarse aggregate and remove all dirt, laitance, and hardened concrete slurry. Any oil or grease on the surface of the concrete shall be removed using hand tools.

The abrasive blast cleaning of concrete surfaces shall be carried out not more than 48 hours prior to the placement of concrete against them.

Immediately after abrasive blast cleaning is completed, the surface shall be checked by the Contract Administrator for fractured concrete or loose aggregate. This material shall be removed using hand tools.

929.07.04.02 Concrete Surfaces for Overlays

Abrasive blast cleaning shall proceed by delineating an area of the deck not exceeding 10 m^2 and completing abrasive blast cleaning within the delineated area prior to proceeding to the adjacent areas of the deck surface.

When the concrete overlay is to be placed over cathodic protection anode mesh, the abrasive blast cleaning shall be completed prior to installing the mesh in that area.

Except when anode mesh is used, areas of concrete that are abrasive blast cleaned for the subsequent treatment of concrete overlay, shall have the overlay applied within 36 hours or shall be reblasted.

929.07.05 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

929.08 QUALITY ASSURANCE

928.08.01 General

After abrasive blast cleaning is completed, the abrasive blast cleaned concrete surfaces, reinforcing steel, and structural steel shall be examined by the Contract Administrator to verify that the requirements of this specification have been met.

929.09 MEASUREMENT FOR PAYMENT

929.09.01 Actual Measurement

929.09.01.01 Abrasive Blast Cleaning of Reinforcing Steel

Measurement for payment shall be of the area of concrete removed in square metres where reinforcing steel bars are exposed. When the removal exposes more than one mat of reinforcing steel, the measured area shall be for each mat of exposed bars that are to remain in place. There shall be no measurement for abrasive blast cleaning of reinforcing steel in volume of concrete that was not designated for concrete removal by the Contract Administrator.

When only one reinforcing steel bar is exposed in the area of concrete removal, the area shall be calculated based on the width of 200 mm by the length of the exposed reinforcing steel bar.

The total area shall be calculated to the nearest 0.1 m^2.

929.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

929.10 BASIS OF PAYMENT

929.10.01 Abrasive Blast Cleaning for Overlays - Item
Abrasive Blast Cleaning of Reinforcing Steel - Item
Abrasive Blast Cleaning of Structural Steel in Contact with Concrete - Item

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the Work.

Abrasive blast cleaning of reinforcing steel applies to abrasive blast cleaning of existing reinforcing steel that is either epoxy coated or uncoated reinforcing steel.

When the Contract does not contain a separate tender item for providing access to the work, the Contract price for the abrasive blast cleaning items requiring the access shall include full compensation for all labour, Equipment, and Material to provide such access.

Appendix 929-A, April 2012
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

No information provided here.

CONSTRUCTION SPECIFICATION FOR CRACK REPAIR - CONCRETE

TABLE OF CONTENTS

932.01 SCOPE

This specification covers the requirements for the pressure injection, routing, and sealing of cracks in concrete for the purpose of structural rehabilitation and water seepage control.

932.01.01 Specification Significance and Use

This specification has been developed for use in provincial- and municipal-oriented Contracts. The administration, testing, and payment policies, procedures, and practices reflected in this specification correspond to those used by many municipalities and the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

932.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

932.02 REFERENCES

When the Contract Documents indicate that provincial-oriented specifications are to be used and there is a provincial-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.PROV, unless use of a municipal-oriented specification is specified in the Contract Documents. When there is not a corresponding provincial-oriented specification, the references below shall be considered to be to the OPSS listed, unless use of a municipal-oriented specification is specified in the Contract Documents.

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 920	Deck Joint Assemblies, Preformed Seals, Joint Fillers, Joint Seals, Joint Sealing Compounds, and Waterstops - Structures
OPSS 929	Abrasive Blast Cleaning - Concrete Construction

Ontario Provincial Standard Specifications, Material

OPSS 1212	Hot Poured Rubberized Asphalt Joint Sealing Compound
OPSS 1302	Water

ASTM International

C 920-08	Elastomeric Joint Sealants
D 4285-83 (2006)	Test Method for Indicating Oil or Water in Compressed Air

932.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Active Crack means a crack in concrete with plane surfaces that are in a state of movement relative to each other.

Crack Depth means the distance that the crack extends from the injection surface into the concrete to the point where the crack is 0.10 mm wide.

Effective Pressure means the fluid grout pressure at point of entry at the injection port. This shall be calculated as gauge pressure minus head losses in injection system.

Engineer means a Professional Engineer licensed by the Professional Engineers Ontario to practice in the province of Ontario.

Flushing means removing debris from the crack section by means of air or a liquid under pressure.

Gauge Pressure means the actual fluid grout pressure reading on the pump gauge.

Injection Port means a mechanical device that is firmly connected into the crack section for the purpose of providing access into a crack for the grouting material.

Passive Crack means a concrete crack in concrete with plane surfaces that are not moving relative to each other.

Payment Adjustment Factor means a multiplier applied to the unit Contract price to determine the actual unit payment price.

Plural Component Pump means a grout pump that separately delivers the grout material components separately to a common static mixer.

Pot Life means the period of time during which the polyurethane or epoxy resin remains pumpable.

Refusal Criteria means zero flow of grout at the proposed effective pressure for a duration of 5 minutes.

Regulated Operating Pressure means the maximum pressure, measured at the pump discharge, that the pump is capable of producing.

932.04 DESIGN AND SUBMISSION REQUIREMENTS

932.04.01 Submissions

932.04.01.01 Crack Repair Work Plan

Four copies of the crack repair work plan shall be submitted to the Contract Administrator at least 3 weeks prior to the commencement of the work.

The crack repair work plan shall bear the seal and signature of an Engineer and include at least the following information.

a) A description of the method of repair, including the following minimum information:

   i. Basis of selection.
   ii. Proposed effective pressure.

iii. Surface finishing.
iv. Location and size of injection ports.
v. Surface treatment of the concrete prior to surface sealing.
vi. Method of storing and handling grouts, cleaning solvents, and waste materials.

b) A list of the materials to be used for crack preparation and repair, including the following minimum information:

i. Material specifications.
ii. Product data sheets with test data.
iii. Material safety data sheets.
iv. Pot life of the components to be used based on a sample size of 200 ml at 5 °C and 20 °C.

c) A certificate from the material supplier shall be submitted stating the material is suitable for the intended use in this Contract.

d) A list of the equipment and accessories to be used including the following minimum information:

i. The operating pressure of each component.
ii. The type of injection port and means of closure.

932.04.02 Return of Submissions

Two copies of each submission shall be returned marked as one of the following:

a) Stamped with the wording that allows for permission to construct.

In this case, work can commence upon receipt of the submission by the Contractor. A copy of the submission shall be available at the site prior to and during construction.

b) Stamped with the wording that allows for permission to construct as noted.

In this case, work can start upon receipt of the submission by the Contractor. The submission shall be updated as noted and shall have a stamp affixed that is signed by an Engineer stating the submission has been revised according to the noted comments. A copy of the stamped updated submission shall be available at the site prior to and during construction.

c) Showing only required changes.

In this case, the submission shall be updated as required and the submission process repeated.

932.05 MATERIALS

932.05.01 Grout

932.05.01.01 General

Material used for crack injection shall be polyurethane resins for active cracks and epoxy resins for passive cracks.

Polyurethane and epoxy grout shall prevent the penetration of water and shall have sufficient flowability to fill the crack at least 80% of the depth of the crack using the proposed equipment and method of repair at the ambient and substrate temperatures existing at the time of grouting.

932.05.01.02 Epoxy Resin

Epoxy resin shall be moisture insensitive and 100% solids.

932.05.01.03 Polyurethane Resin

Polyurethane resin shall be 100% solids.

932.05.02 Joint Sealing Compounds

932.05.02.01 Hot-Poured Rubberized Joint Sealing Compound

The hot-poured rubberized joint sealing compound shall be according to OPSS 1212.

932.05.02.02 Cold-Applied Joint Sealing Compound

Cold-applied joint sealing compound shall be according to ASTM C 920, Type S, Grade NS, Class 25, Use TM. Type M sealant shall be used where the depth of a chase exceeds 15 mm or the manufacturer's recommended depth for Type S sealant, whichever is less. Where the cold sealing compound is visible after completion of the work a grey colour material shall be used.

932.05.03 Water

Water shall be according to OPSS 1302.

932.06 EQUIPMENT

932.06.01 Gauges

In addition to the calibrated gauges required for use with the pumps and with the injection hose, additional gauges shall be available on site to replace those that malfunction.

Certificates of calibration, from an organization accredited by the Standards Council of Canada shall be supplied for each gauge certifying that the gauges are capable of measuring the pressure within a tolerance of $\pm$ 5 kPa.

932.06.02 Pumps

Equipment used for pressure injection shall be suitable for the intended use and compatible with the grout.

Pumps shall be positive displacement type and shall be capable of delivering a minimum of two litres of grout per minute.

Pumps shall be capable of developing a maximum regulated operating pressure at least equal to twice the effective pressure.

Pumps shall be equipped with a calibrated gauge and shall be capable of accurately maintaining an effective operating pressure of 50 kPa or less.

Plural component pumps shall be used when multicomponent solution grouts are used.

Hand cartridge pumps shall not be used unless the volume of crack repair is less than one litre of resin for 100 m^2 of gross repair area.

932.06.03 Mixers

932.06.03.01 Static In-Line Mixers

Static in-line mixers shall produce a homogeneous grout and shall be sized to accommodate the minimum and maximum anticipated flow rates.

Static mixers shall have the manufacturer's plate attached showing the following mixer information:

a) Size.

b) Type.

c) Maximum operating pressure.

932.06.03.02 Agitating Mixer

Agitating mixers shall have a power driven paddle mixing head and produce a homogeneous component.

The speed of the mixers shall be variable to a maximum of 500 rpm.

932.06.04 Injection Hoses

Injection hoses shall have a rated working pressure equal to or greater than the maximum pump operating pressure and shall be equipped with a calibrated gauge at the injection port end.

932.06.05 Injection Ports

Injection ports shall be removable or non-metallic insert type units. The pressure capacity of the injection ports shall be at least equal to the maximum operating pressure of the pump. All injection ports shall be equipped with a shut-off valve or other mechanical means of closure under pressure.

Surface mounted injection ports shall not be used.

932.06.06 Air Compressor

Compressed air shall be free from oil and water when tested according to ASTM D 4285.

932.06.07 Drills

Drilling of the injection holes shall be performed using a rotary percussion or rotary diamond type drill.

Percussion drilling equipment shall not be used for drilling holes greater than 26 mm diameter and holes within 150 mm of any edge of concrete.

Only holes 26 mm or less in diameter shall be drilled within 50 mm of any free edge of concrete.

932.06.08 Routing Equipment

Routing equipment shall be any of the following:

a) Concrete router.

b) Hand-held grinding wheel or a multi-bladed cut-off saw equipped with abrasive or diamond blades.

c) Multi-bladed floor saw cutting equipment equipped with diamond blades.

932.07 CONSTRUCTION

932.07.01 General

Installation of all accessories and material shall be according to the manufacturer's recommendations and as specified in the submitted work plan.

Work shall only proceed when the temperature of the concrete is 5 °C or greater.

932.07.02 Access

Adequate access shall be provided to facilitate:

a) Performance of work.

b) Inspection and measurement of the work by the Contract Administrator.

932.07.03 Crack Identification

Prior to commencement of the work, the cracks requiring repair, as identified by the Contract Administrator, shall be numbered, physically marked as to their extent, and measured in the presence of the Contract Administrator.

This information shall be recorded and a copy submitted to the Contract Administrator.

932.07.04 Crack Injection

932.07.04.01 Drilling for Injection Ports

Injection holes shall be drilled, on each side of the crack, at a 45° angle to the surface of the concrete. The holes shall be located such that they intersect the crack section at approximately the midpoint and they shall extend through the crack section. The holes shall be sized to accommodate the injection ports. The spacing of the holes shall not exceed the depth of the crack or 200 mm, and the holes shall be alternated from one side of the crack to the other.

Prior to installation of the injection ports each hole shall be individually cleaned of all deleterious material by an air-water blast to completely remove all drill cuttings from the hole.

Injection ports shall be inserted into the holes and sealed. The inserted end of the injection port shall not extend beyond the point at which the drilled hole intersects the crack.

932.07.04.02 Cleaning and Flushing

After the injection ports have been inserted, cracks shall be flushed with an air-water mixture or an alternating water and air flush to remove all deleterious material prior to the injection of grout. The flushing material shall be injected through the injection port and continued until it exudes from the adjacent injection port and the crack is thoroughly cleaned. This flushing shall proceed from one end of the crack to the other.

A final flush shall be made with air only to remove all of the free water.

932.07.04.03 Surface Preparation and Sealing

Surface opening of the cracks shall be sealed prior to injection.

The surface of the concrete shall be mechanically cleaned for a distance of 25 mm each side of the crack sections to prepare a clean substrate for bonding of the surface sealing compound. The surface preparation and sealing shall be as recommended by the manufacturer of the surface sealing material.

The surface sealing material shall completely confine the injection grout to the crack section with only the injection ports providing access. The surface sealing material shall withstand the maximum injection pressure without developing leakage along the crack section.

Surface sealing of passive cracks shall not commence until at least one hour after the final air flush.

932.07.04.04 Injection of Grout

932.07.04.04.01 General

Injection of grout shall proceed from the injection port at the lowest elevation of the crack and continue upwards along the crack on an injection port to injection port basis without interruption to the other end of the crack. The injection nozzle shall not be moved to the adjacent injection port until grout is showing at the next higher adjacent injection port or refusal criteria is developed.

While under pressure, each injection port shall be sealed immediately after completion of injection at that injection port.

When a maximum operating pressure greater than 3 MPa is required to inject the grout, the injection operation shall cease until the Contractor determines why this operating pressure is required.

932.07.04.04.02 Monitoring

The volume of grout used within each five metres of crack length shall be recorded. The pump gauge pressure shall be recorded every 10 minutes. The volume of grout and pump pressure shall be related to the crack location.

The records shall indicate crack location and number, injection port spacing and confirmation of grout showing or refusal. A copy of the recorded information shall be submitted to the Contract Administrator at the end of each Day.

932.07.04.04.03 Effective Pressure

When calculating the effective pressure, the head losses shall be determined prior to commencement of injection.

Head losses shall be determined in the presence of the Contract Administrator by performing a pressure flow test, through the equipment, for each equipment configuration used.

932.07.04.04.04 Ratio Test

Plural component injection equipment proportioning shall be verified in the presence of the Contract Administrator by measuring the volume output of material in the pressure lines at least once for each two hours of operation.

When deviation from the manufacturer's specified proportioning ratio exceeds 5%, immediate adjustment or replacement of the equipment is required.

932.07.04.04.05 Pot Life Determination

Prior to commencing the grouting operation, a sample shall be taken from the material containers on site and manually proportioned to the specified component ratio in the presence of the Contract Administrator. The total sample size shall be 200 ml, and the same size container shall be used for each sample taken.

The temperature of the material at the time of mixing and the pot life of the mixed material shall be recorded.

The proportions of materials and pot life shall conform to those specified in the original submissions.

An additional sample shall be taken from the end of the injection hose and a further pot life determination performed.

During grouting material samples shall be taken on a frequency of at least one per hour of operation and the pot life recorded.

Deviation from the proportions and pot life specified shall result in immediate discontinuance of use of the material.

All records shall be submitted to the Contract Administrator at the end of each working day.

932.07.04.05 Surface Finishing

Surface finishing shall not proceed until the curing period, as specified by the material supplier, has elapsed. Surface finishing shall consist of removal of the injection ports and the surface sealant flush with the original concrete surface. Core holes and holes left after the removal of injection ports shall be filled with a cement-based non-shrink grout after the surface sealant has been removed.

Where the crack is not completely filled to the injection surface, the crack shall be filled with a compatible material acceptable to the Contract Administrator. The material shall be applied according to the manufacturer's recommendations.

932.07.04.06 Coring

A 75 mm diameter test core shall be taken for each completed ten-metre increment of injected crack for the full depth of the crack, within 1½ to 2 hours after injection, at locations specified by the Contract Administrator. The ten-metre increment is the length of a continuous crack or a cumulative measurement of cracks of lesser length. The cores shall be submitted to the Contract Administrator. Similar coring shall be done to check remedial work.

932.07.04.07 Filling of Core Holes

Following the extraction of cores all slurry and other debris shall be removed from the core holes. The holes shall be blasted with compressed air and filled with non-shrink grout flush with the surface of the concrete.

Surface preparation, mixing, installation, and curing shall be according to the manufacturer's recommendations.

932.07.05 Routing and Sealing Cracks

Cracks shall be routed to create a chase and then filled with a sealant.

The depth to width ratio of the chase shall be 1H:1V with the crack located within the middle third of the chase. The width of the chase shall be 15 mm $\pm$ 5 mm.

The chase shall be abrasive blast cleaned according to OPSS 929. Abrasive blast cleaned areas shall have the subsequent treatment applied within 36 hours or shall be reblasted.

Immediately prior to placing the bond breaker, the chase shall be blasted with compressed air to remove all dust, dirt, and loose material.

A bond breaker compatible with the joint sealing compound and concrete shall be placed at the bottom of the chase.

Joint sealing compound shall be placed in the chase flush with the adjacent concrete surface unless it is subjected to vehicular traffic, in which case, it shall be recessed 2 mm $\pm$ 1 mm.

Hot-poured rubberized joint sealing compounds shall only be used on horizontal surfaces. Cold-applied joint sealing compounds shall only be used on vertical surfaces or on horizontal surfaces that are not to be waterproofed. Cold-applied joint sealing compound shall be installed according to the manufacturer's recommendations. Hot-poured rubberized joint sealing compound shall be installed according to OPSS 920.

932.07.06 Remedial Action

The failure of the test cores to meet the requirements specified in the Quality Assurance section shall be sufficient cause for immediate review and adjustment of the method of injection. The ten-metre increments represented by the failed test cores shall be repaired such that at least 80% of the crack depth is filled. The method of repair shall be submitted to the Contract Administrator prior to the commencement of the work.

932.07.07 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

932.08 QUALITY ASSURANCE

932.08.01 General

When the repair operation is complete, the Contract Administrator shall inspect the work to determine if the completed work contains defects.

932.08.02 Crack Injection

The 75 mm diameter test cores shall be examined for the percentage of the crack depth filled.

932.08.03 Ratio Test

The proportioning ratio of the injection material shall not deviate more than 5% from the manufacturer's specified proportioning ratio stated in the work plan.

932.08.04 Pot Life

The proportion of material and pot life shall not deviate from that specified by the manufacturer in the work plan.

932.08.05 Acceptance or Rejection

The Contract Administrator shall accept or reject material on the basis of the ratio testing and pot life determination results.

Crack injection shall be accepted or rejected on the basis of the percentage of crack depth filled as determined by evaluating the test core taken in each ten-metre increment of length.

Rejection of the ten-metre increment of crack shall be applied during the entire grouting operation.

Where 90% or more of the crack depth is filled in the test core, the ten-metre increment of crack length represented by the core shall be accepted.

Where 80 to 89% of the crack depth is filled in the test core, the work shall be accepted and a payment adjustment shall be applied to the ten-metre increment length of crack represented by that core.

Where less than 80% of the crack depth is filled in the test core, the ten-metre increment of crack length represented by the core shall be rejected.

932.09 MEASUREMENT FOR PAYMENT

932.09.01 Actual Measurement

932.09.01.01 Crack Injection

Measurement of crack injection shall be by length in metres of the accepted injected cracks. The total length shall be the sum of individual increments represented by the accepted test cores taken within each increment. Cracks filled to less than 80% of the crack depth shall not be measured for payment.

932.09.01.02 Routing and Sealing

Measurement of routing and sealing shall be by length in metres.

932.10 BASIS OF PAYMENT

932.10.01 Crack Injection - Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Material to do the work.

There shall be 100% payment of the Contract price where 90% or more of the crack depth is filled.

There shall be no payment where less than 80% of the crack depth is filled.

There shall be a payment adjustment of the unit Contract price for each ten-metre increment of crack filled to between 80% and 89% of the crack depth.

$$Pa = [100 - (89-D) \times 2] \div 100$$

Where: Pa = payment adjustment factor
D = percentage of the crack depth filled, rounded to the nearest 0.1%.

and: $89 \geq D \geq 80$

932.10.02 Routing and Sealing-Hot-Poured Rubberized Joint Sealing Compound-Item
Routing and Sealing-Cold-Applied Joint Sealing Compound-Item

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

Appendix 932-A, November 2009
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

No information provided here.

MATERIAL SPECIFICATION FOR AGGREGATES - GENERAL

TABLE OF CONTENTS

1001.01 SCOPE

This specification covers the source, processing, and testing requirements for aggregates and provides for the use of reclaimed asphalt pavement and reclaimed concrete material.

1001.01.01 Specification Significance and Use

This specification has been developed for use in provincial- and municipal-oriented Contracts. The administration, testing, and payment policies, procedures, and practices reflected in this specification correspond to those used by many municipalities and the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

1001.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

1001.02 REFERENCES

When the Contract Documents indicate that provincial-oriented specifications are to be used and there is a provincial-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.PROV, unless use of a municipal-oriented specification is specified in the Contract Documents. When there is not a corresponding provincial-oriented specification, the references below shall be considered to be to the OPSS listed, unless use of a municipal-oriented specification is specified in the Contract Documents.

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Ministry of Transportation Publications

MTO Laboratory Testing Manual:
LS-602 Sieve Analysis of Aggregates

Canadian General Standards Board

8.1-88 Sieves, Testing, Woven Wire, Inch Series

ASTM International

E 11 - 09e1 Woven Wire Test Sieve Cloth and Test Sieves

1001.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Aggregate means natural mineral materials such as sand, gravel, and crushed bedrock. Reclaimed materials may substitute for aggregates when allowed by the appropriate specification.

Boulder means a detached rock mass with a diameter greater than 200 mm.

Clay means a fine-grained soil with particles smaller than 2 µm that exhibit plasticity over a range of water contents.

Coarse Aggregate means that portion of aggregate material retained on the 4.75 mm sieve when tested according to LS-602.

Cobble means a rounded or semi-rounded rock fragment with an average dimension between 75 mm and 200 mm.

Crushed Material means aggregate particles having at least one well-defined face resulting from fracture. Particles with smooth faces and rounded edges or with only small chips removed are not considered crushed.

Deleterious Material means materials that include, but not limited to, the following: wood, clay brick, clay tile, plastic, gypsum, gypsum plaster, wallboard, roots, and all other organic matter.

Fine Aggregate means that portion of aggregate passing the 4.75 mm sieve when tested according to LS-602.

Flat and Elongated Particles means aggregate particles whose greatest mean dimension in the longitudinal axis compared to the least mean dimension in a plane perpendicular to the longitudinal axis exceeds a ratio of 4:1.

Granular means any processed or natural aggregate material with less than 35% by mass passing the 75 µm sieve.

Gravel means rounded, water-worn rock fragments retained on the 4.75 mm sieve and passing through the 75 mm sieve.

Iron Blast-Furnace Slag means the material resulting from solidification of molten blast-furnace slag under atmospheric conditions. Subsequent cooling may be accelerated by application of water to the solidified surface.

Manufactured Sand means sand produced by the crushing and further processing, i.e., washing, grading, classifying of quarried rock, boulders, cobbles, or gravel from which the natural fine aggregate has been removed. Natural sand may be added to optimize properties.

Natural Sand means naturally formed sand found in unconsolidated deposits.

Nickel Slag means the non-metallic product resulting from the production of nickel.

Quarried Rock means the material that has been or is being removed from an open excavation made in a solid mass of rock, which was integral with the parent mass prior to removal.

Reclaimed Asphalt Pavement (RAP) means the processed hot mix asphalt material that is recovered by partial or full depth removal.

Reclaimed Concrete Material (RCM) means removed or processed hardened Portland cement concrete.

Sand means fine aggregate passing the 4.75 mm sieve and retained on a 75 µm sieve resulting from natural disintegration of rock or from crushing.

Screened Sand means natural sand obtained from gravel deposits that is screened only.

Screenings means the fine aggregate produced by the crushing of quarried rock, boulders, cobbles, or gravel.

1001.04 DESIGN AND SUBMISSION REQUIREMENTS

1001.04.01 Submission Requirements

The Contract Administrator shall be advised in writing of each intended aggregate source prior to its use in the Work.

The Contractor shall provide test results, either individual or mean values, demonstrating conformance of the material with the requirements of the appropriate specification.

Test results shall be made available at the Contract Administrator's request.

1001.05 MATERIALS

1001.05.01 Aggregates

1001.05.01.01 General

Aggregates shall be composed of hard, durable fragments that are clean and free of clay coatings and other deleterious material.

1001.05.01.02 Fine Aggregates

Fine aggregates shall be according to the appropriate specifications and, unless otherwise provided therein, shall be one or a blend of the following:

a) Natural sand.

b) Manufactured sand.

c) Screenings produced during crushing.

d) Iron blast furnace slag or nickel slag.

e) Reclaimed asphalt pavement.

f) Reclaimed concrete material.

1001.05.01.03 Coarse Aggregates

Coarse aggregates shall be according to the appropriate specifications and, unless otherwise provided therein, shall be one or a blend of the following:

a) Crushed particles of consistent quality throughout produced from bedrock formations or boulders.

b) Uncrushed material of consistent quality produced from gravel formations.

c) Iron blast furnace slag or nickel slag.

d) Reclaimed asphalt pavement.

e) Reclaimed concrete material.

1001.07 PRODUCTION

1001.07.01 Stripping of Aggregate Source

Prior to excavating materials for aggregate production, the area to be worked shall be cleared of shrubs and trees, grubbed of roots, and stripped of all unsuitable surface materials and weathered zones. The area open ahead of the quarrying or excavating operation shall be of sufficient size to prevent contamination of the aggregate source working face.

1001.07.02 Processing

1001.07.02.01 General

When necessary to conform to the type of materials specified, aggregates shall be screened, crushed, washed, classified, or otherwise processed with suitable equipment to meet specification requirements.

Washed materials or materials excavated from underwater shall be stored for at least a 24 hours or longer period to allow all free water to drain and for the materials to attain uniform water content.

1001.07.02.02 Washing

When specified in the Contract Documents, aggregates shall be washed in washing plants, or otherwise processed to meet specification requirements. Truck or mixer washing and other similar methods shall not be permitted.

Water used for washing aggregates shall be clean and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.

1001.07.02.03 Blending

Blending of aggregates including reclaimed materials that meet the physical requirements of the appropriate specification shall be permitted in order to satisfy the gradation requirements for the material to be provided. The blending shall produce a consistent and acceptable product. Except where noted elsewhere in the Contract Documents, blending to improve the physical requirements shall not be permitted, except to increase the percentage of crushed particles or decrease the percentage of flat and elongated particles.

1001.07.03 Handling and Transporting

At all times, aggregates shall be handled and transported in a manner and with equipment that avoids segregation of the material, excess loss of fines, and contamination by any deleterious material.

1001.07.04 Stockpiling

Stockpile sites shall be level, well drained, free of all foreign materials, and of adequate bearing capacity to support the mass of the materials to be placed thereon. Stockpiles shall be either far enough apart or separated by substantial dividers to prevent intermingling.

For all coarse aggregates, except when stockpiled on Portland cement concrete or asphaltic concrete foundations or on an uncontaminated durable surface, a compacted granular pad of material with a maximum particle size no larger than that of the material being stockpiled and not less than 0.3 m in depth shall be provided to prevent contamination of the piled material.

For fine or combined aggregate stockpiles, the foundation shall be as specified above for coarse aggregates or the material may be placed on the ground provided that the bottom 0.3 m of the pile is not incorporated into the Work.

When samples are obtained for acceptance purposes from stockpiles of combined fine and coarse aggregate material for gradation testing, the stockpile shall be constructed in layers not exceeding 1 m in depth, and spilling of material over the edge of the stockpile shall not be permitted. These stockpile construction requirements shall not apply to separate stockpiles of fine and coarse aggregates and shall not apply to stockpiles of combined fine and coarse aggregate when the gradation acceptance samples are obtained after the material has been removed from the stockpile.

1001.08 QUALITY ASSURANCE

1001.08.01 General

Irrespective of compliance or non-compliance with the gradation and physical requirements of the applicable specification, aggregates may be accepted or rejected on the basis of past field performance, as determined by the Owner.

When a change in the character of the material occurs or when the performance of the materials is found to be unsatisfactory, use of those materials shall be discontinued until the Contractor can prove to the satisfaction of the Contract Administrator that the source remains acceptable or can be made acceptable.

1001.08.02 Sampling

1001.08.02.01 General

Quality assurance samples shall be obtained, handled, and stored as specified in the Contract Documents. The Contract Administrator shall be allowed to access all sampling locations and reserves the right to request quality assurance samples at any time.

1001.08.02.02 Mix Design

Samples obtained by the Contractor for the purposes of mix design shall be representative of the materials to be placed in the Work.

1001.08.03 Testing

1001.08.03.01 General

Tests on aggregates shall be as specified in the Contract Documents. The most recent published test method shall be used.

1001.08.03.02 Testing Sieves

Gradation analysis shall be based on the designated sieves shown in Table 1. As indicated, sieves complying with the alternative shown are compatible and may be used interchangeably with the MTO sieve designation shown.

TABLE 1
Laboratory Testing Sieves

MTO Sieve Designation	Alternate Sieve Standards, CAN/CGSB 8.1 and ASTM E 11
150 mm	6 inch
106 mm	4.24 inch
75.0 mm	3 inch
63.0 mm	2-1/2 inch
53.0 mm	2.12 inch
37.5 mm	1-1/2 inch
26.5 mm	1.06 inch
25.0 mm	1 inch
22.4 mm	7/8 inch
19.0 mm	3/4 inch
16.0 mm	5/8 inch
13.2 mm	0.530 inch
12.5 mm	1/2 inch
9.5 mm	3/8 inch
6.7 mm	0.265 inch
4.75 mm	No. 4
2.36 mm	No. 8
1.18 mm	No. 16
600 µm	No. 30
425 µm	No. 40
300 µm	No. 50
150 µm	No. 100
75 µm	No. 200

Appendix 1001-A, November 2013
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

This specification is to be used in conjunction with OPSS 1002, OPSS 1003, OPSS 1004, OPSS 1006, and OPSS 1010.

This specification incorporates Superpave aggregates, tests, and sieves.

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

No information provided here.

CONSTRUCTION SPECIFICATION FOR UNTREATED GRANULAR SUBBASE, BASE, SURFACE, SHOULDER, AND STOCKPILING

TABLE OF CONTENTS

314.01 SCOPE

This specification covers the requirements for the construction of untreated granular subbase, base, roadway surface and shoulder, edge ramping for bituminous pavements, and stockpiling at specified sites.

314.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

314.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

314.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 350	Concrete Pavement and Concrete Base
OPSS 501	Compacting

Ontario Provincial Standard Specifications, Material

OPSS 1001	Aggregates - General
OPSS 1010	Aggregates - Base, Subbase, Select Subgrade, and Backfill Material

314.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Construction Grading Report means a tabular report provided by the Contract Administrator that identifies stations, offsets, and elevations for granular surfaces consistent with the design cross-section.

Quality Assurance (QA) means a system or series of activities carried out by the Owner to ensure that materials received from the Contractor meet the specified requirements.

Quality Control (QC) means a system or series of activities carried out by the Contractor to ensure that materials supplied to the Owner meet the specified requirements.

314.05 MATERIALS

314.05.01 Aggregates

Granular material and select subgrade material shall be according to OPSS 1010.

314.07 CONSTRUCTION

314.07.01 Granular Subbase, Base, and Surface

Material shall be kept free from clay and other types of deleterious material. The Contractor's operations shall not disturb underlying work.

Material shall be placed without segregation in uniform layers such that the thickness of the compacted layer is not greater than 150 mm, except as provided under the Modified Layer Compaction Method clause.

Each layer shall be bladed to a smooth surface according to the required cross-section and maintained until placement of a subsequent layer, when applicable.

Prior to closing down operations for the completion of each day's work, the subbase material shall be bladed and compacted and, if necessary, covered with sufficient base material to carry traffic.

The granular base shall be maintained to the tolerances in grade and cross-section and to the specified density until the project is accepted or, if the Contract includes paving, until the surface is paved.

314.07.02 Winter Grading of Granular

All ice and snow shall be removed from all portions of the Work Area. Frozen material shall not be incorporated into the Work. Material shall not be placed over frozen ground, except, at the Contractor's option, a single lift may be placed over frozen ground; in which case, final grading and compaction shall be done after the underlying material has thawed.

314.07.03 Edge Ramping of Bituminous Pavement

A ramp of the specified granular material shall be built along the outside edges of each bituminous pavement construction course. Such ramps shall be at a height level with the pavement course and fall away from its edge at a slope not steeper than 4H:1V. Care shall be taken to prevent any ramping material from being spilled or pushed onto the pavement. Any material that is spilled shall be removed immediately without damage to the pavement and the surface thoroughly cleaned with the use of a power broom or other suitable means.

Prior to paving any section, only sufficient material to construct the ramps shall be placed on the shoulders. No other shoulder material shall be placed until the conditions, as detailed in the Shoulders subsection, have been attained.

Edge ramps shall be completed prior to opening adjacent pavement to traffic.

314.07.04 Shoulders

Granular shouldering material shall be placed and compacted at locations and to the line, grade, and cross-section specified in the Contract Documents.

Before commencing shoulder construction, all debris and deleterious material shall be removed from the shoulder area.

Shouldering operations shall commence as soon as, but not before, the following pavement conditions are met:

a) Bituminous Pavements

   Placement of granular material for shouldering operations shall not commence along any section of pavement until 24 hours have elapsed from the time of completion of the final bituminous pavement course in that section. The shouldering operations shall be completed within 24 hours on sections of pavement that are open to traffic. When the pavement is not open to traffic, the shouldering shall be completed before traffic is permitted.

b) Concrete Pavement and Concrete Base

   Shouldering operations shall commence according to OPSS 350. Shouldering shall be completed before opening the concrete base or concrete pavement to traffic.

All shoulder construction material shall be conveyed from the transport vehicle onto the shoulder area. End dumping of shoulder construction material directly on to the adjacent pavement surface or directly on to the shoulder shall not be permitted. The material shall be uniformly distributed within the specified shoulder limits without segregation. Grading and shaping operations shall confine all material to within the specified shoulder limits without overspill. Any shoulder construction material deposited, dragged, or inadvertently placed on the pavement surface shall be removed immediately and the pavement surface shall be thoroughly cleaned with the use of a power broom or other suitable means.

Operation of equipment shall not cause any damage to the pavement.

314.07.05 Compaction

314.07.05.01 General

Each layer of material shall be compacted as specified before the next layer is placed.

314.07.05.02 Compaction Requirements

The compaction requirements shall be according to OPSS 501.

314.07.05.03 Modified Layer Compaction Method

At the option of the Contractor, granular material may be placed in layers thicker than permitted under the Granular Subbase, Base, and Surface subsection, subject to the following provisions:

a) All material shall be placed in uniform layers such that each layer shall have a depth of not more than 300 mm after compaction.

b) Before placing each material in thicker layers, the Contractor shall prove, in a two lane trial area, the ability of the proposed compaction method to achieve the specified density. The location and extent of the trial area shall be approved by the Contract Administrator. At least 48 hours notice shall be given to the Contract Administrator before any work commences on the trial area. Full details of the proposed placing and compacting system or systems, including the rate of placing, depth of layer, number and type of compaction units, and number of passes shall be given to the Contract Administrator. The areas

designated to evaluate each system shall be of sufficient length to be representative of the proposed method and shall normally be approximately 150 m in length.

c) When the Contract Administrator, on the basis of test results, approves a system of placing and compacting, the system shall be used for the remainder of the work to which it is applicable, except that:

   i. Should the Contractor find it necessary at any time to change the system or any part of it, including the source of material or the rate of placing the material, the Contractor shall first obtain approval from the Contract Administrator, who may require a further trial area.
   ii. If at any time tests show that a previously approved system is no longer producing the specified compaction, the Contractor shall make whatever changes are necessary to satisfy the requirements of this specification.

314.07.06 Tolerances

314.07.06.01 General

The surface of the uppermost layer of granular material shall be bladed, shaped, and compacted to produce the specified grade and cross-section.

In the event of a conflict between meeting horizontal grading tolerances and meeting vertical grading tolerances, the vertical grading tolerance shall take precedence.

314.07.06.02 Granular Courses

The finished granular courses shall not deviate more than 30 mm from the specified grade and cross-section and the surface shall not deviate more than 15 mm at any place as measured in any direction with a 3 m straight edge.

314.07.06.03 Bituminous Courses, Sidewalk, Curb, and Gutter

The finished granular surface shall not deviate more than 30 mm from the specified grade and cross- section, except when the finished bituminous grade is controlled by fixed components such as existing pavements and curbs, in which case the finished granular surface shall not deviate more than 10 mm from the specified grade. Granular surfaces shall not deviate more than 10 mm at any place as measured in any direction with a 3 m straight edge.

314.07.06.04 Concrete Courses, Sidewalk, Curb, and Gutter

The finished granular surface shall not deviate more than 10 mm from the specified grade and cross- section and the surface shall not deviate more than 10 mm at any place as measured in any direction with a 3 m straight edge.

314.07.07 Stockpiling of Granular Material

Stockpiles of granular material shall be constructed according to OPSS 1001 at sites specified in the Contract Documents.

314.07.08 Quality Control

The Contractor shall carry out grade checks on the finished granular surfaces and carry out all QC grade checks required to ensure that the finished granular courses are built to within the specified tolerances for grade and cross-section. QC of granular grading shall be based on surface tolerances of the finished granular

courses, as provided in the Tolerances subsection. The grade shall be certified at the stations and offsets shown in the Construction Grading Report.

314.07.09 Submission of Grade Checks

All grade checks relating to horizontal and vertical grading tolerances, including all non-compliances, shall be submitted to the Contract Administrator within 2 Business Days following completion of the grade.
The Contractor shall sign and certify the construction grading report as correct.

When grading templates are available, the Contractor shall sign and certify the template as correct. If no template is available, the Contractor shall complete, sign, and submit form OPSF 314-1 to the Contract Administrator.

314.07.10 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

314.08 QUALITY ASSURANCE

314.08.01 General

The Contract Administrator may conduct random QA grade checks to verify that the grade and cross-section are within the specified tolerances.

314.08.02 Finished Grades Outside Specification

When the finished granular grade or cross-section or both do not meet the acceptance criteria, the granular course shall be brought to grade or cross-section or both within the specified tolerances.

314.08.03 Acceptance

Provided that the Contract Administrator's grade checks are according to those determined by the Contractor, no action shall be taken. If discrepancies between QA and QC grade checks occur, additional QA grade checks may be conducted by the Contract Administrator. If the Contract Administrator chooses not to take QA grade checks, the work shall be accepted on the basis of QC grade checks.

If the finished grade or cross-section or both are not according to the specification, the Contractor shall be required to bring the granular surface to grade or cross-section or both within the specified tolerances and recertify the grade.

314.09 MEASUREMENT FOR PAYMENT

314.09.01 Actual Measurement

314.09.01.01 Granular A, B Type I, B Type II, B Type III, M, O, and S
Granular A, B Type I, B Type II, B Type III, M, and O Stockpiled
Granular A, B Type I, B Type II, B Type III, M, and O from Stockpile
Select Subgrade Material

314.09.01.01.01 Tonne

When payment is by the tonne:

a) When the Contractor supplies Granular A and M composed of air-cooled iron blast-furnace slag or nickel slag, the payment quantities shall be determined by applying the following factors:

   i. The total measured mass of air-cooled iron blast-furnace slag incorporated into the work shall be multiplied by a factor of 1.116.
   ii. The total measured mass of nickel slag incorporated into the work shall be multiplied by a factor of 0.85.

b) When Granular B is composed of slag, the payment quantities shall be determined by comparing the density of the material to the average density of granular material as set by the Owner for that specific area and applying the conversion factors so determined to the weighed tonnes.

c) When granular material is composed of slag, it is necessary to determine the amount of overrun or underrun. Such overrun and underrun shall be the difference between the tender quantity and the payment quantity as determined by applying the foregoing factors to the weighed tonnes.

314.09.01.01.02 Cubic Metre

When payment is by cubic metre, one of the following methods shall be employed as determined by the Contract Administrator:

a) End Area Method

   i. At Source

   The volume of material shall be measured at the source in their original location and computed in cubic metres by the method of average end areas.

   Cross-sections shall be taken after the source has been cleared, grubbed, and stripped of all unsuitable surface material.

   The volume of boulders removed from borrow pits that cannot be accommodated in embankments shall be deducted.

   ii. In Place

   When the measurement for payment of material in their original location is not possible, the measurement for payment shall be made of material measured in place with no allowance for shrinkage and computed in cubic metres by the method of average end areas.

b) Truck Box Method

Material shall be measured in cubic metres, loose, by predetermined truck box capacities. The predetermined capacity of each truck shall be that computed from its box dimensions.

Each truck shall be uniquely and readily identifiable.

314.09.01.01.03 Square Metre

When payment is by square metre, the area shall be based on that shown in the Contract Documents.

314.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

314.10 BASIS OF PAYMENT

314.10.01

Granular A - Item
Granular A, Stockpiled - Item
Granular A, from Stockpile - Item

Granular B Type I - Item
Granular B Type I, Stockpiled - Item
Granular B Type I, from Stockpile - Item

Granular B Type II - Item
Granular B Type II, Stockpiled - Item
Granular B Type II, from Stockpile - Item

Granular B Type III - Item
Granular B Type III, Stockpiled - Item
Granular B Type III, from Stockpile - Item

Granular M - Item
Granular M, Stockpiled - Item
Granular M, from Stockpile - Item

Granular O - Item
Granular O, Stockpiled - Item
Granular O, from Stockpile - Item

Granular S - Item
Select Subgrade Material, Compacted - Item

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

The cost of any additional QA grade checks on the recertified area shall be the responsibility of the Contractor. All grading carried out by the Contractor as a result of QA grade checks to ensure tolerances shall be carried out at no additional charge to the Owner.

Compensation for the cleanup of the stockpile site on completion of the operation, when required, shall be included as part of the granular item cost.

314.10.02 From Stockpile

Compensation for clearing, grubbing, stripping, cleanup of the stockpile site, and for supplying and placing a pad upon which the materials are to be stockpiled shall be included as part of the granular item cost.

CERTIFICATION OF GRADE ELEVATION / CROSSFALL

CONTRACT _____ **LOCATION** _____

COMPONENTS _____ **LOCATION** _____

In compliance with the Contract, I hereby certify that the following component of the work has been correctly constructed to the specified line and grade tolerances.

FROM STATION	TO STATION	TYPE OF GRADE	DATE	CERTIFIED BY	
				Print name	Signature

OPSF 314-1

Appendix 314-A, Commentary for OPSS.MUNI 314, November 2016
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Location, line, grade, and cross-section for granular material. (314.07.04)

- Sites for stockpiles of granular material. (314.07.07)

On projects requiring grading, the designer should provide a Construction Grading Report.

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

No information provided here.

CONSTRUCTION SPECIFICATION FOR REMOVAL

TABLE OF CONTENTS

510.01 SCOPE

This specification covers the requirements for demolition, salvage, removal, and in-place abandonment, either completely or partially, of those materials and structures so designated, including the requirements for backfilling resulting excavations, trenches, holes, and pits.

510.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

510.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

510.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 301 Restoring Unpaved Roadway Surfaces
OPSS 410 Pipe Sewer Installation in Open Cut
OPSS 421 Pipe Culvert Installation in Open Cut
OPSS 422 Precast Reinforced Concrete Box Culverts and Box Sewers in Open Cut
OPSS 501 Compacting

Ontario Provincial Standard Specifications, Materials

OPSS 1004 Aggregates - Miscellaneous
OPSS 1150 Hot Mix Asphalt
OPSS 1151 Superpave and Stone Mastic Asphalt Mixtures
OPSS 1301 Cementing Materials
OPSS 1302 Water
OPSS 1350 Concrete - Materials and Production

Ontario Ministry of Transportation Publications

Structural Manual

CSA Standards

S6-00 Canadian Highway Bridge Design Code

510.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Bridge Structure means that portion of a bridge and associated wing and retaining walls above the bridge footing, excluding modular bridges.

CIR means cold in-place recycling.

CIREAM means cold in-place recycling with expanded asphalt.

Concrete Appurtenances mean as defined in OPSS 410, 421, and 422.

Culvert means a single or multiple cell structure designed to provide an opening under a roadway, pedestrian way, railway, or side entrance for the passage of surface water, livestock, or pedestrians.

Curb and Gutter means any combination of curb, gutter, curb with gutter, gutter setbacks, bullnoses, gutter outlets, and spillways.

Engineer means a professional engineer licensed by the Professional Engineers Ontario to practice in the Province of Ontario.

HIR means hot in-place recycling.

Pipe means any closed conduit originally designed to convey liquid or gas.

Sundry Asphalt Pavements means paved islands, medians, boulevards, and walkways.

510.04 DESIGN AND SUBMISSION REQUIREMENTS

510.04.01 Design Requirements

Caps for capping maintenance holes, catch basins, ditch inlets, and valve chambers shall be designed according to CAN/CSA S6 and the Structural Manual.

510.04.02 Submission Requirements

510.04.02.01 Removal of Bridge Structures

Two weeks prior to commencement of the work, a work plan shall be submitted to the Contract Administrator outlining the equipment to be used, dust and debris control, and the sequence of removals for bridge demolition.

Where any portion of the bridge structure is to support traffic or equipment loading during demolition, the entire structure shall be evaluated for load carrying capacity according to the CAN/CSA S6 and the Structural Manual.

All submissions shall bear the seal and signature of the design Engineer and design check Engineer.

510.05 MATERIALS

510.05.01 Mortar

Mortar shall consist of a mixture of one part Portland cement according to OPSS 1301 and three parts mortar sand according to OPSS 1004, wetted with sufficient water to make the mixture plastic. Water shall be according to OPSS 1302.

510.05.02 Concrete

Concrete for concrete seals shall be according to OPSS 1350 with minimum specified 28-Day compressive strength of 30 MPa.

Concrete for filling abandoned pipes shall be according to OPSS 1350 with minimum specified 28-Day compressive strength of 15 MPa.

510.05.03 Grout

Grout shall consist of a mixture of one part Portland cement according to OPSS 1301 and two parts mortar sand according to OPSS 1004, wetted with sufficient water to make the mixture plastic. Water shall be according to OPSS 1302.

510.07 CONSTRUCTION

510.07.01 General

Removal, abandonment, demolition, or salvage of a particular item shall be as specified in the Contract Documents.

The work shall include all associated excavation, backfill, compaction, trimming, plugging, capping, filling, sealing, and right-of-way preparation.

If provided, existing drawings from the Owner pertaining to bridge structures, modular bridges, culverts, and noise barriers designated for removal shall be reviewed prior to commencement of any activities.

Stockpiling requirements shall be as specified in the Contract Documents.

Where work is done in waterbodies and on waterbody banks, the work shall be according to the Contract Documents.

510.07.01.01 Excavation

Excavation required for the removal work to be carried out shall be part of the removal operation and shall be performed in such a manner as to leave undisturbed any portions not designated for removal.

510.07.01.02 Removal

Removal shall be performed in such a manner and with such equipment as to leave undisturbed and undamaged any portion not designated for removal or salvage. All damaged or disturbed portions shall be corrected expeditiously and repaired to the satisfaction of the Contract Administrator. The broken edges of portions to be left in place that are visible after construction shall be squared and neatly trimmed.

510.07.01.03 Salvage

Any material designated for salvage shall remain the property of the Owner and shall be maintained in a reasonable condition and stockpiled in a manner acceptable to the Contract Administrator.

Salvaged materials that are surplus to the Contract requirements shall be delivered to the location specified in the Contract Documents. When designated for salvage and surplus to the Contract requirements, salvaged frames and related grates or covers shall be kept together as a unit for delivery and stockpiling.

Any material designated for salvage damaged by the Contractor's operations or lost by the Contractor at any time prior to re-use or stockpiling shall be replaced with new material.

510.07.01.04 Backfilling, Compacting, and Trimming

Where a removal or partial removal requires the filling of a resulting trench, hole, or pit, backfilling shall be to the required grade using either suitable excavated material or imported material as required or as specified in the Contract Documents, and shall include levelling and trimming of the site to match required contours and provide adequate drainage. Backfill material shall be placed in layers not exceeding 300 mm and compacted according to OPSS 501.

510.07.02 Bridge Work

510.07.02.01 Removal of Bridge Structures and Bridge Footings

The work of bridge structure removal shall include the complete removal of bridge structure components above the top of the bridge footings to the lines and grades specified in the Contract Documents.

The work of bridge footings removal shall include cutting the piles to the underside of the footing and the complete removal of the bridge footings.

510.07.02.02 Removal of Modular Bridges

The work of modular bridge removal shall include the dismantling and removal and salvage of the modular bridge components, all timber in the deck, curbs, running strips, and steel beam guide rail system attached to the bridge. The work shall include the unloading and erection of the launching nose and subsequent dismantling.

Modular bridge components that are the property of the Owner, including the dismantled launching nose, shall be loaded onto transport vehicles, supported on 100 x 100 mm timber to allow forklift access, securely fastened, and then transported to the location specified in the Contract Documents.

All components shall be delivered in good condition during normal working hours and neatly stockpiled. All small parts shall be crated to prevent loss.

The approximate weight of the modular bridge, as specified in the Contract Documents, includes the weight of the steel components of the bridge, the ramps, and the launching nose, but excludes the weight of the wooden deck, construction tools, and rollers.

Vehicles required to transport the launching nose and the modular bridge components and parts shall be provided by the Contractor and of sufficient size to fully support the modular bridge components.

510.07.02.02.01 Operational Constraints

Prior to dismantling of the modular bridge, qualification information shall be provided to the Contract Administrator to ensure that the person supervising the removal of the modular bridge is competent to successfully fulfill such duties.

The Contract Administrator shall be notified a minimum of 7 Days in advance of the date on which modular bridge removal is to commence. The Owner shall make the launching nose available to the Contractor, following such notification.

510.07.02.02.02 Removal of Modular Bridge Substructures

The work shall include the removal of modular bridge substructures, bank seats, cribs, and timber or steel bents, and any rock in the cribs.

Modular bridge substructure materials shall be removed from the right-of-way or managed as specified in the Contract Documents.

Rocks from cribs shall not be placed in any waterbody.

510.07.03 Drainage Work

510.07.03.01 General

Any sediment or deposited material required to be removed shall not be allowed to enter any waterbody.

Frames with grates or covers and watermain appurtenances, within valve chambers that are to be removed, shall be salvaged.

510.07.03.02 Removal of Curb and Gutter

The work shall include the removal of asphalt, concrete, and cut stone curb and gutter. Cut stone curb shall be salvaged.

510.07.03.03 Removal of Asphalt Curb and Gutter

The work shall include the removal of asphalt curb and gutter.

510.07.03.04 Removal of Concrete Curb and Gutter

The work shall include the removal of concrete curb and gutter.

510.07.03.05 Removal of Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers

The work shall consist of the removal of maintenance holes, catch basins, ditch inlets, and valve chambers.

510.07.03.06 Abandonment of Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers

The work shall include the partial removal of maintenance holes, catch basins, ditch inlets, and valve chambers where structures and the Utility systems therein are abandoned. Such partial removal, when within the roadway, shall be to a minimum of 1.0 m below subgrade.

Prior to backfilling, the bottom of each structure designated for partial removal shall be broken to allow for the free movement of groundwater.

As an alternative to partial removal, maintenance holes, catch basins, ditch inlets, or valve chambers may be removed in their entirety.

510.07.03.07 Capping Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers

The work shall include the capping of maintenance holes, catch basins, ditch inlets, and valve chambers where the Utility systems therein are to remain in service. Such capping shall include the removal of all adjustment units. Where the structure exists within the roadbed, the upper portion of the structure shall be removed to a minimum of 1.0 m below subgrade and the walls of the structure shall be saw cut or similarly finished to produce a neat horizontal cut suitable for placing a concrete cap.

510.07.03.08 Removal of Pipes and Culverts

The work shall include the removal of pipes and culverts of 200 mm diameter and greater, including multiple cell timber culverts.

Concrete, clay, and plastic pipes may be removed by rupturing or collapsing the pipe with suitable equipment and leaving the debris in place in a manner as to eliminate all voids and so as not to be detrimental to the work.

When removing pipes that enter into a concrete culvert, maintenance hole, catch basin, ditch inlet, or valve chamber and the structure is to remain in service, the openings left in the structures from the pipe shall be sealed with concrete or brick suitable for outdoor use and mortar. Brick seals shall be a minimum thickness of one brick length. The contact surface of each brick shall be coated with mortar to provide a watertight seal. Concrete seals shall be the minimum thickness of the structure wall.

510.07.03.09 Abandonment of Pipes and Culverts

The work shall include the filling of all pipes and culverts when the Contract Documents specify abandonment.

Abandoned sections of pipes and culverts up to 1200 mm in diameter shall be filled with grout or concrete.

Access points shall be provided to allow for confirmation that the pipe has been completely filled.

When abandoning pipes that enter into a concrete culvert, maintenance hole, catch basin, ditch inlet, or valve chamber and the structure is to remain in service, the openings in the structure shall be sealed according to the Removal of Pipes and Culverts clause.

510.07.03.10 Removal of Pipe Subdrains

The work shall include the removal of pipe subdrains smaller than 200 mm in diameter.

Excavate, as required, to remove existing pipe subdrains, backfill the resulting trenches with native material, and compact.

510.07.03.11 Removal of Hydrants, Valves, and Watermain Appurtenances

The work shall include the removal or abandonment of hydrants, valves, and watermain appurtenances.

When a hydrant is removed, the hydrant shall be removed with its boot intact and salvaged.

When the mainline is to remain in service after a removal, the work shall include capping at the tee at the mainline.

When a mainline valve is to be abandoned and the valve is not in a valve chamber, the valve box shall be removed.

When a water service connection is abandoned, the work shall include shutting off the service at the mainline.

510.07.04 Fence and Noise Barrier Work

510.07.04.01 Removal of Fence

The work shall include the removal of all fences, regardless of type.

The work shall consist of the dismantling and removal of the fence, including all posts, fence fabric, footings, gates, components, and fittings forming part of the fence designated for removal.

Where the means of egress and ingress between the right-of-way and adjacent property is being controlled by an existing fence designated for removal, that control shall be maintained for the duration of the Contract.

When only part of an existing fence is removed, repairs to match the existing fence shall be made to the ends remaining.

510.07.04.02 Removal of Noise Barriers

The work shall include the dismantling of the noise barrier including posts, panels, framing, doors, fire access openings, and the removal of concrete footings to a depth of 1.3 m.

510.07.05 Delineators, Traffic Barriers, and Energy Attenuator Work

510.07.05.01 Removal of Delineator Posts

The work shall include the removal of delineator and guide posts, including wooden, metal, and flexible posts, and associated hardware.

510.07.05.02 Removal of Guide Rail Systems

The work shall include the removal of cable guide rail, steel beam guide rail, and box beam guide rail systems, including cables, steel beams, box beams, channels, hardware, posts, anchor blocks, and anchoring systems to the limits specified in the Contract Documents.

510.07.05.03 Removal of Concrete Barriers

The work shall include the removal of cast-in-place concrete barriers; the removal and salvage of precast concrete barriers; the removal of back to back installed concrete barriers, concrete or granular fill between the back to back concrete barriers, barrier transition sections; and the removal of associated pads and hardware as specified in the Contract Documents.

510.07.05.04 Removal of Energy Attenuators

The work shall include the removal of energy attenuators, including pads and anchoring devices. At specified locations, the energy attenuators shall be dismantled and salvaged as a complete system, including all hardware.

510.07.05.05 Removal of Ramp Closure Gates

The work shall include removal of ramp closure gate concrete footings, gates, signs, and all associated hardware.

The gates and associated hardware shall be salvaged and delivered to the location specified in the Contract Documents.

510.07.06 Pavement Work

510.07.06.01 General

During pavement removal operations, care shall be taken to prevent contamination with granular and other foreign materials.

Removal shall be performed in such a manner as to leave adjacent pavement and structures remaining in place undisturbed.

When the roadway is to be opened to traffic after the daily shut down and full width pavement removal is required, the following shall apply:

a) For two-lane highways, removal shall be done to the same station for the full pavement width prior to shutdown at the end of the day.

b) For multi-lane highways, removal shall be done to essentially the same station for the full pavement width for a specific direction prior to shutdown at the end of the day.

c) Prior to opening the lanes to traffic, temporary ramping shall be provided as specified in the Contract Documents.

Asphalt pavement material from removal operations that is to be used on this Contract or stockpiled for future use by the Owner shall be weighed according to the Contract Documents then processed prior to stockpiling so 100% of the resultant material passes the 26.5 mm sieve. RAP shall be stockpiled according to the requirements of OPSS 1150 or OPSS 1151, as applicable to the Contract.

Removed asphalt pavement materials that are different due to the removal equipment used or pavement type shall be stockpiled separately.

510.07.06.02 Cutting Existing Pavement

Pavement shall be cut for neat removal to the depth specified in the Contract Documents.

Suitable mechanical sawing equipment or pavement milling equipment capable of producing a straight clean vertical face shall be used for cutting the pavement. The existing pavement type, thickness, and, if any, size of reinforcement shall be as specified in the Contract Documents.

510.07.06.03 Removal of Pavement, Treated Base, and Concrete Base

The work shall include the full-depth removal of asphalt pavement, concrete pavement, asphalt pavement from concrete surfaces and concrete base, cement-treated base, and asphalt-treated base. All materials shall be managed as specified in the Contract Documents.

When removed material is to remain temporarily on site due to construction operations, the removed material shall be placed on an asphalt or concrete surface until final disposition.

When the operation for full-depth asphalt removal from concrete base or concrete surfaces other than structures causes thickness reductions or surface variations exceeding 10 mm, the removal operations shall be corrected expeditiously and the damaged concrete areas repaired.

As part of the work of full-depth pavement removal, where public traffic is to be maintained throughout the work without the use of a temporary bypass, temporary granular ramping shall be constructed and maintained to convey public traffic through the area. The ramping shall be at 20H:1V. Temporary ramps shall be removed to accommodate subsequent construction after traffic has been routed off the temporary ramp.

Following pavement removal, the existing roadway granular shall be restored according to OPSS 301, when such roadway is not designated for abandonment.

Prime, surface treatments, and mulch pavements greater than 50 mm in depth are considered to be asphalt pavement.

This work shall not include removal of materials for jointing done as part of a paving operation.

510.07.06.04 Removal of Asphalt Pavement, Partial-Depth

The work shall include the partial-depth removal of asphalt pavement. Such material shall be managed as specified in the Contract Documents.

The asphalt pavement shall be removed to the average depth specified in the Contract Documents.

Before commencing removal operations, all debris, deleterious material, and existing windrows shall be removed from the roadway surface, including material beyond the theoretical roadway width, to provide positive drainage.

If the remaining asphalt pavement does not require further processing or if the remaining asphalt pavement is to be recycled using CIR or CIREAM or HIR processes, then the equipment used for partial depth removal shall be automatically controlled for grade and slope during removal. The surface remaining after removal shall have a constant and continuous crossfall matching the intended surface course crossfall. The surface remaining after removal shall have an even texture and be free of significantly different grooves and ridges in all directions.

Removed asphalt pavement material shall not remain on the roadway after completion of the day's operation. Placing of the material on grade other than a bituminous surface prior to hauling to a stockpile shall not be permitted.

Temporary transverse ramping shall be as specified in the Contract Documents. If due to unforeseen circumstances, removal cannot be done full width prior to shut down at the end of the day, then temporary, longitudinal ramping shall also be provided as specified in the Contract Documents. All ramping shall be removed prior to placing adjacent hot mix asphalt pavement.

Partial-depth asphalt pavement removal operations and the resulting surfaces from partial-depth asphalt removal operations shall not be permitted between November 16th and June 1st, unless approved by the Contract Administrator.

510.07.06.05 Removal of Asphalt Pavement from Concrete Surfaces on Structures

The work shall include the removal of asphalt pavement and waterproofing from the concrete surfaces on structures. All materials shall be managed as specified in the Contract Documents.

When pavement-milling equipment is used, the weight of milling equipment shall be limited to:

a) 43 tonnes maximum weight for post-tensioned decks and rigid frame decks,

b) 26 tonnes maximum weight for thin slab concrete bridge deck on girders. For thin slab concrete bridge deck on girders, the equipment shall not travel laterally beyond 1.0 m from the centreline of the exterior girder.

When the method of asphalt removal results in impact damage or excessive vibration is observed, operations shall be modified to eliminate these effects.

Unless the Contract Documents specify a concrete or latex-modified concrete overlay is to be placed on the existing concrete deck, the milling operation shall be controlled such that the milling teeth do not come in contact with the concrete deck surface and bridge joints. Any remaining asphalt pavement and waterproofing not removed by rotary milling equipment shall be removed by other methods.

If the milling operation damages the surface of the concrete deck, causing surface variations or concrete thickness reductions exceeding 2 mm, the milling operation shall be corrected expeditiously and the damaged concrete areas repaired. The proposed repair method shall be submitted in writing to the Contract Administrator, prior to commencing repairs. Surface preparation, placement, and curing of the repair materials shall be according to the repair material manufacturer's instructions.

510.07.06.06 Removal of Concrete Pavement, Partial-Depth

The concrete pavement shall be removed to the depths indicated in the Contract Documents.

The equipment used for partial-depth concrete pavement removal shall be automatically controlled for grade and slope during removal. The surface remaining after removal shall have a constant and continuous cross fall matching the intended surface cross fall. The surface remaining after removal shall have an even texture free of significantly different grooves and ridges in all directions.

The removed concrete pavement material shall not remain on the roadway after completion of the day's operation.

After partial-depth removal of existing concrete pavement, the Contractor shall reshape and compact the existing shoulder material to ensure proper drainage of the remaining surface and adjoining shoulders.

Removal operations and resulting surfaces from removal operations shall not be permitted during the winter months on highways with posted speeds of 80 km/h or higher.

510.07.07 Concrete Work

510.07.07.01 Removal of Concrete

The work shall include the removal of retaining walls; footings; foundations; concrete culverts, including associated wingwalls and retaining walls; concrete appurtenances; and similar concrete structures specified in the Contract Documents.

510.07.08 Right-of-Way Work

510.07.08.01 Preparing Right-of-Way

When preparing the right-of-way is specified in the Contract Documents, all objects and materials within the specified road allowance that interfere with the execution of the work and are not covered under separate removal items, shall be removed under this work. The work includes, but is not limited to the removal of trees less than 150 mm diameter, tree roots and stumps, brush and hedges, culverts, wooden and steel posts, signs, sidewalks, precast or poured driveway curbs, asphalt curbs, boulders, stone walls and retaining walls, and other surface materials that require removal in order to complete all parts of the Contract.

Any precast concrete slabs, bricks and stones, cut stone curbs, timbers, or similar landscaping elements that are removed shall remain the property of the adjacent property owner and shall be piled neatly on such adjacent property.

510.07.08.02 Removal of Driveways, Sidewalks, and Sundry Asphalt Pavements

When collective work to remove driveways and sidewalks needs to be done, work shall include the removal of asphalt, concrete, stone or brick driveways and sidewalks, and sundry asphalt pavements.

510.07.08.03 Removal of Concrete Sidewalk

The work shall include the removal of concrete sidewalk.

510.07.08.04 Removal of Gabions

The work shall include the removal of gabions, including rock and wire.

510.07.09 Overhead Signs and Sign Support Structure Work

Overhead signs and sign support structures shall be salvaged.

Sign support structure footings shall be removed to a minimum of 1.3 m below subgrade.

510.07.10 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

510.09 MEASUREMENT FOR PAYMENT

510.09.01 Actual Measurement

510.09.01.01 Removal of Bridge Footings

Measurement of removal of bridge footings shall be the volume in cubic metres of the concrete removed.

510.09.01.02 Removal of Curb and Gutter
Removal of Asphalt Curb and Gutter
Removal of Concrete Curb and Gutter

Measurement of removal of curb and gutter shall be the length in metres horizontally along the flow lines of the curb and gutter removed, whether straight or circular, without separation into types. When the slope of the curb and gutter is 4H:1V or steeper, then the above measurement is of the slope length.

No deduction shall be made from the measured length for the spaces occupied by maintenance hole and catch basin castings. Where the removal includes runs of curb and gutter that converge to form bullnoses, each run shall be measured for payment and such measurement shall be deemed to include the concrete fillet within the bullnose.

510.09.01.03 Removal of Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers

For measurement purposes, a count shall be made of the number of maintenance holes, catch basins, ditch inlets, and valve chambers removed regardless of type, depth, or size.

510.09.01.04 Abandonment of Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers, Partial-Depth

For measurement purposes, a count shall be made of the number of maintenance holes, catch basins, ditch inlets, and valve chambers abandoned regardless of type or size.

510.09.01.05 Capping of Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers

For measurement purposes, a count shall be made of the number of maintenance holes, catch basins, ditch inlets, and valve chambers capped regardless of type or size.

510.09.01.06 Removal of Pipes and Culverts

Measurement of removal of pipes and culverts shall be the length in metres horizontally along the pipe or culvert, from one end or end section to the other end or the other end section. Where the grade of the pipe or culvert is 10% or greater, then the above measurement is of the slope length. Pipes and culverts smaller than 200 mm diameter shall be treated as part of the excavation work.

No deduction shall be made from the measured length for the spaces occupied by intermediate maintenance holes, catch basins, ditch inlets, and valve chambers.

510.09.01.07 Abandonment of Pipes and Culverts

Measurement of abandonment of pipes and culverts shall be by length in metres horizontally along the pipe or culvert, from one end or end section to the other end or the other end section. Where the grade of the pipe or culvert is 10% or greater, then the above measurement is of the slope length.

510.09.01.08 Removal of Pipe Subdrains

Measurement of removal of pipe subdrains shall be by length in metres horizontally along the centerline of the pipe subdrains, including outlets.

510.09.01.09 Removal of Hydrants
Removal of Valves
Removal of Watermain Appurtenances

For measurement purposes, a count shall be made of the number of hydrants, valves, and watermain appurtenances removed.

510.09.01.10 Removal of Fence
Removal of Noise Barrier

Measurement of removal of fence and noise barrier shall be the length in metres, horizontally along each fence or noise barrier removed.

510.09.01.11 Removal of Delineator Posts

For measurement purposes, a count shall be made of the number of delineator and guide posts removed.

510.09.01.12 Removal of Cable Guide Rail
Removal of Concrete Barrier
Removal of Steel Beam Guide Rail
Removal of Steel Box Beam Barrier

Measurement of removal of traffic barrier shall be the length in metres horizontally along each type of traffic barrier removed, excluding energy attenuators.

Where cable guide rail and steel box beam barrier are anchored to concrete anchor blocks, measurement shall be made between the end anchor points with no additional measurement made of the overlapping sections at intermediate anchorages.

510.09.01.13 Removal of Anchor Blocks

For measurement purposes, a count shall be made of the number of anchor blocks removed.

510.09.01.14 Removal of Energy Attenuators

For measurement purposes, a count shall be made of the number of complete energy attenuators systems removed.

510.09.01.15 Removal of Ramp Closure Gates

For measurement purposes, a count shall be made of the number of ramp closure gates removed.

510.09.01.16 Cutting Existing Pavement

Measurement of cutting of existing pavement shall be by length in metres along each cut.

510.09.01.17 Removal of Asphalt Pavement
Removal of Asphalt Pavement from Concrete Surfaces
Removal of Concrete Pavement
Removal of Asphalt-Treated Base
Removal of Cement-Treated Base
Removal of Concrete Base

Measurement of removal of asphalt pavement, asphalt pavement from concrete surfaces, concrete pavement, asphalt-treated base, cement-treated base, and concrete base shall be by area in square metres.

No deductions shall be made from the area for the space occupied by maintenance holes, catch basins, and valve chambers.

The full-depth removal of asphalt pavement, asphalt pavement from concrete surfaces, concrete pavement, asphalt-treated base, cement-treated base, and concrete base shall be measured for payment whether on the roadway surface or within an excavation, where such pavement or base has remained in place since its construction.

510.09.01.18 Removal of Asphalt Pavement, Partial-Depth
Removal of Concrete Pavement, Partial-Depth

Measurement of removal of partial-depth asphalt or concrete pavement shall be by area in square metres or by mass in tonnes as specified in the Contract Documents.

510.09.01.19 Removal of Asphalt Pavement from Concrete Surfaces on Structures

Measurement of removal of asphalt pavement from concrete surfaces on structures shall be by area in square metres.

510.09.01.20 Removal of Concrete

Measurement of removal of concrete shall be by volume in cubic metres.

When broken concrete or masonry is used as rip-rap or rock protection, deductions shall not be made from the concrete removal item.

510.09.01.21 Removal of Driveways, Sidewalks, and Sundry Asphalt Pavements

Measurement of removal of driveways, sidewalks, and sundry asphalt pavements shall be by horizontal area in square metres.

510.09.01.22 Removal of Concrete Sidewalk

Measurement of removal of concrete sidewalks shall be by horizontal area in square metres.

510.09.01.23 Removal of Gabions

Measurement of removal of gabions shall be by volume in cubic metres.

510.09.01.24 Removal of Sign Support Structure
Removal of Sign Support Structure Footings

For measurement purposes, a count shall be made of the number of sign supports and sign support footings removed.

510.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

510.10 BASIS OF PAYMENT

510.10.01
Removal of Bridge Structure - Item
Removal of Bridge Footings - Item
Removal of Modular Bridge - Item
Removal of Modular Bridge Substructure - Item
Removal of Curb and Gutter - Item
Removal of Asphalt Curb and Gutter - Item
Removal of Concrete Curb and Gutter - Item
Removal of Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers - Item
Abandonment of Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers Partial-Depth - Item
Capping of Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers - Item
Removal of Pipe and Culverts - Item
Abandonment of Pipes and Culverts - Item
Removal of Pipe Subdrains - Item
Removal of Hydrants - Item
Removal of Valves - Item
Removal of Watermain Appurtenances - Item
Removal of Fence - Item
Removal of Noise Barriers - Item

Removal of Delineator Posts - Item
Removal of Cable Guide Rail - Item
Removal of Concrete Barrier - Item
Removal of Steel Beam Guide Rail - Item
Removal of Steel Box Beam Barrier - Item
Removal of Anchor Blocks - Item
Removal of Energy Attenuators - Item
Removal of Ramp Closure Gates - Item
Cutting Existing Pavement - Item
Removal of Asphalt Pavement - Item
Removal of Asphalt Pavement from Concrete Surfaces - Item
Removal of Concrete Pavement - Item
Removal of Asphalt-Treated Base - Item
Removal of Cement-Treated Base - Item
Removal of Concrete Base - Item
Removal of Asphalt Pavement, Partial-Depth - Item
Removal of Asphalt Pavement from Concrete Surfaces on Structures - Item
Removal of Concrete Pavement, Partial-Depth
Removal of Concrete - Item
Preparing Right-of-Way - Item
Removal of Driveways, Sidewalks, and Sundry Asphalt Pavements - Item
Removal of Concrete Sidewalk - Item
Removal of Gabions - Item
Removal of Sign Support Structure - Item
Removal of Sign Support Structure Footings - Item

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

Imported backfill shall be paid for separately according to the tender item of the material specified in the Contract Documents.

Payment at the Contract price for the appropriate removal tender item shall be full compensation for all labour and Equipment for earth excavation required in the course of the removal operations.

Material designated for salvage but damaged by Contractor operations or lost by the Contractor shall be replaced with new material at no additional cost to the Owner.

If the Contractor elects to remove maintenance holes, catch basins, ditch inlets, and valve chambers in their entirety rather than as a partial removal, the removal shall be at no additional cost to the Owner.

When the Contract does not contain a separate item for the removal of pipe subdrain, the contract price for the items directly associated with the removal of pipe subdrain shall include full compensation for all labour, Equipment, and Materials required to do the work described in this specification.

Disturbed or damaged portions not designated for removal or salvage that result from the Contractor's operations shall be corrected or repaired at no additional cost to the Owner.

510.10.02 Excavation for Underpavement Objects

When the Contract contains separate items for the removal of concrete pavement, asphalt pavement, concrete base, cement-treated base, sidewalk, and curb and gutter, such items removed because of the removal of under-pavement objects such as sewers, culverts, Utilities, and watermains, payment shall be at the Contract prices and according to the specifications for the removal of concrete pavement, asphalt pavement, concrete base, cement-treated base, sidewalk, or curb and gutter, respectively.

510.10.03 Excavation for Removal

When excavation for removal overlaps the excavation required for other work under the Contract, the overlapping excavation for the removal shall be paid for in accordance with the specification for other work.

No deductions shall be made to the quantities of concrete base, cement-treated base, sidewalk, curb and gutter, and any other structure or portion of structure where these items removed are included within the established lines of an excavation item measured for separate payment.

Appendix 510-A, November 2014
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Items that are to be removed, abandoned, demolished, or salvaged. (510.07.01)

- Stockpiling requirements. (510.07.01)

- Requirements for work that is to be carried out in waterbodies or on waterbody banks. (510.07.01)

- For removal items,
  - Delivery locations for salvaged materials in excess to Contract requirements (510.07.01.03)
  - For bridge structures, specify the line and grade to which the structure is to be removed. (510.07.02.01)
  - Destination of modular bridge components. (510.07.02.02)
  - Approximate weight of the modular bridge to be removed. (510.07.02.02)
  - Management of modular bridge substructure materials. (510.07.02.02.01)
  - Delivery requirements for ramp closure gates. (510.07.05.05)
  - Temporary ramping requirements. (510.07.06.01)
  - For pavement, specify the depth of sawcut and identify the pavement type; thickness; size of reinforcement, if any; and management of materials. (510.07.06.02 and 510.07.06.03)
  - For partial-depth pavement, identify the average depth of the removal and management of materials. (510.07.06.05)

- Method of measurement for the partial-depth removal of asphalt or concrete pavement. (510.09.01.18)

The designer should determine if the following is required and, if so, specify it in the Contract Documents:

- Imported backfill. (510.07.01.04)

The designer should list in the Contract Documents existing drawings available, if any, for structures to be removed. (510.07.01)

The designer should determine if special restrictions or permits apply where work under the specification is required in waterbodies or on waterbody banks.

For the demolition of bridges, OPSS 510 does not place any restrictions on the Contractor in terms of methods or equipment to be used. Therefore, when it is foreseen that a demolition will require special requirements or safety precautions, the designer should include these requirements in the Contract Documents.

The designer should determine which removals are included under Earth Excavation and Grading. (510.10.03)

The designer should ensure that the removal of asphalt from bridge decks is to be paid separately, when the entire bridge deck is removed and the asphalt cannot be mixed with concrete.

The designer should ensure that all items to be left in place are in accordance with environmental constraints and requirements.

Appendix 510-A

Removed items may contain materials that may be subject to specific handling and disposal requirements (e.g., asbestos and slag). The designer should ensure that these requirements are included where such materials are known to exist.

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

OPSD 102.010	Removals, Legend
OPSD 710.010	Capping Existing Structures, Maximum 4.0 m Cover

CONSTRUCTION SPECIFICATION FOR CONCRETE STRUCTURES

TABLE OF CONTENTS

904.01 SCOPE

This specification covers the requirements for the construction of concrete structures.

904.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

904.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

904.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 501	Compacting
OPSS 905	Concrete Reinforcement
OPSS 908	Metal Traffic Barriers and Metal Railings for Structures
OPSS 919	Formwork and Falsework
OPSS 920	Deck Joint Assemblies, Waterstops, Joint Fillers, Joint Seals and Joint Sealing Compounds - Structures
OPSS 928	Structure Rehabilitation - Concrete Removal
OPSS 929	Abrasive Blast Cleaning - Concrete Construction
OPSS 930	Structure Rehabilitation - Concrete Patches and Overlays
OPSS 932	Crack Repair - Concrete

Ontario Provincial Standard Specifications, Material

OPSS 1002	Aggregates - Concrete
OPSS 1202	Bearings - Elastomeric Plain and Steel Laminated
OPSS 1301	Cementing Materials
OPSS 1302	Water
OPSS 1315	White Pigmented Curing Compounds for Concrete
OPSS 1350	Concrete - Materials and Production

Ontario Ministry of Transportation Publications

Laboratory Testing Manual:
LS-413 Method of Test for Non-Volatile Content of Chemical Admixtures, Latex Admixtures and Curing Compounds
LS-414 Method of Test for Relative Density of Chemical Admixtures, Air Entraining Admixtures, Latex Admixtures and Curing Compounds
LS-416 Method of Test for Settling Rate - Curing Compound

ASTM International

C 171-92 Sheet Materials for Curing Concrete

American Association of State Highway and Transportation Officials (AASHTO)

M182-89 Standard Specification for Burlap Cloth made from Jute or Kenaf

904.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Bridge means a structure that is greater than 3 m in span that provides a roadway, carriageway, or walkway for the passage of vehicles or pedestrians or both across an obstruction or gap or facility.

Coated Reinforcing Steel Bars means reinforcing steel bars coated with epoxy.

Cold Joint means the interface surface other than at a formed joint that occurs when plastic concrete is placed against concrete that has taken its initial set.

Cold Weather means those conditions when the ambient air temperature is at or below 5 °C. It is also considered to exist when the ambient air temperature is at or is likely to fall below 5 °C within 96 hours after completion of concrete placement. Temperature refers to shade temperature.

Concrete Toe Wall means a low unreinforced concrete gravity type retaining wall no greater than 2 m in height.

Construction Joint means the surface where two successive placements of concrete meet or where new concrete is placed against old concrete across which it is desirable to achieve bond between the two concrete placements and through which steel reinforcement may be continuous.

Culvert means a structure which provides an opening through an embankment and in which roadway loads are distributed to the structure through fill or that is designated as a culvert in the Contract Documents.

Designated Limits means the dimensions of the component as shown on the Contract Drawings or the limits of the component as revised in the field in writing by the Contract Administrator.

Dowel means deformed coated reinforcing steel bar, reinforcing steel bar or stainless steel reinforcing bar placed into a hole of specified dimensions drilled into a concrete structure and bonded to the concrete by dowel adhesive.

Dowel Type means a dowel differentiated by bar size, embedment length, orientation of embedment and by bar material, such as 15M stainless steel reinforcing bar and 20M reinforcing steel bar.

High Performance Concrete (HPC) means concrete with a minimum specified 28-Day compressive strength of at least 50 MPa, that shall include silica fume and may include other supplementary cementing materials having a specified rapid chloride permeability at 28-32 Days of 1,000 coulombs or less.

Honeycombing means rough and stony concrete surface with voids where the mortar did not fill the spaces between the coarse aggregate particles.

Pull Test means an in situ test consisting of the application of a specified tensile axial load for a specified time period to installed dowels selected for testing.

Reinforcing Steel Bars means plain or deformed steel bars, or welded wire fabric, with no epoxy coating, used for the reinforcement of concrete.

R Value means the metric thermal resistance value that is a measurement of the resistance to heat transfer of insulation.

Segregation means visible separation of the mortar and coarse aggregate particles in the plastic concrete resulting in concrete that is not uniform in appearance or proportions.

Stainless Steel Reinforcing Bar means plain or deformed stainless steel bars.

Steel Reinforcement means a general term for steel bars, which includes reinforcing steel bars, splice bars, coated reinforcing steel bars, stainless steel reinforcing bars, and welded wire fabric.

Structure means any bridge, culvert, tunnel, retaining wall, wharf, dock, or guideway, or any part thereof, or other reinforced concrete component designed to carry loads, including high mast pole footings and sign support footings.

Tremie means a hopper with a vertical pipe extending from the bottom of the hopper to the lowest point of concrete deposit, used to place concrete under water.

904.04 DESIGN AND SUBMISSION REQUIREMENTS

904.04.01 Submission Requirements

904.04.01.01 Notification of Placement of Structural Concrete

At least 72 hours prior to each placing operation, the Contractor shall notify the Contract Administrator in writing of the scope and scheduling of the proposed placing operation.

904.04.01.02 Bridge Deck Placement Plan

A work plan shall be submitted to the Contract Administrator a minimum of one week prior to commencement of placing concrete in bridge decks for information purposes. The work plan shall include:

a) The proposed methods and sequence of placing operations to be used.

b) Complete details of all equipment to be used during the concrete placement.

904.04.01.03 Temperature Control Plans

A temperature control plan shall be submitted to the Contract Administrator a minimum of one week prior to commencement of placing any concrete that requires temperature control, for review of compliance with the contract requirements.

The plan shall include methods for monitoring and controlling concrete temperature and the temperature difference before, during, and after placement for:

a) Concrete subject to cold weather.

b) HPC.

c) Bridge decks.

d) Large concrete components where the smallest dimension is 1.5 m.

The temperature control plan shall include, as a minimum, the following:

a) Concrete element for which the plan applies.

b) Temperature monitoring system, including the locations and depths, number of thermocouples, and frequencies of recordings to be used in each placement.

c) Method of ensuring concrete temperature and temperature difference are maintained for the duration of the protection period.

d) Any alterations to work schedule, production, delivery schedule, and time of placement for temperature control purposes.

e) Any modification to mix design for temperature control purposes.

f) Any other specific measures to be taken.

g) Method of withdrawal of protection.

In addition, for concrete subject to cold weather, the temperature control plan shall also include the following:

a) Type of insulation, R value and number of layers, including test data verifying the R value. The submission for cold weather protective measures shall be accompanied by samples of insulation, if requested by the Contract Administrator.

b) Type and layout of heaters and type and extent of housing.

904.04.01.04 Temperature Records

Datalogger temperature records and a record of any actions taken to maintain control of temperature and temperature difference shall be forwarded to the Contract Administrator at the end of each working day during the temperature monitoring period. At the end of the temperature monitoring period, the Contractor shall submit to the Contract Administrator a complete temperature record, including graphical plot of temperature versus time.

904.04.01.05 Curing Compound

A minimum of one week prior to the application of the curing compound, the following shall be submitted to the Contract Administrator for information purposes:

a) Literature stating the manufacturer's recommended rate of application.

b) Description of the equipment to be used.

c) A statement from the manufacturer of the curing compound approving the equipment.

Test results for curing compounds shall be submitted to the Contract Administrator within 7 Days of sampling.

904.05 MATERIALS

904.05.01 Concrete

Concrete shall be according to OPSS 1350.

904.05.02 Portland Cement

Portland cement shall be according to OPSS 1301.

904.05.03 Sand

Sand shall be according to OPSS 1002.

904.05.04 Bonding Agents

Bonding agent shall consist of Portland cement, Type GU, and sand in the ratio of 1:1 by volume and water sufficient water to produce a consistency such that it can be applied with a stiff brush to the existing concrete in a thin even coating that shall not run or puddle.

904.05.05 Mortar

Mortar shall be a 2:1 mixture by volume of sand and Portland cement, Type GU, and shall contain 12% entrained air with water sufficient to make a stiff mix.

904.05.06 Proprietary Patching Materials

Proprietary patching materials shall be from the ministry’s list of concrete patching materials.

904.05.07 Burlap

The burlap shall be according to AASHTO M182, Class 4, and shall be free from substances that are deleterious to concrete. The burlap shall have no tears or holes.

904.05.08 Water

Water used for curing and fog misting of concrete, including pre-soaking of burlap, and for making bonding agents and mortar and mixing proprietary patching materials, shall be according to OPSS 1302.

904.05.09 Moisture Vapour Barrier

The material shall be a white opaque polyethylene film according to ASTM C 171, at least 100 µm thick.

904.05.10 Curing Compound

Curing compound shall be according to OPSS 1315.

904.05.11 Approach Slab Seat Elastomer

The elastomer delivered to the site shall exceed the required length to allow for a 600 mm test sample to be taken from each structure.

The elastomer shall be according to the plain bearing requirements of OPSS 1202, except that the hardness of the elastomer shall be a minimum of 50 Shore A, and the elastomer shall have a minimum tensile strength of 15 MPa.

904.05.12 Insulation Material

Insulation material shall be mineral wool, glass fibre, plastic foam or other suitable material, having an R value not less than 0.02 m^2 C/W per 1 mm thickness.

Straw insulation shall not be used. Loose or absorbent insulation material shall not be used unless it is completely contained within waterproof wrapping.

904.05.13 Dowels

Dowels shall be as specified in the Contract Documents. Dowels shall be capable of sustaining the pull test loads specified in Table 1 without displacement for a time period of not less than 1 minute.

904.05.14 Dowel Adhesive

Dowel adhesive shall be an approved epoxy or acrylic resin.

904.06 EQUIPMENT

904.06.01 General

Equipment made of aluminium material shall not come in contact with the plastic concrete.

904.06.02 Concrete Pump

The concrete pump shall be a reciprocating pump equipped to fit a pipeline at least 100 mm in diameter.

904.06.03 Consolidating Equipment

Internal vibrators shall be of the high frequency type with 8,000 minimum to 12,000 maximum vibrations per minute when immersed in concrete.

Internal vibrators used to consolidate concrete components containing epoxy coated steel reinforcement shall have a resilient covering that shall not damage the epoxy-coated reinforcement during use.

External vibrators shall have a minimum frequency of 3,600 vibrations per minute.

904.06.04 Mixer for Bonding Agents

The mixer for the bonding agent shall be a stationary mixer, power driven, and capable of uniformly mixing the materials.

904.06.05 Finishing Machine

The finishing machine shall:

a) Be self-propelled and capable of forward and reverse movement under positive control.

b) Be fitted with wheels that travel on adjustable screed rails.

c) Be fitted with a reversing rotating cylinder screed capable of finishing the concrete without subsequent hand finishing.

d) Be fitted with a reversing power screw auger.

e) Be capable of externally vibrating the surface of the concrete by means of a plate or roller.

f) Be fitted with a means to raise all screeds to clear the screeded surface and to accurately reposition them without adjusting the legs.

g) Have adjustable legs fitted with locking devices.

904.06.06 Screed Rails

The rails shall be made of metal and be straight to within 3 mm in a 3 m length. Screed rail chairs shall be adjustable in height, made of metal, and spaced at a maximum of 1.2 m and be placed under all rail joints. Maximum deflection of the screed rails under load shall be 2 mm in a 1.2 m length.

904.06.07 Work Bridges

Work bridges shall be provided to facilitate surface finishing of unscreeded areas, corrections to surface finish, concrete inspection, and placing of curing materials.

Work bridges shall ride on the screed rails and the top surface of a work bridge shall not be higher than 1.0 m above the finished surface.

904.06.08 Hand Finishing Tools

Floats shall be made of magnesium or wood. Magnesium bull floats shall be commercially made.

904.06.09 Straight Edges

Two straight edges commercially made of metal, one 3 m and one 500 mm long, shall be used.

904.06.10 Tremie

The tremie shall be equipped with a foot valve at the bottom of the pipe. The pipe shall have a 300 mm $\pm$ 50 mm inside diameter and shall be long enough to extend to the lowest point of concrete deposit.

904.06.11 Spray Equipment for Curing Compound

The curing compound shall be applied to the concrete surface by means of motorized spraying equipment approved by the manufacturer of the curing compound. The equipment shall include mechanical agitator.

904.06.12 Compressor - Air Blasting

The compressor for air blasting shall have a minimum capacity of 3.5 m^3/minute. The compressed air shall be free of oil or other contaminants.

904.07 CONSTRUCTION

904.07.01 Formwork and Falsework

Formwork and falsework shall be according to OPSS 919. Textile form liners shall not be used.

904.07.02 Steel Reinforcement, Mechanical Connectors, and Associated Hardware

Steel reinforcement, mechanical connectors, and associated hardware shall be according to OPSS 905.

Where the superstructure is continuous over a support, all of the deck steel reinforcement shall be placed in the entire deck before any concrete is placed. This requirement does not apply to the bottom slab of post-tensioned box voided decks.

904.07.03 Deck Joint Assemblies and Joint Material

Deck joint assemblies, joint fillers, joint seals, joint sealing compounds, and external waterstops shall be according to OPSS 920.

904.07.04 Preparation for Concrete Placement

904.07.04.01 General

All concrete surfaces against which new concrete is to be placed, including formed and sawcut surfaces, shall be clean, solid, and free from loose or unsound fragments, coatings, and any other foreign substances or debris and shall be sufficiently rough to ensure that a full bond is developed with the new concrete. The concrete surface shall be uniformly roughened to a surface profile of 5 mm $\pm$ 2 mm by means of methods such as scabbling, chipping, or bushhammering to expose the aggregates across the entire surface. Roughening is not required for the vertical faces of slope paving or for new concrete substrate with a roughened finish, imparted at the time of placement, meeting the profile requirement.

904.07.04.02 Abrasive Blast Cleaning

The following surfaces shall be abrasive blast cleaned according to OPSS 929:

a) All existing steel reinforcement that shall be incorporated into the rehabilitation of a concrete structure component.

b) All surfaces of existing structural steel against which new concrete shall be placed for the rehabilitation of a concrete structure component.

c) All new or existing concrete surfaces against which new concrete shall be placed.

904.07.04.03 Pre-wetting

All concrete surfaces to receive concrete shall be maintained in a wet condition for a period of 1 hour prior to placing any new concrete.

Immediately prior to wetting the concrete surface, all dust and loose material shall be removed from the prepared surface by using compressed air.

Prior to placing concrete, excess water shall be removed from the surface using compressed air.

904.07.04.04 Bonding Agent

A bonding agent shall be used for:

a) Vertical surfaces of concrete against which new concrete is to be placed.

b) Blockouts in concrete for installation and modification of deck joint assemblies.

c) Stressing tendon anchorage recesses.

A thin uniform coating of bonding agent shall be brushed onto the prepared surface immediately before placing fresh concrete. Bonding agents shall be mixed by means of a mixer. Any bonding agent not used within 30 minutes of mixing shall be discarded. Bonding agent that has dried shall be removed and replaced prior to placing concrete against it.

904.07.04.05 Element-Specific Preparation

For concrete in footings, when it is specified in the Contract that the concrete is to be placed against undisturbed soil or set in rock, any over-excavation shall be filled with concrete of the same strength as the footing concrete.

For parapet and barrier walls and curbs on structures, all anchorages shall be fastened in place accurately and securely before proceeding with concrete placement. The railing anchorage inserts shall be fastened in place according to OPSS 908.

For concrete in approach slabs, the approach slab seat elastomer, polystyrene, and joint filler shall be installed and the subgrade thoroughly wetted down prior to placing the concrete in the approach slab, including the adjacent sidewalk slab.

For concrete in slope paving, the slope face shall be shaped; excavation completed; granular A placed and compacted; and the crushed rock, moisture vapour barrier, wood strips, and joint filler shall be placed as required prior to placing the concrete. Sealant shall be installed as specified in the Contract Documents.

The granular A shall be compacted according to OPSS 501.

904.07.05 Dowels into Concrete

904.07.05.01 General

The Contractor shall carry out pull testing of dowels in the trial installations and during production. Pull test loads shall be according to Table 1. The Contractor shall notify the Contract Administrator in writing when the trial installation or a lot, as defined in the Lot Size clause, is ready for testing. The Contractor shall allow 3 Business Days for the Contract Administrator to witness the testing.

The Contractor shall provide documentation of equipment calibration to the Contract Administrator a minimum of 14 Days prior to any pull testing of the dowels.

904.07.05.02 Trial Installation

Prior to installing each dowel type specified in the Contract Documents, the Contractor shall carry out a trial installation of that dowel type at locations selected by the Contract Administrator.

Each trial installation shall consist of a set of three dowels. If the Contractor changes the installation procedure for a dowel type from that used in the associated trial installation, the Contractor shall repeat the trial installation prior to incorporating dowels installed using the changed installation procedure into the work.

Each of the three dowels in the set shall be capable of achieving the specified test load and times, without any movement of the dowels, for the trial installation to be considered acceptable.

If the trial installation is not acceptable, installation of that dowel type in the work shall not be permitted until the following have been carried out by the Contractor to the satisfaction of the Contract Administrator:

a) A written explanation for the failure has been submitted.

b) Corrective action to be taken has been identified.

c) The trial installation has been repeated with acceptable results.

If a dowel is not capable of achieving the test load and time due to failure of the surrounding concrete, the Contractor shall not be permitted to install any additional dowels of that type in the work until further advised by the Contract Administrator.

904.07.05.03 Installation

The Contractor shall drill holes to the required dimensions, clean holes, place dowel adhesive, and properly position the dowels as specified in the Contract Documents. Core drilling of the dowel holes shall not be permitted.

Steel reinforcement and other existing embedments shall not be cut or damaged by the drilling process. Prior to drilling holes, the Contractor shall locate existing steel reinforcement using a covermeter, Utility ducts, post tensioning hardware, and any unsound concrete in the vicinity of the dowel locations. If any of the above is encountered during drilling operations, the Contract Administrator shall be notified immediately.

The Contractor's operations shall not cause spalling, cracking, or other damage to the surrounding concrete. Concrete spalled or otherwise damaged by the Contractor's operations shall be repaired in a manner acceptable to the Contract Administrator.

The Contractor shall clean the holes using compressed air to remove all deleterious material, including dust and debris, and shall dry them prior to placing the dowel adhesive. Holes that are started but not completed shall be cleaned and filled with a proprietary patching material.

The handling and placement of the dowel adhesive shall conform to the manufacturer's written instructions. All excess dowel adhesive shall be struck-off flush with the concrete surface and removed from the surrounding concrete surface area.

Dowels shall be clean and free of deleterious material.

The Contractor shall maintain dowels in the proper position during the setting of the dowel adhesive and shall prevent the loss of dowel adhesive from the holes.

904.07.05.04 Pull Test

904.07.05.04.01 General

The Contractor shall not install formwork or attach anything to the dowels such as steel reinforcement and Utility ducts until the pull tests have been completed and the dowels are accepted into the work.

904.07.05.04.02 Lot Size

A lot shall consist of dowels of the same dowel type installed on a given day, in a single stage. Where a given day's production is less than 50 dowels, the day's work may be combined with the next day's production to form a single lot.

904.07.05.04.03 Pull Test Procedure

The Contractor shall conduct pull testing for the trial installation and each lot within 3 Business Days of installation. The Contract Administrator shall be present during the testing procedure. The Contract Administrator shall randomly select 5% of the dowels in each lot or 10 dowels, whichever is greater, for testing. The applicable pull test load shown in Table 1 must be sustained by the dowel, without displacement, for a time period of no less than one minute.

904.07.05.05 Replacement of Failed Dowels

All dowels failing the pull test requirement, including trial installation dowels, shall be replaced by the Contractor by installing a new dowel in an adjacent location approved by the Contract Administrator.

Dowels failing the pull test requirement, including trial installation dowels, shall be removed and the hole filled with proprietary patching material.

904.07.06 Placing of Concrete

904.07.06.01 General

The method of transporting, placing, and consolidating the concrete shall be such as to prevent segregation.

Concrete shall be deposited within 1.5 m of its final position. When concrete is to be dropped more than 1.5 m, fully enclosed vertical drop chutes extending to the point of deposit shall be used. Drop chutes are not required for placing concrete in steel tube piles of 0.6 m diameter or less. Concrete shall be placed at a steady rate, such that a monolithic concrete is obtained without the formation of cold joints.

When there is an interruption in placing concrete greater than 20 minutes, the surface of the concrete shall be covered with wet burlap. The Contractor shall notify the Contract Administrator immediately of any interruption resulting in a cold joint and shall submit a proposal for remedial action for approval.

904.07.06.02 Concrete Placing Restrictions

No concrete shall be placed until all curing material and, in cold weather, all cold weather protection material, have been delivered to the site.

Barrier and parapet walls on structures shall not be slipformed.

When concrete is to be placed on a surface that has a slope greater than 3%, the placing operation shall begin at the lower end of the slope and progress upwards.

All surfaces against which concrete are to be placed shall be free of standing water, except for tremie concrete. Fresh concrete shall be protected from contact with rain or snow.

The temperature of formwork, steel reinforcement or the material on which the concrete is to be placed shall not exceed 30 °C.

Debris shall be removed from the area where concrete is to be placed.

Ice and snow shall be removed from the area where concrete is to be placed. Deicing chemicals shall not be used. Concrete shall not be placed on or against frozen ground. Excavations prepared for concreting and any existing concrete, steel reinforcement, structural steel, forms, or other surfaces against which concrete shall be placed shall be at a minimum temperature of 5 °C for a period of 12 hours prior to commencement of placing concrete.

904.07.06.03 Concrete in Structure and in Deck

Concrete diaphragms shall be placed monolithically with the deck.

All bridge deck placements 3 m or wider shall be finished using a finishing machine and a work bridge. Where placements are longer than 40 m or wider than 10 m, a second work bridge shall be used. For deck placements narrower than 3 metres, the Contractor shall submit a proposal detailing a method of finishing to the Contract Administrator for approval. Small, localized areas may be hand finished subject to approval by the Contract Administrator.

Where the superstructure is continuous over a support, the screed rails shall be placed for the entire length of the structure before any concrete is placed.

A dry run shall be carried out to ensure that the specified camber, crown, slab thickness, and concrete cover are achieved. In those areas of the deck where a finishing machine will be used to finish the concrete, the dry run shall be carried out by means of the finishing machine fitted with an attachment suitable for checking the required cover, securely fastened to the finishing machine strike-off, with the strike-off set in its lowest position. This operation shall be repeated to cover the entire area to be concreted.

For HPC and silica fume overlay, at the time of the dry run the Contractor shall demonstrate that the performance of the fog misting equipment meets the specified requirements.

Screed rails and the supports for the screed rails shall not be removed until the concrete has hardened sufficiently to withstand the weight of workers and equipment used to remove them without marring the surface of the concrete. Any part of the screed rail supports that remain in the deck shall have 100 mm of concrete cover. Chairs used to support screed rails shall not be welded to structural steel but may be welded to shear connectors.

The holes in the deck resulting from removal of the screed rail supports shall be thoroughly cleaned of all deleterious material and abrasive blast cleaned immediately prior to filling with proprietary patching material. The work of cleaning and filling the holes shall be completed within 96 hours after the end of the deck curing period.

904.07.06.04 Tremie Concrete

Concrete shall be placed using a tremie or concrete pump. No air or water pockets shall be introduced into the tremie concrete by the placing equipment.

Pipe of a tremie or hose of a concrete pump shall be positioned vertical and shall be long enough to reach the lowest point of concrete deposit. A continuous flow of concrete at a minimum rate of 15 m^3/h shall be maintained through the pipe or hose. The concrete shall be placed in its final position and to its full depth in a continuous placing operation without interruption. The top under water surface of the concrete shall be kept level during concrete placement. After placement, the concrete shall not be disturbed, puddled, or vibrated. Tremies or concrete pumps shall be located a maximum distance of 5 m apart and a maximum of 2.5 m from forms.

Concrete shall only be placed in water that has a temperature 2 °C or greater. The velocity of water flow inside the forms shall not be more than 3 m/min.

When placing the tremie pipe or concrete pump hose and at the start of the concreting operation, the pipe or hose shall be sealed at the bottom to prevent ingress of water. Once concrete is flowing through the pipe or hose, the discharge end shall be kept continuously immersed in the freshly placed concrete. If the seal is lost, thereby allowing the pipe or hose to fill with water, the pipe or hose shall be withdrawn, the seal re-established, and the starting operation repeated. Separate cranes shall be used to deliver the tremie concrete and to move and position the tremie or concrete pump.

Tremie concrete shall not be placed above the existing water level.

When a placement operation is interrupted below water level, the surface laitance shall be removed to expose the coarse aggregate within 36 hours after the interruption and before continuation of the operation.

When a placement operation is completed and work is to continue in the dry, the Contractor shall prepare the construction joint by removing surface laitance to expose the coarse aggregate.

Unwatering shall not be permitted until at least 24 hours after the concrete placement is completed.

904.07.07 On-Site Transportation

Runways for buggies shall be of sufficient strength to prevent shaking and jarring of the buggies and steel reinforcement.

Concrete placing and transporting devices shall not be supported by the steel reinforcement.

Chutes shall have sufficient slope to deliver concrete of the approved consistency and shall have a maximum length of 15 m.

904.07.08 Consolidation

Internal or external vibrators or both shall be used to thoroughly consolidate concrete at the point of deposit within 15 minutes of placing.

Each layer of concrete shall be vibrated. Vibrators shall extend into the previous layer to produce a homogenous mixture at the layer interface.

Vibration shall not be used to make the concrete flow or to spread the concrete more than 1.5 m from the point of deposit.

904.07.09 Concrete Finishing

Finishing of the concrete surface shall be done while it is sufficiently plastic to achieve the desired grades, elevations, and texture. The Contractor shall ensure that excessive fines and water are not drawn to the surface.

No material shall be applied to the concrete surface or the finishing tools to aid in the finishing.

The surface shall be smooth, free from open texturing, undulations, projections, and ridges and shall be struck off true to grade and cross-section and, except as specified for bridge deck placements, shall be hand finished with a float.

Bearing seats and expansion joint dams shall receive a wood float finish. The top surface of sidewalks and curbs shall be given a broomed finish. Bridge decks shall be finished according to the Concrete in Structure and in Deck clause. In addition, for bridge decks where the concrete forms the wearing surface, the surface shall be textured. Texturing shall be done with a wire broom or comb having a single row of tines after a tight, uniform surface has been achieved. The required texture shall be transverse grooves that may vary from 1.5 mm width at 15 mm centres to 4.5 mm width at 20 mm centres with a groove depth varying from 3.0 mm to 4.5 mm. The texture shall extend uniformly to within 150 to 300 mm of the curb. Concrete surfaces against which new concrete shall be placed shall be left with a rough surface finish.

904.07.10 Curing

904.07.10.01 General

The curing period shall be a minimum of 7 Days for concrete subject to cold weather, concrete cured with curing compound, and HPC. For all other concrete, the curing period shall be a minimum of 4 Days.

When the ambient air temperature is 0 °C or higher at the time of placing, components of structures shall be cured with burlap and water except as specified in the Curing Formed Surfaces clause. When the ambient air temperature is below 0 °C at the time of placing, components shall be cured with moisture vapour barrier, except for HPC, which shall be moist cured with burlap and water regardless of ambient air temperature. During cold weather, burlap shall be prevented from freezing.

Curing compound shall only be permitted for non-structural elements such as slope paving.

904.07.10.02 Fog Misting of High Performance Concrete

The Contractor shall provide fog misting by hand held fogging wands and may also employ a fogging system mounted on the finishing machine.

Fog mist shall be applied from the time HPC is deposited in the deck, approach slab, median, curb, or sidewalk until it is covered with burlap.

Fog mist shall be applied using misting nozzle in such a way as to maintain a fog mist above the concrete surface to maintain high relative humidity above the concrete and prevent drying of the concrete. No accumulation of water shall be permitted on the concrete surface. Water from fog misting nozzles shall not be worked into the concrete surface or used as a finishing aid.

904.07.10.03 Curing with Burlap and Water

Burlap shall be pre-soaked by immersing it in water for a period of at least 24 hours immediately prior to placing. Two layers of burlap shall be applied to the surface of the concrete. The burlap shall be applied immediately after finishing the concrete surface. For continuing operations, such as barrier wall or sidewalk, the burlap shall be applied within 2 to 4 m of the finishing operation, and for bridge decks, within 2 to 4 m of the pan or screed of the finishing machine. Burlap strips shall overlap 150 mm and shall be held in place without marring the surface of the concrete.

The burlap shall be maintained in a continuously wet condition throughout the curing period by means of a soaker hose. The burlap shall be covered with a layer of moisture vapour barrier, within 12 hours of placing of the concrete, in a manner that shall prevent deformation of the surface of the concrete.

Air flow in the space between the moisture vapour barrier and the burlap shall be prevented.

Water shall not be allowed to drip, flow, or puddle on the concrete surface when placing the burlap or at any time before the concrete has achieved final set.

Where waterproofing is to be applied to a structure deck following curing with burlap and water, the deck shall be air dried for at least 72 hours prior to the application of waterproofing.

904.07.10.04 Curing with Moisture Vapour Barrier

A moisture vapour barrier shall be placed immediately after finishing the concrete surface, within 2 to 4 m of the finishing operation. Air flow in the space between the moisture vapour barrier and the concrete surface shall be prevented. The moisture vapour barrier strips shall overlap 150 mm and shall be held in place at the edges and laps to prevent displacement, without marring the surface of the concrete.

904.07.10.05 Curing with Curing Compound

Immediately prior to application, the curing compound shall be agitated by mechanical means to provide a homogeneous mixture. It shall be applied immediately after finishing of the concrete surface, within 2 to 4 m of the finishing operation, completely covering the surface of the concrete. A second application of curing compound shall be applied within 30 to 60 minutes after the first application. Each application shall be such that the membrane formed is uniform in thickness and colour and free of breaks and pinholes.

The rate of each application shall not be less than the rate specified by the manufacturer of the compound.

904.07.10.05.01 Curing Compound Sampling and Testing

The Contractor shall be responsible for sampling and testing curing compounds. Curing compounds shall be sampled at the site, from the spray nozzle, in the presence of the Contract Administrator. Samples shall be taken at a frequency of one sample per contract or one sample per 1,000 lineal meters, whichever provides the greater number of samples. Testing shall be carried out by a laboratory on the ministry's list of laboratories qualified for this testing. Testing for relative density, non-volatile content, and settlement shall be carried out according to LS-413, LS-414, and LS-416.

904.07.10.06 Curing Formed Surfaces

Forms for structure barrier wall, parapet wall, and curb on deck shall be removed no later than 24 hours after concrete placement, and the concrete shall be cured according to the Curing with Burlap and Water clause for the remainder of the minimum curing period.

Other formed surfaces shall require no additional curing where the formwork is left in place for the minimum specified curing period. Where the formwork is removed before the curing period is completed, formed surfaces shall be cured with burlap and water according to the Curing with Burlap and Water clause for the remainder of the minimum curing period.

For all concrete other than HPC, when ambient air temperatures are 5 °C or less, forms for concrete barrier wall, parapet wall, and curb on deck may be left in place for the duration of the curing period. When forms are left in place, exposed concrete surfaces of these components shall be cured with vapour barrier.

904.07.11 Control of Temperature and Temperature Difference

904.07.11.01 General

The Contractor shall ensure that during the curing period the concrete temperature does not fall below 10 °C or exceed 70 °C. The Contractor shall also ensure that the temperature difference between the centre of the concrete component at a location where the concrete is expected to reach the highest temperature and the surface does not exceed 20 °C, for:

a) Any concrete subject to cold weather.

b) HPC.

c) Large concrete components where the smallest dimension is 1.5 metres.

d) All bridge decks.

904.07.11.02 Monitoring

The Contractor shall monitor the concrete and ambient air temperature for:

a) Any concrete subject to cold weather.

b) HPC.

c) Large concrete components where the smallest dimension is 1.5 metres.

d) All bridge decks.

The Contractor shall supply and install thermocouple wires and associated instrumentation with a combined accuracy of $\pm$ 1 °C capable of recording and displaying temperature. The instrumentation shall include data loggers capable of recording at hourly intervals or less and shall allow direct reading of temperature.

The thermocouples for concrete temperature measurement shall be installed according to Table 2 prior to placing concrete. Thermocouples for monitoring ambient air temperature shall be installed in the shade close to the surface of the concrete at a frequency of 1 thermocouple per stage.

Recording of concrete temperatures shall begin at the start of placement. The temperature shall be recorded automatically at intervals no greater than 1 hour until the end of the monitoring period. The monitoring period shall be 7 Days or longer when necessary in order to meet the requirements of the Withdrawal of Protection clause.

The Contractor shall also monitor and verify concrete and ambient air temperature every 6 hours, or more frequently, for the first 3 Days and every 12 hours for the remainder of the monitoring period. The Contractor shall take necessary action to maintain the temperature within the specified limits.

The Contract Administrator shall be provided access to verify temperature readings. The digital temperature indicators shall be left in place until the end of the monitoring period. If the datalogger does not have a digital display that allows the Contract Administrator to verify temperature, the Contractor shall provide the Contract Administrator with the necessary instruments to allow the Contract Administrator to verify thermocouple function and readings.

904.07.11.03 Concrete Subject to Cold Weather

The Contractor shall design the protection system for the worst conditions that can be reasonably anticipated from local weather records, forecasts, site conditions, and past experience for the time period during which the protection is required. The Contractor shall monitor the conditions and modify the protection system as required.

For cold weather conditions, minimum protection of concrete shall be according to Table 3 and shall be maintained for the duration of curing period. This period may need to be extended in order to meet the requirement of the Withdrawal of Protection clause.

904.07.11.03.01 Housing and Heating

The design of the protective housing shall take into account the effects of construction activities such as placing concrete, stressing, and grouting. Heating equipment of sufficient capacity to establish and maintain the specified curing conditions shall be used throughout the curing period and for such time thereafter as is necessary for the completion of the work. Heating equipment used within the housing shall be vented outside the housing. Heating equipment having an open flame shall not be permitted.

The ambient air temperature adjacent to the concrete or formwork within the housing shall not be permitted to vary by more than 8 °C.

904.07.11.04 Withdrawal of Protection

For concrete subject to cold weather and for large concrete components where the smallest dimension is 1.5 metres, the protection shall be gradually removed or reduced in such a manner that the maximum allowable drop of concrete temperature, as specified in Table 4, for each 24-hour period is not exceeded.

The protection shall not be totally removed nor shall the concrete be fully exposed to the air until the average concrete temperature is within 10 °C of the ambient air temperature.

904.07.12 Removal of Formwork and Falsework

The removal of formwork and falsework shall be according to OPSS 919 and the Contract Documents.

904.07.13 Construction Joints

The Contractor shall form construction joints at the locations shown on the Contract Documents.

In addition, construction joints can be formed where control joints are specified in barrier walls and parapet walls. No other construction joints shall be permitted unless approved in advance by the Contract Administrator.

A straight 20 mm V-groove shall be formed at the exposed face of the concrete at all construction joints. V-grooves shall not be used on bridge deck surfaces, except for the bottom slab of post tensioned box voided slabs.

A bulkhead shall be used to form vertical or inclined construction joints.

904.07.14 Surface Finish

904.07.14.01 General

Concrete surfaces shall not be treated with cement slurry or paste.

Within 3 Days following the removal of forms or curing materials, all holes left in the concrete surface with dimension greater than 15 mm and less than 50 mm shall be filled with mortar or a proprietary patching material. The holes shall be moist at the time of filling. Mortar shall be tamped into place. Proprietary patching materials shall be placed according to manufacturer's instructions.

Surfaces with cavities greater than 50 mm or with honeycombing are considered deficient and shall be repaired. The Contractor shall submit a repair proposal to the Contract Administrator for approval.

904.07.14.02 Exposed Surfaces

The appearance of the concrete shall be uniform in colour, pattern, and texture when viewed from a distance of 15 m. Where a patch is exposed to view, white Portland cement shall be blended with the normal cement to achieve a uniformity of colour. To ensure this uniformity, trial mixes shall be made beforehand and sample panels compared with the main body of the concrete.

The Contractor shall remove all projections, such as fins and bulges, and all blemishes, such as stains and rust marks.

Proprietary patching materials shall be selected to achieve uniformity of colour and appearance.

904.07.14.03 Surface Tolerance

Formed and unformed surfaces shall be such that, when tested with a 3 m long straight edge placed anywhere in any direction on the surface, there shall be no gap greater than 6 mm between the bottom of the straight edge and the surface of the concrete. When the straight edge is placed across a construction joint the gap between the straight edge and the surface of the concrete shall not be greater than 3 mm.

All unformed construction joint surfaces against which sidewalks, curbs, medians, and barrier walls are to be placed shall be such that, when tested with a 500 mm straight edge placed anywhere in any direction on the surface, there is no gap greater than 20 mm between the bottom of the straight edge and the surface of the concrete.

904.07.14.04 Contamination of Surface

Contamination by oil or other deleterious substances shall be prevented. Contaminated concrete in bridge decks or against which new concrete is to be placed shall be removed according to OPSS 928, procedure for Concrete Removal-Partial Depth-Type A, B, and C.

904.07.15 Alignment of Components

The position of the inner and outer top edges of structural components shall be set true to the elevations, alignment, and camber specified in the Contract Documents without visible deviation from one end of the structure to the other. All concrete items or structural components shall be constructed to the specified geometry.

Variations from plumb or a specified slope shall not exceed 1H:400V. Departure from specified alignment shall not exceed $\pm$ 25 mm.

904.07.16 Testing for Early Strength

The Contractor may, at his option, prepare sets of cylinders for early strength determination in addition to the cylinders required for determination of strength at 28 Days.

The Contractor shall be responsible for all aspects of the preparation, storing, and transportation of cylinders for early strength determination. Curing of cylinders for early strength determination shall consist of storing the cylinders in or on the structure as near as possible to the component that they

represent. The cylinders shall receive the same protection from the elements on all surfaces as is given to the portions of the structure that they represent. The Contractor shall identify the time of testing for early-break cylinders and provide the Contract Administrator with 1 Business Day advance notice to arrange testing. The Contractor shall deliver cylinders for early strength determination immediately prior to the time of testing. The Owner shall test a reasonable number of cylinders for early strength determination at the laboratory designated in the Contract.

Early strength determination of concrete in post-tensioned structures shall be carried out on a minimum of four sets of cylinders representative of the concrete placed in the structure. At least one set of cylinders from the start, middle, and end of the deck section being placed, shall be cast. All cylinder test results must reach the minimum stressing strength specified in the Contract Documents before stressing can commence.

904.07.17 Cracks in Formed and Unformed Surfaces

The Contractor shall inspect all concrete to identify and document any cracks including, their location, width, and density. The results of the inspection shall be reported to the Contract Administrator. The Contractor shall continue to inspect and monitor cracks up to the date of Completion of the Work.

Based on criteria in Table 5, the Contractor shall identify areas requiring repair or replacement, and shall identify the limits of such repair or replacement. This information shall be provided to the Contract Administrator along with a proposal for remedial action to be taken. No repairs shall proceed until the proposal has been accepted by the Contract Administrator in writing.

Repairs shall be according to OPSS 932. Where removal is required, the removals and preparation of concrete shall be according to OPSS 928 and OPSS 930.

For bridge decks to be waterproofed, the inspection of the surface to be waterproofed shall be carried out after completion of curing and before application of tack coat for waterproofing. For all other concrete, the inspection shall be carried out in a timely manner but no later than one month following completion of curing. The Contractor shall not proceed with waterproofing of a bridge deck until repairs have been completed and permission to waterproof has been given by the Contract Administrator.

904.07.18 Concrete Cover

The Contractor shall clear all debris and obstructions and provide unhindered access to allow the Contract Administrator to carry out the concrete covermeter survey as specified in the Concrete Cover subsection of the Quality Assurance section. The Contractor shall notify the Contract Administrator in writing when the test area is ready for the concrete covermeter survey.

The Contractor shall allow the Contract Administrator a time period of 3 Business Days to complete the survey, including review of the survey by the Owner. This time period shall commence upon receipt of the Contractor's written notification to carry out the survey. The time period required to complete the concrete survey shall be extended if inclement weather or the ambient air temperatures below 5 °C fall within that time period.

Where the cover does not meet the Contract requirements, the Contractor shall submit a proposal for remedial action for approval by the Contract Administrator.

The Contractor shall not proceed with waterproofing of a bridge deck until the survey has been completed and permission to waterproof has been given by the Contract Administrator.

For all other components, the inspection of the surface shall be carried out in a timely manner, no more than one month after removal of curing.

904.07.19 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

904.08 QUALITY ASSURANCE

904.08.01 Acceptance

Acceptance shall be according to OPSS 1350 and this specification, including satisfactory completion of all remedial action associated with surface tolerance, surface finish, concrete cover, alignment, cracks, and dowel bars and any other deficiencies.

904.08.02 Concrete Cover

The concrete cover shall meet the Contract requirements. Concrete cover determination shall be carried out by the Contract Administrator on the front faces of barrier or parapet walls, and the top surface of decks, including medians and sidewalks. The Contract Administrator shall provide the survey report to the Contractor.

904.08.03 Approach Slab Seat Elastomer

The Contract Administrator shall select a random sample of the approach slab seat elastomer, 600 mm in length, from each structure for testing.

The Contractor shall allow 60 Days from the time of submission of the sample for the Owner's testing program.

The approach slab seat elastomer samples shall be delivered by the Contractor to the Contract Administrator.

Approach slab seat elastomer that does not meet the Contract requirements shall be considered unacceptable.

904.08.04 Dowels into Concrete

904.08.04.01 Acceptance of Dowels into Concrete

If more than one dowel fails, the lot of dowels shall be considered unacceptable and the Contractor shall complete the following:

a) Conduct pull tests on all remaining untested dowels of the lot.

b) On the subsequent lot, conduct pull tests on 10% of dowels or 20 dowels, whichever is greater. If more than one dowel fails, all remaining untested dowels of that lot shall be tested.

c) The subsequent lot shall be tested at the higher frequency until no more than one tested dowel fails.

The Contractor shall pull test all replacement dowels in the presence of the Contract Administrator. Each replacement dowel shall be accepted individually.

Dowels shall not be subjected to more than one pull test.

904.09 MEASUREMENT FOR PAYMENT

904.09.01 General

No deductions from the volume of concrete shall be made for any of the following:

a) Drainage openings, load reducing devices, embedded timbers, and Utility and prestressing steel ducts, each of which has a cross-sectional area of less than 0.1 m^2.

b) Timber, steel, concrete, or concrete filled tubular piles.

c) Steel reinforcement, miscellaneous hardware, and structural steel.

904.09.02 Actual Measurement

904.09.02.01 Concrete in Culverts
Mass Concrete
Tremie Concrete
Concrete in Footings
Concrete in Barrier Wall Footings

Measurement of concrete shall be by volume in cubic metres.

Measurement shall be made within the designated limits of the work.

Tremie concrete volume may be measured using the concrete delivery tickets, when so designated by the Contract Administrator.

904.09.02.02 Dowels into Concrete

For measurement purposes, a count shall be made of the number of dowels installed.

904.09.03 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement

904.10 BASIS OF PAYMENT

904.10.01 Concrete in Culverts - Item
Mass Concrete - Item
Tremie Concrete - Item
Concrete in Footings - Item
Concrete in Barrier Wall Footings - Item
Concrete in Structure - Item
Concrete in Substructure - Item
Concrete in Substructure and Retaining Walls - Item
Concrete in Deck - Item
Concrete in Barrier Walls - Item
Concrete in Parapet Walls - Item
Concrete in Approach Slab - Item
Concrete in Slope Paving - Item
Concrete in Toe Wall - Item
Prestressed Concrete Bridge Deck - Item
High Performance Concrete in Substructure - Item
High Performance Concrete in Structure - Item
High Performance Concrete in Approach Slab - Item
High Performance Concrete in Deck - Item

High Performance Concrete in Barrier Walls - Item
High Performance Concrete in Parapet Walls - Item
High Performance Concrete in Substructure and Retaining Walls - Item

Payment at the Contract price for the concrete tender items shall be full compensation for all labour, Equipment, and Material to do the work, subject to payment adjustments specified in the Contract Documents.

Surface cavities greater than 50 mm and honeycombing shall be repaired at no cost to the Owner.

904.10.02 Dowels into Concrete - Item

Payment at the Contract price for the tender items shall be full compensation for all labour, Equipment, and Material to do the work, except that payment for the reinforcing steel bars or coated reinforcing steel bars or stainless steel reinforcing bars used as the dowels shall be according to OPSS 905.

No payment shall be made for dowels that fail the pull test, except where the failure is due to concrete breakout.

Repair to the concrete required due to Contractor's operations shall be made at no cost to the Owner.

For any dowels that fail the pull test as a result of concrete breakout failure and not by bond failure, payment for repairs to concrete resulting from concrete breakout failure during the pull test and the cost of the replacement dowel shall be made as Extra Work.

The cost of additional testing according to the Acceptance of Dowels into Concrete clause shall be at the Contractor's expense and shall be a lump sum of $1,000 with additional cost of $50 per dowel.

904.10.03 Formwork and Falsework

Payment for formwork and falsework shall be included in the work in which it is used.

Where formwork is required for the work under a concrete tender item, it shall be deemed for progress payment purposes that the formwork, together with its supporting falsework, when installed, constitutes 35% of the work to be carried out under the tender item.

Partial payment for construction of the formwork and falsework shall be made on a prorated basis.

904.10.04 Working Slabs

When a concrete working slab is required by the Contract Administrator, payment shall be made as Extra Work at the unit price of the concrete in the footing to be placed on it.

904.10.05 Deck Joint Assemblies, Bearings, and Deck Drains

When the Contract does not contain a separate tender items for deck joint assemblies, bearings, and deck drains, the Contract price for the concrete tender items in which the deck joint assemblies, bearings, and deck drains are incorporated shall include full compensation for all labour, Equipment, and Material required to place the deck joint assemblies, bearings, and deck drains.

904.10.06 Reinforcing Steel Bars, Coated Reinforcing Steel Bars, or Stainless Steel Reinforcing Bars

When the Contract does not contain a separate tender item for reinforcing steel bar, coated reinforcing steel bar or stainless steel reinforcing bar, the Contract price for the concrete tender item in which the steel reinforcement is incorporated shall include full compensation for all labour, Equipment, and Material required to place the reinforcing steel bars, coated reinforcing steel bars or stainless steel reinforcing bars.

TABLE 1
Pull Test Loads

Dowel Size	Test Loads kN	
	Embedment depth less than 200 mm	Embedment depth 200 mm or greater
10M	20	35
15M	40	70
20M	60	110
25M	100	180
30M	140	250
35M	190	340

TABLE 2
Minimum Number of Thermocouple Sets for Concrete Temperature Measurement

	Concrete Elements Requiring Temperature Monitoring	**Number of Thermocouple Sets in Each Element**	**Number of Thermocouples in Each Set**	**Thermocouple Set Locations**
Cold weather protection	Each concrete element	Minimum of 3 per element or stages thereof	2	In locations where the concrete is expected to reach the highest temperature and at the surface of concrete.
Bridge Decks	All	1) Minimum of 3 per stage, or per deck if deck is not placed in stages. 2) When diaphragm is cast together with a deck a minimum of 4 per stage.	3	The beginning, middle, and final portion of the deck placement and in the diaphragm. In locations where the concrete is expected to reach the highest temperature and at the surfaces of concrete. (Note 1)
HPC	Substructure elements: abutments, pier columns, and pier caps	Minimum of 3 per element or stages thereof	2	In locations where the concrete is expected to reach the highest temperature and at the surface of concrete.
Large concrete components where the smallest dimension is 1.5 metres	Elements with smallest dimension of 1.5 m or more	Minimum of 3 per element or stages thereof	2	In locations where the concrete is expected to reach the highest temperature and at the surface of concrete.

Notes:

1. For bridge decks, thermocouples shall be installed in sets of three consisting of one mid-depth thermocouple and two surface thermocouples. The surface thermocouples shall be placed immediately above or the shortest distance from the corresponding mid-depth thermocouple. The surface thermocouples shall be installed beneath the burlap, in contact with the surface concrete or imbedded in the concrete within 5 mm of the surface and, for bridge decks, the second surface thermocouple shall be placed inside the bottom form.

TABLE 3
Minimum Cold Weather Protective Measures

Footings and Slabs on the Ground				
Anticipated Minimum Ambient Air Temperature °C	**Thickness**			
	> 1.0 m	**1.0 - 0.5 m**	**< 0.5 - 0.25 m**	**< 0.25 m**
+5 to 0	PM1	PM1	PM1	PM2
-1 to -10	PM2	PM2	PM2	PM3
-11 to -20	PM3	PM3	PM4	PM5
less than -20	PM3	PM4	PM5	PM5
All Other Components				
+5 to 0	PM1	PM1	PM1	PM2
-1 to -10	PM2	PM2	PM3	PM4
-11 to -20	PM3	PM3	PM4	PM5
less than -20	PM4	PM5	PM5	PM5

Notes:

A. Protective Measures

PM1 - Cover components with a moisture vapour barrier as specified for curing with moisture vapour barrier.
PM2 - Cover components as for PM1, then cover the moisture vapour barrier with insulation having an R-Value of 0.67.
PM3 - Cover components as for PM1, then cover the moisture vapour barrier with insulation having an R-Value of 1.33.
PM4 - Cover components as for PM1, then cover the moisture vapour barrier with insulation having an R-Value of 2.00.
PM5 - Housing and heating.

B. All R-Values are metric

C. The conversion factor from metric to imperial units is:

Metric R-Value x 5.678 = Imperial R-Value.

TABLE 4
Maximum Allowable Drop in Concrete Temperature

Thickness	**> 2.0 m**	**1.0 - 1.99 m**	**< 1.0 m**
Maximum Allowable Drop in Concrete Temperature per 24 hours	10 °C	15 °C	20 °C

TABLE 5
Criteria for Treatment of Cracks

Components	Width of Crack at Widest Point mm	Treatment of Cracked Areas
Decks to be waterproofed and paved	≥ 0.50	Repair
Exposed decks	> 0.30	a) Repair cracks in the areas where total linear measurement of crack per m^2 is < 5 m. b) Remove and replace the cracked areas where total linear measurement of crack per m^2 is ≥ 5 m.
Barrier wall, parapet wall, sidewalk, and median on a structure	> 0.30	a) Repair cracks in the areas where the total linear measurement of crack per linear meter of the wall, sidewalk or median measured along the side facing traffic is < 5 m. b) Remove and replace the cracked areas where the total linear measurement of crack per lineal meter of the wall, sidewalk, or median measured along the side facing traffic is ≥ 5 m.
	≤ 0.30	Apply sealer acceptable to the ministry to cracked areas where total linear measurement of crack per m^2 is ≥ 5 m.
Curb on a structure	> 0.30	a) Repair cracks in the areas where the total linear measurement of crack per linear meter of the curb is < 1.5 m. b) Remove and replace the cracked areas where the total linear measurement of crack per linear meter of the curb is ≥ 1.5 m.
Piers, pier caps, abutments, and other structural components within 3 m of roadway	> 0.30	Repair
	≤ 0.30	Apply sealer acceptable to the ministry to cracked areas where total linear measurement of crack per m^2 is ≥ 5 m.
All other components	≥ 1.00	Repair

Appendix 904-A, November 2012
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Dowels. (904.05.13)

- Slope paving sealant installation. (904.07.04.05)

- Dowel type. (904.07.05.01)

- Installation of dowels. (904.07.05.02)

- Removal of formwork and falsework. (904.07.12)

- Location of construction joints. (904.07.13)

- Alignment of components. (904.07.15)

- Stressing strength for concrete. (904.07.16)

- Management of excess materials. (904.07.19)

- Payment adjustments for concrete. (904.10.01)

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

No information provided here.

CONSTRUCTION SPECIFICATION FOR STEEL REINFORCEMENT FOR CONCRETE

TABLE OF CONTENTS

905.01 SCOPE

This specification covers the requirements for the placement of steel reinforcement and mechanical connections for concrete structures.

905.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

905.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

905.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Material

OPSS 1440	Steel Reinforcement for Concrete
OPSS 1442	Epoxy Coated Steel Reinforcement for Concrete
OPSS 1443	Organic Coatings for Steel Reinforcement

Ministry of Transportation Publications

Structural Manual

Laboratory Testing Manual:
LS-434 Method of Test for Mechanical Connectors Used to Splice Steel Reinforcement

CSA Standards

G30.18-M92 (R2002)	Billet Steel Bars for Concrete Reinforcement
S6-00 (R2005)	Canadian Highway Bridge Design Code
W186-M1990 (R2002)	Welding of Reinforcing Bars in Reinforced Concrete Construction

ASTM International

A 955/A 955M-05a	Deformed and Plain Stainless-Steel Bars for Concrete Reinforcement
E8/E8M-04	Standard Test Methods for Tension Testing of Metallic Materials

ISO International Organization for Standardization/International Electrotechnical Commission

ISO 17025 General Requirements for the Competence of the Testing and Calibration Laboratories

Others

Concrete Reinforcing Steel Institute:
Voluntary Certification Program for Fusion-Bonded Epoxy Coating Applicator Plants

905.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Coated Reinforcing Steel Bar means reinforcing steel bars coated with epoxy.

Engineer means a professional engineer licensed by the Professional Engineers Ontario to practice in the Province of Ontario.

Mechanical Connection means a joining of two steel reinforcement bars by means of a mechanical connector.

Mechanical Connector means a mechanical device used to splice steel reinforcement bars.

Proposal means a Contractor's submission of changes, when engineering design is required, affecting the original design.

Reinforcing Stainless Steel Bars means as defined in OPSS 1440.

Reinforcing Steel Bars means as defined in OPSS 1440.

Slip means the axial displacement of the reinforcing bars measured relative to the mechanical connector. Displacement is measured at a rebar stress of 5% of specified yield after the mechanical connection has been loaded to a rebar stress of 50% of specified yield then unloaded to a bar stress of 5% of specified yield.

Splice means a connection of one steel reinforcement bar or splice bar to another by lapping, welding, mechanical connections, or other means or the lap between sheets or rolls of welded wire fabric.

Splice Bar means as defined in OPSS 1440.

Steel Reinforcement means a general term for deformed steel bars that includes reinforcing steel bars, splice bars, coated reinforcing steel bars, reinforcing stainless steel bars, and welded steel wire fabric.

Steel Wire Fabric means a wire mesh fabricated by means of welding the crossing joints, available in rolls or flat sheets.

Tensile Strength means the stress at which a steel reinforcement bar fails under tensile testing.

Yield Strength means the maximum tensile stress that a material is capable of sustaining.

905.04 SUBMISSION AND DESIGN REQUIREMENTS

905.04.01 Submission Requirements

905.04.01.01 Certification of Manufacturer

At least 3 weeks prior to fabrication, a statement shall be submitted to the Contract Administrator from the manufacturer certifying that their plant meets the minimum quality criteria set forth in the Voluntary Certification Program for Fusion-Bonded Epoxy Coating Applicator Plants document.

905.04.01.02 Working Drawings

When Working Drawings are not included in the Contract Documents by the Owner, the Contractor shall prepare and submit to the Contract Administrator 5 complete sets of Working Drawings consisting of steel reinforcement placing drawings and steel reinforcement schedules at least 3 weeks prior to commencement of the installation of the reinforcement. The Working Drawings shall include the following information:

a) Quantity of steel reinforcement.

b) Size of steel reinforcement bars.

c) Grade of steel.

d) Identification mark and number, including coating designation.

e) Location and spacing for all steel reinforcement.

f) Type of steel reinforcement.

When the Working Drawings have been prepared by the Contractor according to the Contract Documents, an Engineer's stamp is not required; however, the Working Drawings shall be accompanied by a letter bearing the seal and signature of an Engineer attesting to this conformity. All other design work requires the seals and signatures of both the design and the checking Engineers.

When other authorities are involved in the approval of the design or construction of a highway structure, the submission shall be made at least 5 weeks prior to commencement of work. The submission shall include one additional set for each authority.

Work shall not commence until written notice to proceed has been given by the Contract Administrator.

When a metric to imperial bar size substitution is made, the Working Drawings shall include a), b), and c) as noted above, as well as the location and spacing of both the metric and the substitute imperial steel reinforcement bars.

When bar marks are shown on the Working Drawings, they shall be used in the schedule.

Reinforcing steel shall be detailed according to CAN/CSA-S6 and the Structural Manual.

905.04.01.03 Welding Details

Five copies of all welding details shall be submitted to the Contract Administrator at least 3 weeks prior to commencement of the welding of steel reinforcement. All welding details shall bear the seal and signature of an Engineer. The welding details shall include the following information:

a) Materials.

b) Procedures.

c) Bars to be welded.

d) Location and type of weld.

e) Tack welds.

Details shall be designed to prevent notching effects in the bars.

905.04.01.04 Mechanical Connections

Five copies of all details for the mechanical connections shall be submitted to the Contract Administrator at least 3 weeks prior to commencement of the work and shall contain the following information:

a) The type or series identification of the connector.

b) The grade and size of the reinforcement to be joined by the connector.

c) A copy of the manufacturer's catalogue giving complete data on the connector material and installation procedures.

d) Location of splices, including type of splice.

905.04.01.05 Mill Test Certificates

One copy of mill test certificates for each material to be used in the fabrication shall be available for review at the fabricating plant during fabrication. The mill test certificates shall show that the material is according to the Contract Documents.

If the material cannot be identified by mill test certificates, coupons shall be taken and tested and these coupon test certificates shall be made available.

Two copies of the mill or coupon test certificates shall be submitted to the Contract Administrator when the material is shipped from the fabrication plant.

When mill test certificates originate from a mill outside Canada or the United States of America, the Contractor shall have the information on the mill test certificate verified by testing by a Canadian laboratory. This laboratory shall be certified by an organization accredited by the Standards Council of Canada to comply with the requirements of ISO/IEC 17025 for the specific tests or type of tests required by the material standard specified on the mill test certificate. The mill test certificates shall be stamped with the name of the Canadian laboratory and appropriate wording stating that the material is in conformance with the requirements specified in the Contract Documents. The stamp shall include the appropriate material designation, testing date, and signature of an authorized officer of the Canadian laboratory.

905.04.01.06 Return of Submissions

Two copies of each submission to be returned shall be marked as one of the following:

a) Stamped with the wording that allows for permission to construct.

In this case, work may commence upon receipt of the Working Drawing by the Contractor. A copy of these Working Drawings shall be available at the site prior to and during construction.

b) Stamped with the wording that allows for permission to construct as noted.

In this case, work may start upon receipt of the Working Drawings by the Contractor. The Working Drawings shall be updated as noted and shall have a stamp affixed that is signed by an Engineer stating the Working Drawings have been revised according to the noted comments. A copy of the stamped updated Working Drawings shall be available at the site prior to and during construction.

c) Showing only required changes.

In this case, the Working Drawings shall be updated as required and the submission process repeated.

905.05 MATERIALS

905.05.01 Steel Reinforcement

Steel reinforcement shall be according to OPSS 1440.

Reinforcement steel shall be produced by a manufacturer approved by the Owner.

The imperial and soft-converted metric bar size substitutions for metric bar sizes as shown in Table 2 shall be permitted on a one-for-one basis without adjustment.

Other imperial and soft-converted metric reinforcing stainless steel bar sizes may be substituted for metric bar sizes, subject to the following:

a) The area of substituted steel reinforcement for the concrete component per linear metre or per gross cross-section area, as applicable, shall not be less than that shown for the concrete component on the Contract Documents.

b) The spacing of substituted steel reinforcement for the concrete component shall be according to CAN/CSA-S6 and the Structural Manual.

Nominal cross-sectional areas of metric and imperial bar sizes used for determining substitutions shall be according to ASTM A 955M and CAN/CSA G30.18, respectively.

Reinforcing stainless steel bars, stainless steel spirals, and stainless steel spiral spacers shall be of a stainless steel type as shown in Table 1.

905.05.02 Mechanical Connections

The mechanical connectors shall be by a manufacturer acceptable to the Owner.

Mechanical connections for steel reinforcement shall develop in tension or compression, as required, at least 120% of the specified yield strength of the bars, but not less than 110% of the mean yield strength representative of the bars to be used in the test of the mechanical connection. For the purpose of qualifying mechanical connectors the actual yield strength obtained from the mill test certificate may be used in lieu of testing for the mean yield of the bars.

The total slip of the steel reinforcement shall not exceed the following measured displacements between gauge points straddling the mechanical connector as follows:

a) For bar sizes up to and including 45M 0.25 mm

b) For 55M bars 0.75 mm

Splice bars shall be supplied by the manufacturer of the mechanical connector.

Mechanical connectors and splice bars for stainless steel reinforcing bars shall be of the stainless steel type as shown in Table 1.

Mechanical connectors shall be of an approved type and design and may be the form saver type, the filled sleeve type, the sleeve swaged coupler type, the threaded coupler type, the hot rolled thread bar coupler type or the forged bar coupler type, or as specified in the Contract Documents.

905.05.03 Associated Hardware

Hardware, including spacers and support devices, approved by the Owner shall be used with steel reinforcement. Supports or support systems shall be capable of withstanding the loads to be placed on them. Embedded hardware, except for tie wire, within 50 mm of exposed faces shall be coated with an acceptable material or be of an acceptable non-metallic material.

The tie wire shall be annealed ferrous wire 2.6 mm in diameter and shall be coated when used with coated reinforcing steel bar.

Tie wire used to tie reinforcing stainless steel bars to reinforcing stainless steel bars, reinforcing steel bars, and shear studs shall be Type 316 LN or Type 316 L stainless steel wire, 1.2 or 1.6 mm in diameter. Tie wire used to tie reinforcing stainless steel bars to coated reinforcing steel bars shall be coated wire.

Concrete chairs shall be a minimum compressive strength of 20 MPa and may only be used in footings.

905.05.04 Patching Material for Coated Reinforcing Steel Bars

Patching material for coated reinforcing steel bars and mechanical connectors shall be according to OPSS 1443.

905.05.05 Polyethylene Sheeting

Polyethylene sheeting used for protection purposes shall be opaque and have a minimum thickness of 150 μm.

905.07 CONSTRUCTION

905.07.01 General

All reinforcement and associated hardware shall be kept clean of all mud, oil, and other deleterious materials that adversely affect bonding strength and stored clear of ground contact on timbers or other suitable protective cribbing spaced to prevent sags in the bundles.

Stacked bundles of straight bars shall have adequate blocking to prevent contact between the layers of bundles.

Reinforcing steel bars with rust, mill scale, or a combination of both shall be acceptable, provided the minimum physical properties, including height of deformations and mass, of a wire brushed test specimen are not less than the applicable specification requirements. Loose scale shall be removed.

Reinforcing stainless steel bars shall be free of deposits of iron and non-stainless steels.

905.07.02 Reinforcing Steel Bars, Coated Reinforcing Steel Bars, Reinforcing Stainless Steel Bars, Splice Bars, Coated Splice Bars, and Stainless Steel Splice Bars

905.07.02.01 Storage and Protection of Coated Reinforcing Steel Bars

Unprotected on-site storage shall not exceed 30 Days and total on-site storage time shall not exceed 120 Days.

When protection is required, bars shall be covered with opaque polyethylene sheeting or other equivalent protective material. For stacked bundles, the protective covering shall be draped over the sides of the bundles around the perimeter of the stack. The covering shall be adequately secured with provisions for adequate air circulation around the bars to prevent condensation under the protective covering.

Exposed bars installed in the structure, including bars partially embedded in concrete, shall be protected from the elements by covering with opaque polyethylene sheeting or equivalent protective material when the exposure time exceeds 30 Days. The protection shall be adequately supported and secured in place.

This protection shall be maintained until removal is required for concrete placement.

905.07.02.02 Storage and Protection of Reinforcing Stainless Steel Bars

Reinforcing stainless steel bars shall be stored separately from other steel reinforcement with the bar tags maintained and clearly visible until placing operations commences.

905.07.02.03 Placing

Steel reinforcement shall be placed in the positions shown in the Working Drawings and held in this location during the operations of placing and consolidating concrete.

Bars shall be tied at least at every fourth intersection. The maximum untied length of any bar shall be 1 m.

For slab-on-girder type decks, the top layer of deck reinforcement shall be tied to the shear studs or shear stirrups on each girder at approximately 1.5 m centres.

Spacers for spirals shall be spaced equally around the spiral and shall be such that the pitch of the spiral as specified in the Contract Documents is maintained.

Steel reinforcement shall be placed according to the tolerances as shown in Table 3.

905.07.02.04 Cutting

The cutting of steel reinforcement and splice bars, except for coated reinforcing steel bars and coated splice bars, by oxyacetylene torch may be carried out only where permitted in writing by the Contract Administrator. The cutting of coated reinforcing steel bars by oxyacetylene torch is prohibited. Coated bars shall be cut only when specified in the Contract Documents or approved by the Contract Administrator. Repairs to epoxy coatings shall be according to the Repairs to Damaged Epoxy Coating clause.

905.07.02.05 Bending

Steel reinforcement shall not be re-bent in the field, except when specified in the Contract Documents or approved by the Contract Administrator.

When epoxy coated reinforcing steel bars are re-bent or straightened in the field, the area of the bend shall be inspected and damaged areas repaired.

905.07.02.06 Welding

Steel reinforcement shall not be welded, including tack welds, except as shown in the Contract Documents or as shown on the welding details submitted to the Contract Administrator.

When welding of the steel reinforcement is specified in the Contract Documents, the welding shall be according to CSA W186 and performed by companies certified by the Canadian Welding Bureau according to CSA W186.

Welding of splices for coated reinforcing steel bar spirals shall be of the direct butt-splice type with no more than one splice per 15 m of bar. Splice welds shall be ground flush with the bar deformations and cleaned of deleterious material prior to application of the patching material. Patching of epoxy coating shall be according to the Repairs to Damaged Epoxy Coating clause.

Except for splicing of stainless steel spirals, stainless steel reinforcing bars shall not be welded.

905.07.02.07 Splicing

Welded splices shall develop 100% of the tensile strength of the bar.

Splices for steel reinforcement other than spirals shall be made as specified in the Working Drawings.

End anchorage of column spiral reinforcement shall be provided either by one and one half extra turns of spiral bar at each end of the spiral, one end embedded in the footing and the other end in the component supported above, or by a 90 degree bend around a longitudinal reinforcing bar plus an extension of at least 24 bar diameters into the core of the column.

Splicing of spiral reinforcing bars by means of a non-welded splice shall be as specified in the Working Drawings. Non-welded splices shall be by a mechanical connection or anchoring the ends of the spiral bars by means of a 90 degree bend around a longitudinal reinforcing bar with extensions of at least 24 bar diameters into the core of the column.

905.07.02.08 Repairs to Damaged Epoxy Coating

905.07.02.08.01 General

Coated reinforcing steel bars and associated hardware with epoxy coating damage greater than 1% of the surface area in any one metre length of bar shall be rejected.

Coated reinforcing steel bars and associated hardware with epoxy coating damage to 1% or less of their surface area shall have all damaged areas of the coating repaired.

Repairs to damaged epoxy coating shall be according to OPSS 1442.

Repairs shall not be done when the temperature of the steel bar or ambient air is 5 °C or less or when moisture is present on the bar.

905.07.02.08.02 Pre-Installation

Prior to installation, the Contract Administrator shall have access to inspect the coated reinforcing steel bars to identify bars to be rejected or repaired.

All bars and accessories with damaged portions of coating, including bare portions of bar, shall be repaired.

905.07.02.08.03 Post-Installation

After the coated reinforcing steel bars have been placed in the work, the Contract Administrator shall have access to inspect the coated reinforcement steel for visible signs of damage and to determine if steel with epoxy coating damage shall be replaced or repaired.

Repairs to the epoxy coating shall be completed at least 12 hours prior to permission to place concrete is given. Repairs should be performed immediately after the damage occurs and shall be done before rusting begins. Rust that is present shall be completely removed prior to the patching material is applied.

905.07.03 Mechanical Connections

905.07.03.01 General

Locations of mechanical connections shall be as specified in the Working Drawings.

When a mechanical connector type is specified in the Contract Documents, only the specified mechanical connector type shall be used for that application.

The form saver type of mechanical connector shall only be used at construction joints.

The mechanical connections shall be qualified by tests made on sample splices according to the Job Control Tests clause.

All procedures and equipment for mechanical connections shall be according to the mechanical connector manufacturer's recommendations.

Ends of reinforcing bars to be joined shall be cut nominally square.

Mechanical connector sleeves shall have the clear concrete cover as specified in the Contract Documents for the steel reinforcement in that location.

Stirrups, ties, and other reinforcement shall be adjusted or relocated, if necessary, to provide the required clear concrete cover to the reinforcement.

Threads cut on the ends of the steel reinforcement shall match the internal threads in the mechanical connector.

Joints between the coated reinforcing steel bars, coated splice bars, and coated mechanical connectors shall be sealed with the application of epoxy coating according to OPSS 1443. Epoxy coating shall be applied according to the manufacturer’s recommendations.

905.07.03.02 Job Control Tests

When mechanical connectors are used, the Contractor shall perform job control testing on a lot by lot basis prior to installation of the connectors. A lot shall comprise of all connectors of one size and type from one supplier. The lot will be divided into sublots of 300 connectors or any fraction thereof. The job control test shall consist of testing for slip and strength according to LS-434. Testing shall be carried out on 3 sample connections for each sublot of mechanical connector types used in the Work. The samples shall be made at the Working Area in the presence of the Contract Administrator and the test shall be performed on each bar size connected.

Each test sample shall be tagged with a weatherproof marking that clearly identifies the following:

a) Contract number.

b) Sublot number.

c) Connector bar size.

d) Number of connectors within the sublot.

e) Date of supply to the Working Area.

f) Name of manufacturer.

The reinforcing bars from which the test samples are fabricated shall be selected on a random basis. The length of each bar to be joined shall be at least 500 mm. The same materials, position, location, equipment, and procedures as are being used to make connections in the steel reinforcement in the work shall be used when making the sample connections.

The Contractor shall make sample connections and arrange testing by an independent test laboratory. The results shall be submitted to the Contract Administrator for his review and stamping.

When one of the 3 test samples for a sublot fails the slip test or the strength test, 2 new sample connections shall be prepared from the same sublot and tested along with the remaining connectors.
In this case a total of 4 samples are necessary to qualify the sublot of 300. Qualification of this sublot requires all 4 connectors to pass. If these further requirements are not met, the sublot shall be rejected.

The above procedure shall be repeated for the next sublot. If an additional sublot fails, the remainder of the lot shall then be rejected and the Contractor shall submit a proposal for replacing this lot to the Contract Administrator for approval.

Only qualifying sublots shall be used in the work.

Rejected mechanical connections shall be stored at a secure site for inspection by the Contract Administrator until completion of the Work. After completion of the Work, the Contractor shall remove the rejected material.

A copy of all job control test reports bearing the seal and signature of an Engineer shall be submitted to the Contract Administrator.

905.07.03.03 Testing Laboratory Requirements

The testing of mechanical connectors shall be carried out by an independent laboratory accredited by the Standards Council of Canada or ISO 17025 registered for testing according to ASTM E8M.

905.07.04 Management of Excess Material

Management of excess material shall be according to the Contract Document.

905.08 QUALITY ASSURANCE

905.08.01 Sampling

905.08.01.01 Steel Reinforcement

The sampling of steel reinforcement shall be on a random basis.

905.08.01.02 Reinforcing Stainless Steel Bar

Three 1.5 m long randomly selected samples of reinforcing stainless steel bars for each bar size from each supplier of reinforcing stainless steel bars shall be submitted to the Contract Administrator with the mill test certificates for that Contract.

905.08.02 Testing

905.08.02.01 Steel Reinforcement

The testing of steel reinforcement shall be according to CSA G30.18.

905.08.03 Mechanical Connections

The torque will be checked on 5% of the splices. Formwork that will limit access to connectors for testing purposes shall not be placed until testing has been completed.

905.09 MEASUREMENT FOR PAYMENT

905.09.01 Actual Measurement

905.09.01.01 Reinforcing Steel Bar
Coated Reinforcing Steel Bar
Reinforcing Stainless Steel Bar

Measurement of steel reinforcement shall be by mass for the steel reinforcement placed. Alternatively, steel reinforcement may be a lump sum item.

905.09.01.02 Mechanical Connections and Coated Mechanical Connections

For measurement purposes, a count shall be made of the number of mechanical connections or coated mechanical connections installed.

905.09.01.03 Stainless Steel Mechanical Connections

For measurement purposes, a count shall be made of the number of stainless steel mechanical connections installed.

905.09.02.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

905.10 BASIS OF PAYMENT

905.10.01 Reinforcing Steel Bar - Item
Coated Reinforcing Steel Bar - Item
Reinforcing Stainless Steel Bar - Item

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the Work.

Payment for the supply of steel reinforcement to the Working Area shall be made according to the Contract Documents.
When the Contract does not contain separate tender items for steel reinforcement, the Contract price for the concrete items into which the steel reinforcement is incorporated shall be full compensation for labour, Equipment, and Material to do the work.

905.10.02 Mechanical Connections - Item
Coated Mechanical Connections - Item
Stainless Steel Mechanical Connections - Item

Payment at the Contract price for the above tender items shall be full compensation for labour, Equipment, and Material to do the Work.

Costs associated with any required removal and replacement of rejected mechanical connectors shall be the Contractor’s responsibility at no additional cost to the Owner.

TABLE 1
Type of Stainless Steel

Common or Trade Name	UNS Designation
Type 316 LN	S31653
Type 2205 Duplex	S31803

Note:

A. Condition / Finish: reinforcing stainless steel bars and shapes shall be hot rolled and pickled or hot rolled and descaled to the required mechanical properties and dimensions.

TABLE 2
Metric to Imperial Steel Reinforcement Bar Size Conversion

Metric Bar Size	Imperial Bar Size	Bar Designation No.
15M	#5	15
25M	#8	25
35M	#11	35

TABLE 3
Tolerances for Cover and Placing Accuracy

Steel Reinforcement	**Tolerance mm**	
Location	**Cast-In-Place Concrete**	**Precast Concrete**
Cover To Surface of Concrete (Note 1)		
Principal Reinforcing Steel	± 20	± 10
Concrete Cast Against and Permanently Exposed to Earth	± 25	
Stirrups in Webs		+ 5, - 3
Stirrups, Ties, Spirals	± 20	± 10
Placing Accuracy		
Thin Deck Slab Top Bottom	 ± 20 ± 10 (Notes 2, 3, and 4)	 ± 15 ± 10 (Notes 2, 3, and 4)
Remainder	± 30 (Notes 2, 3, and 4)	± 30 (Notes 2, 3, and 4)
Lateral Spacing in Thick Slabs, Footings and Walls	± 30 (Notes 3 and 4)	± 30 (Notes 3 and 4)
Longitudinal Location of Bends and Ends of Bar in Continuous Member	± 50	± 50
Longitudinal Location of Bends and Ends of Bar at Discontinuous End	± 20	± 20

Notes:

Not withstanding the above tolerances:

1. The cover to the concrete surface shall not be reduced by more than one-third of the specified cover.

2. The clear distance between bars shall not be less than one and one-half times the nominal diameter of the bar, one and one-half times the nominal size of the coarse aggregate, or 40 mm.

3. In 2 or more layers, the rebar shall be directly above one another and the clear distance between layers shall not be less than 25 mm.

4. The size, number, and spacing of bars shall be as specified in the Working Drawings.

Appendix 905-A, November 2014
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Pitch of spiral steel reinforcement. (905.07.02.03)

- Concrete cover to steel reinforcement connections. (905.07.03.01)

- Payment for supply of steel reinforcement to working area. (905.10.01)

The designer should determine if any of the following are required and, if so, specify them in the Contract Documents.

- Whether the Owner is supplying the Working Drawings. (905.04.01.02)

- Whether the need for a specific type of mechanical connector. (905.05.04)

- Whether cutting of coated bars is allowed. (905.07.02.04)

- Whether field re-bending of bars is allowed. (905.07.02.05)

- Whether welding of steel reinforcement is allowed. (905.07.02.06)

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

OPSD 804.030	Concrete Headwall For Pipe Less Than 900 mm Diameter
OPSD 804.040	Concrete Headwall For Sewer Or Culvert Pipe Outlet
OPSD 812.010	Cut Off Wall For Structural Plate Pipe Arch Or Circular CSP
OPSD 3329.100	Deck, Reinforcement Supports For Reinforcing Steel For Slab Depths Less Than 300 mm
OPSD 3329.101	Deck, Reinforcement Supports For Reinforcing Steel For Slab Depths Greater Than 300 mm
OPSD 3339.100	Deck, Voids Access Hatch For Concrete Bridges Installation

CONSTRUCTION SPECIFICATION FOR METAL TRAFFIC BARRIERS AND METAL RAILINGS FOR STRUCTURES

TABLE OF CONTENTS

908.01 SCOPE

This specification covers the requirements for metal traffic barriers and metal railings for structures including posts and anchors.

908.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

908.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

908.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 906	Structural Steel

CSA Standards

G40.20/G40.21-04 (R2009)	General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels
G164-M92 (R2003)	Hot Dip Galvanizing of Irregularly Shaped Articles
O80-Series 08	Wood Preservation
W47.1-03 (R2008)	Certification of Companies for Fusion Welding of Steel
W47.2-M1987 (R2008)	Certification of Companies for Fusion Welding of Aluminum
W59.2-M1991 (R2008)	Welded Aluminum Construction
S6-06	Canadian Highway Bridge Design Code
G189-1966 (R2003)	Sprayed Metal Coatings for Atmospheric Corrosion Protection

ASTM International

A 27/A 27M-08	Specification for Steel Castings, Carbon, for General Application
A 307-07b	Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
A 314-08	Specification for Stainless Steel Billets and Bars for Forging
A 325M-09	Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength [Metric]
A 780/A 780M-09	Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

B 108M-08	Specification for Aluminum-Alloy Permanent Mold Castings
B 117-09	Standard Practice for Operating Salt Spray (Fog) Apparatus
B 209-07	Specification for Aluminum and Aluminum-Alloy Sheet and Plate
B 221-08	Aluminum and Aluminum-Alloy Extruded Bars, Red, Wire, Shapes and Tubes
D 4541-09	Test Methods for Pull-Off Strength of Coatings Using Portable Adhesion Testers

Canadian General Standards Board (CGSB)

CAN/CGSB-1.181-99 Ready-Mixed Organic Zinc-Rich Coating

Society for Protective Coatings (SSPC)

SSPC - SP 1, November 2004 Solvent Cleaning
SSPC - SP11, November 2004 Power Tool Cleaning to Bare Metal

U.S. General Services Administration:

FED-STD-595C-Jan. 16, 2008 Colors Used in Government Procurement

908.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Barrier Wall Railing means a metal railing that is fastened to the top of a concrete barrier wall and is part of a barrier system that has undergone the barrier appraisal requirements of CAN/CSA-S6.

Bicycle Railing means an all-metal barrier system mounted on a structure that has been designed to meet the bicycle barrier requirements of CAN/CSA-S6.

Certificate of Conformance means a document issued by the Quality Verification Engineer confirming that the specified components of the Work are in general conformance with the requirements of the Contract Documents.

Engineer means a professional engineer licensed by the Professional Engineers Ontario to practice in the Province of Ontario.

Metal Traffic Barrier means an all-metal traffic barrier system mounted on a structure that has undergone the barrier appraisal requirements of CAN/CSA-S6.

Parapet Wall Railing means a metal railing that is fastened to the top of a concrete parapet wall and is part of a barrier system that has undergone the barrier appraisal requirements of CAN/CSA-S6.

Pedestrian Railing means an all-metal barrier system mounted on a structure that has been designed to meet the pedestrian barrier requirements of CAN/CSA-S6.

Quality Verification Engineer (QVE) means an Engineer retained by the Contractor qualified to provide the services specified in the Contract Documents.

Railing means a general or generic term for railing and includes barrier wall railing, pedestrian railing, bicycle railing, parapet wall railing, or metal traffic barrier.

908.04 DESIGN AND SUBMISSION REQUIREMENTS

908.04.01 Submission Requirements

908.04.01.01 General

The Contractor shall submit 3 sets of Working Drawings to the Contract Administrator prior to commencement of fabrication of the railings, for information purposes only. Prior to a submission, an Engineer's seal and signature shall be affixed on the Working Drawings verifying that the drawings are consistent with the Contract Documents.

When multi-discipline engineering work is depicted on the same Working Drawing and a single Engineer is unable to seal and sign the Working Drawing for all aspects of the work, the drawing shall be sealed and signed by as many additional Engineers as necessary.

The railing manufacturer shall not commence fabrication of the railing until receiving a sealed and signed copy of the Working Drawings. A copy of these drawings shall be retained at the manufacturing plant during the railing fabrication.

The Contractor shall have a sealed and signed copy of the railing Working Drawings at the site prior to and during installation of the railing.

908.04.01.02 Interim Inspection after Fabrication of Railing

Upon completion of fabrication, the Quality Verification Engineer shall conduct an interim inspection of the work to verify that the fabrication of the railing has been carried out according to the railing Working Drawings and as specified in the Contract Documents, and issue written permission to proceed with the delivery.

908.05 MATERIALS

908.05.01 Metal Traffic Barrier

Materials shall be according to the barrier as specified in the Contract Documents.

908.05.02 Barrier Wall Railing, Parapet Wall Railing, Pedestrian Railing, and Bicycle Railing

908.05.02.01 Steel Railing and Steel Posts

Steel shall be according to CSA G40.20/G40.21.

Rails and posts shall be Grade 350W or 350WT as specified in the Contract Documents.

Steel plate shall be Grade 300W or 350W as specified in the Contract Documents.

Galvanized bolts and nuts shall be according to ASTM A 307 or ASTM A 325M as specified in the Contract Documents.

Cast steel posts shall be according to ASTM A 27, Grade 65-35.

Setscrews shall have zinc-nickel plating applied to a thickness of 10 µm. The plating shall show no red rust after 1,000-hour exposure to salt spray according to ASTM B 117.

All steel surfaces shall be protected by hot dipped galvanizing according to CAN/CSA G164-M, providing a minimum zinc mass of 610 g\m^2.

Paint shall be as specified in the Contract Documents.

908.05.02.02 Aluminum Railing and Aluminum Posts

Extruded aluminum tubing shall be 6061-T6 or 6351-T6 alloy according to ASTM B 221M.

Aluminum sheet and plate shall be 6061-T6 alloy according to ASTM B 209M.

Cast Posts shall be A444.0-T4 heat-treated according to ASTM B 108. Extruded posts shall be 6061-T6 or 6531-T6.

908.05.02.03 Stainless Steel Fasteners

Bolts, set screws, nuts, and washers shall be Type 304 stainless steel according to ASTM A 314.

908.05.02.04 Hardware - Galvanized

L-bolt assemblies shall be according to ASTM A 307 and include hex nuts, flat washers, and lock washers. The assemblies shall be galvanized according to CAN/CSA G164-M.

908.05.03 Anchorage Assembly

Anchorage assemblies shall be as specified in the Contract Documents.

The anchorage assembly shall be supplied with the bolts installed in a template.

908.05.04 Grout

Grout shall be non-staining, non-shrink cement based grout or non-staining, non-shrink epoxy based grout, and as specified in the Contract Documents.

908.05.05 Zinc Rich Paint

Zinc rich paint shall be according to CAN/CGSB-1.181.

908.07 CONSTRUCTION

908.07.01 General

Railing components shall be protected from damage and distortion during handling, transportation, storage, and installation.

Bedding grout shall not be used. Epoxy grout can be placed under post bases, as necessary, to fill the voids. The epoxy grout shall not have a thickness exceeding 3 mm. The mixing, surface preparation, installation, and curing shall be according to the manufacturer's recommendations.

The work shall include installation of the anchorage assemblies installed after concrete placement or installed in wood.

908.07.02 Alignment

The railing shall be installed to the elevations and alignments as specified in the Contract Documents within a tolerance of ± 6 mm and with no kinks or other visible breaks in alignment throughout the length of the installation.

908.07.03 Anchorages

908.07.03.01 General

Anchorage assemblies shall be installed as specified in the Contract Documents.

908.07.03.02 Anchorages Installed Before Concrete Placement

When specified in the Contract Documents, anchorage components shall be installed prior to placing concrete and shall be securely tied to reinforcing steel. Anchorage assemblies shall be positioned with templates and installed securely in the formwork to maintain the position of the anchors during placement of concrete.

908.07.03.03 Anchorages Installed After Concrete Placement

When specified in the Contract Documents, anchorages shall be installed after concrete placement. Holes shall be core drilled, anchoring grout placed, and anchors properly positioned at locations as specified in the Contract Documents. The placement of the anchoring agent and the anchors shall be according to the manufacturer's recommendations, except as modified herein. The holes shall be free of dust and debris immediately prior to placement of the anchoring agent. When the anchoring agent fails to fill the hole after insertion of the anchor, additional anchoring agent shall be immediately added to fill the hole.

When a cement based grout is used as the anchoring agent, the holes shall be pre-dampened for a period of 1 hour and any free water shall be removed prior to the application of the cement based grout.

When an epoxy grout is specified as the anchoring agent, the inside surface of the holes shall be roughened and dry prior to the application of the epoxy grout.

Where anchors are inserted into horizontal or inclined holes in a vertical face, the anchors shall be maintained in position during the setting of the anchoring agent. Loss of anchoring agent from the holes shall be prevented.

908.07.03.04 Anchorages Installed in Timber

Holes for bolts shall be drilled with a bit 1.5 mm larger in diameter than the bolt. The diameter of the recessed holes for the bolt heads shall be no greater than 10 mm larger than the width of the bolt head.

Where oil treatment has been used on the wooden curbing, the cut surfaces of the wood shall be given three coats of creosote oil. Each coat shall be allowed to dry before the next coat is applied.

Repairs to cuts in material treated with water-borne preservatives shall be according to CSA O80 Series.

908.07.04 Fabrication of Railings

908.07.04.01 General

The railing system components shall be fabricated according to the details specified in the Working Drawings. Field modification shall only be done when approved by the Contract Administrator.

When welding is required, the fabricator shall be certified according to Division 2.1 of CSA W47.1 for steel railings or CSA W47.2 for aluminum railings.

908.07.04.02 Steel Components

Fabrication and welding shall be according to OPSS 906.

All flame cut edges shall be as smooth and regular as those produced by edge planing and shall be free of slag.

When the galvanized surface of a railing component is damaged or uncoated, the exposed steel shall be repaired if the cumulative total of the damaged and uncoated areas does not exceed 2% of the total area of each component or 0.02 m^2, whichever is less. Where the cumulative area exceeds these amounts, the damaged coating shall be stripped and the component re-galvanized according to CAN/CSA G164-M.

Damaged and uncoated areas shall be cleaned of all rust and other contaminants and repaired using one of the following methods:

a) Soldering method using zinc-tin-copper solder

The surface preparation of damaged and uncoated areas and the application of the flux and zinc-tin-copper solder shall be according to ASTM A 780 and the manufacturer's recommendations.

The finished thickness of the metal coating in the repaired area shall be a minimum of 90 µm. The repaired surface shall be ground flush with the surrounding galvanized coating.

b) Metallizing

The surface preparation and application of thermal spray metal coating or metallizing shall be done according to CSA G189 to provide a minimum thickness of 100 µm, applied in two separate coats.

The metal coating on the repaired areas shall have a minimum adhesion of 2.8 MPa, when tested according to ASTM D 4541.

c) Repair by epoxy zinc/epoxy/polyurethane paint system

This method of repair of galvanized coating is permitted when:

i. The individual damaged and uncoated area with exposed steel is less than 625 mm^2.
ii. The dry film thickness of the galvanized (zinc) coating of a structural member in localized areas does not meet the specification requirements but exceeds 60 µm.
iii. The number of repair spots does not exceed 6 per each 12 m section of galvanized rail bar. The number of repair spots in each galvanized rail post shall be limited to a maximum of 2.

Repair of galvanized coating defects on railings and posts shall be made with coating material from the MTO's pre-qualified products list or, when specified in the Contract Documents, the Owner's pre-qualified products list.

i. Structural coating material shall be low volatile organic compounds (VOC).
ii. All three listed coatings shall be from the same manufacturer applied in the correct order.
iii. The colour of the finish coat shall be equivalent to 17178 aluminum according to FED-STD-595C.

Surface preparation for repairing by this procedure requires hand or power tool cleaning of the damaged or uncoated area using clean equipment, scraping of the edges of metal coating to remove loose edges, and feathering of the edges of intact coatings and abrading of surface, followed by

solvent cleaning according to SSPC-SP 1. Where damage has exposed base metal and the width is larger than 6 mm, the damaged area shall be cleaned according to SSPC-SP 11, prior to the application of the epoxy zinc primer.

All paint coating materials for repair shall be brush applied according to the manufacturer's product data sheets.

908.07.04.03 Aluminum Components

Aluminum railings and posts shall be thoroughly cleaned of all discolourations by approved methods and all marks and scratches shall be removed. The railings, when erected, shall have a clean degreased aluminum surface of uniform appearance and texture.

Railing components shall be joined by riveting, bolting, expanding, or welding as specified in the Working Drawings. Special aluminum alloy fasteners shall only be used with written approval from the Contract Administrator.

When tubular balusters are fastened to the horizontal rails by expanding the tubes, the holes drilled into the rail shall not be more than 1 mm greater than the nominal diameter of the baluster tube. A standard self-feeding tapered roll expander shall be used to expand the balusters to allow for a tight fit in all rails.

Sheet or plate material may be sheared, sawn, or cut with a router; however, sheet or plate materials more than 10 mm thick shall only be sawn or routed. Cut edges shall be true and smooth, free from excessive burrs and ragged edges.

Re-entrant cuts shall only be used when unavoidable and, when they are used, a fillet shall be provided by drilling prior to cutting.

Aluminum alloys shall not be flame cut.

Boltholes in 10 mm or thinner material may be drilled or punched to finished size. In material thicker than 10 mm, the holes shall be drilled to finished size or sub-punched smaller than the nominal diameter of the fastener and reamed to size.

During fit-up, holes shall not be drifted in such a manner as to distort the metal, but holes misaligned less than 2 mm may be reamed to render a reasonable fit.

The shank of bolts shall be long enough to provide full bearing in the connection and, where the shank extends beyond the surface being clamped, washers shall be used under the nuts to ensure proper clamping.

Welding of aluminum shall be permitted only where specified in the Working Drawings.

Inert Gas Shielded Arc (GSA) processes and the quality of the welding shall be according to CSA W59.2-M.

908.07.05 Contact Surfaces

Where aluminum would otherwise come in contact with other metal surfaces, the contacting surfaces shall be separated from each other by use of a synthetic rubber or neoprene gasket. The single rail and double rail galvanized steel railings mounted on aluminum casting posts on top of a barrier wall or parapet wall are exempt from these requirements.

Where aluminum would otherwise come in contact with concrete, wood, or masonry, the contact surfaces shall be separated by means of a synthetic rubber or neoprene gasket or the aluminum surface shall be given a heavy coat of alkali-resistant bituminous paint prior to installation. The paint shall be applied as it is received from the manufacturer without the addition of thinner.

908.07.06 Quality Control

908.07.06.01 Certificate of Conformance

A completed Certificate of Conformance shall be submitted to the Contract Administrator upon completion of the work. The Qualification Verification Engineer's seal and signature shall be affixed on the completed Certificate of Conformance confirming that the following are in general conformance with the requirements of the Contract Documents:

a) Materials

b) Fabrication

c) Installation and adjustments

908.07.07 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

908.09 MEASUREMENT FOR PAYMENT

908.09.01 Actual Measurement

908.09.01.01 Metal Traffic Barrier
Barrier Wall Railing
Parapet Wall Railing
Pedestrian Railing
Bicycle Railing

Measurement of railing shall be by length in metres from end to end of railing.

908.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

908.10 BASIS OF PAYMENT

908.10.01 Metal Traffic Barrier - Item
Barrier Wall Railing - Item
Parapet Wall Railing - Item
Pedestrian Railing - Item
Bicycle Railing - Item

Payment at the Contract price for the above tender items shall be full compensation for labour, Equipment, and Material to do the work.

Appendix 908-A, November 2014
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The design should specify the following in the Contract Documents:

- Steel Grade 350W or 350WT for rails and posts. (908.05.02.01)

- Steel Grade 300W or 350W for steel plate. (908.05.02.01)

- Galvanized bolts and nuts: ASTM A 307 or ASTM A 325M. (908.05.02.01)

- Paint for steel railing steel posts. (908.05.02.01)

- Anchorage assembly requirements. (908.05.03)

- Detailed grout requirements. (908.05.04)

- Railing elevations and alignments. (908.07.02)

- Anchorage assembly installation. (908.07.03.01)

The design should determine if the following are required and, if so, specify them in the Contract Documents:

- Anchorage to be installed prior to concrete placement. (908.07.03.02)

- Anchorage to be installed after concrete placement. (908.07.03.03)

- Coating materials from Owner's pre-qualified products list. (908.07.04.02)

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

OPSD 3419.100	Barriers and Railings, Steel Beam, Guide Rail and Channel Anchorage
OPSD 3419.150	Barriers and Railings, Steel, Single Railing Anchorage
OPSD 3419.155	Barriers and Railings, Steel, Double Railing Anchorage

CONSTRUCTION SPECIFICATION FOR STRUCTURE REHABILITATION - CONCRETE REMOVAL

TABLE OF CONTENTS

928.01 SCOPE

This specification covers the mechanical requirements for the removal of concrete from existing structures, except by means of pressurized water, in order to facilitate structure rehabilitation.

928.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

928.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

928.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 905 Steel Reinforcement for Concrete

CSA Standards

CAN/CSA S6-06 Canadian Highway Bridge Design Code

928.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Concrete Crusher means a piece of equipment fitted with a hydraulic attachment, such as a scissor type jaw, used for the removal of concrete.

Concrete Removal - Full Depth means concrete removals that typically apply to full or partial length removals of entire thickness of curbs, sidewalks, medians, wingwalls, barrier walls, parapet walls, ballast walls, and approach slabs. This also applies to localized removals extending the full thickness of slab decks and culverts.

Concrete Removal - Partial Depth, Type A means concrete removals that typically apply to the top surface of decks, including removals over round voids in post tensioned structures, the top and inside faces of concrete barrier walls and parapet walls, sidewalks, curbs, and the floor slabs of culverts and tunnels.

Concrete Removal - Partial Depth, Type B means concrete removals that typically apply to deck soffit and fascia of bridge decks, soffit of the top slab of culverts and tunnels, girders, diaphragms, and outside face of concrete barrier walls and parapet walls.

Concrete Removal - Partial Depth, Type C means concrete removals other than the ones specified for Concrete Removals - Partial Depth, Type A and Type B that typically apply to abutments, wingwalls, pier columns and caps, bearing seats, retaining walls, and vertical walls of culverts and tunnels.

Concrete Removal Sequence means a specified order of concrete removal within a stage to ensure structural adequacy, stability, and integrity throughout construction.

Concrete Removal - Structural Component means concrete removals that typically apply to full or partial length removals of entire thickness of decks, girders, diaphragms, and pier columns and caps that have an impact on the structural adequacy, stability, and integrity of a structure.

Engineer means a professional engineer licensed by the Professional Engineers Ontario to practice in the Province of Ontario.

Layer means two or more steel reinforcement bars placed in a plane parallel to a concrete face.

Mat means transverse and longitudinal layers of steel reinforcement tied together.

Rehabilitation means the modification, alteration, or improvement to a structure or its components that is designed to correct defects or deficiencies.

Scarifying means the removal of concrete from the top surface of a structure to a specified depth achieved by the milling action of cutting teeth fitted to a rotating head.

Structure means a bridge, culvert, tunnel, retaining wall, wharf, dock, and guideway or any part thereof or other reinforced concrete component designed to carry loads, including high mast pole footings and sign support footings.

928.04 DESIGN AND SUMBMISSION REQUIREMENTS

928.04.01 Design Requirements

The structural design and evaluation shall be carried out according to CAN/CSA S6.

The design assumptions for structural design and evaluation shall represent the condition of the structure during construction, including the effect of concrete removals on load distribution and member resistance, support location and restraints, construction loads, and construction staging and shall be based on the existing structure drawings.

The weights of construction equipment shall be based on the equipment manufacturer's specifications. The minimum dynamic load allowance for rig-mounted breakers and concrete crushers shall be 0.4. The load factors for construction live loads shall be the same as for highway live loads.

928.04.02 Submission Requirements

928.04.02.01 General

All Working Drawings, removal methods, and calculations shall bear the seal and signature of an Engineer.

At least 2 weeks prior to commencement of the work, 5 copies of any proposal shall be submitted to the Contract Administrator.

When other authorities are involved in the approval of the design or construction of a highway structure, the submission shall be made at least 5 weeks prior to commencement of work. The submission shall include one additional set of the submission for each authority.

Work shall not commence until written notice to proceed has been given by the Contract Administrator.

928.04.02.02 Working Drawings and Concrete Removal Methods

At least 3 weeks prior to the start of the concrete removal, 3 sets of Working Drawings and the methods for concrete removal shall be submitted to the Contract Administrator.

Working Drawings and concrete removal methods shall contain the following information:

a) Layout and description of:

   i. Concrete removal sequences.
   ii. Concrete removal equipment.
   iii. Saw cutting details.
   iv. Access to work areas, work platforms, and scaffolding.
   v. Temporary supports.
   vi. Debris platforms provided for the protection of pedestrians, traffic, and the environment.

b) Identification of all components to remain in place and measures to be taken to ensure that they are not damaged during removal operations.

c) Clearances at existing and proposed structures.

d) A statement by the design Engineer certifying that, based on the existing drawings of the structure and the assumption that these drawings are a realistic representation of the existing structure, the proposed method and sequence of removals satisfies the structural adequacy, stability, integrity, and serviceability requirements of the structure according to CAN/CSA S6, including the following:

   i. Existing structures supporting heavy equipment and vehicles.
   ii. Lifting and handling of large pieces of concrete greater than 2 m in any dimension.

e) Identification of the milestone inspections necessary for safe execution of concrete removal, such as the following:

   i. Installation of temporary supports.
   ii. Installation of temporary protection for pedestrians, traffic, and environment.
   iii. Structural strengthening or modification.
   iv. Removal of existing dead load or earth pressure, or both.

The Contractor shall have a copy of the stamped Working Drawings and removal methods on site at all times while the work is being carried out.

928.04.02.03 Return of Submissions

Two copies of each submission to be returned shall be marked as one of the following:

a) Stamped with the wording that allows for permission to construct.

   In this case, work can commence on receipt of the Working Drawings by the Contractor.

b) Stamped with the wording that allows for permission to construct as noted.

   In this case, work can start on receipt of the Working Drawings by the Contractor. The Working Drawings shall be updated as noted and shall have a stamp affixed that is signed by an Engineer stating that the Working Drawings have been revised according to the noted comments.

c) Showing only required changes.

   In this case, the Working Drawings shall be updated as required and the submission process repeated.

928.06 EQUIPMENT

928.06.01 Air Hammers

Air hammers shall be hand-held and meet the following requirements:

a) Chipping hammers shall have a maximum weight of 9.0 kg, prior to any handle modification, when applicable, and a maximum piston stroke of 102 mm.

b) Jackhammers shall have a maximum weight of 14.0 kg.

c) All air hammers shall have the manufacturer's name and parts or model number engraved on them by the manufacturer. All information shall be clearly legible.

The manufacturer's published specifications shall be the sole basis for determining weight and piston stroke.

928.06.02 Rig-Mounted Breakers

Rig-mounted breakers using pneumatically driven equipment shall be fitted with a moil point only and produce a maximum energy of 1,000 Joules per blow, as identified on the unit by the manufacturer.

928.06.03 Sawing Equipment

Sawing equipment shall be capable of sawing the concrete along the lines and to the depths specified in the Contract Documents.

928.06.04 Scarifiers

Scarifying equipment shall be capable of removing a minimum of 6 mm of concrete from the surface of the structure in one pass.

The maximum weight of a scarifier used on bridge decks shall not exceed 26 tonnes.

928.06.05 Straight Edges

Two commercially made metal straight edges, in lengths of 1.5 m and 3 m shall be available on site.

928.07 CONSTRUCTION

928.07.01 General

Concrete shall not be removed beyond the specified depth and demarcated boundaries for concrete removal unless approved by the Contract Administrator.

The depth of concrete removal shall be as specified.

The Contract Administrator shall be notified to inspect the removal areas upon completion of the concrete removal in the demarcated areas. Additional areas of concrete removals identified by the Contract Administrator shall be removed according to this specification.

928.07.02 Operational Constraints

928.07.02.01 General

Concrete shall not be removed within 1 m of newly placed concrete until the newly placed concrete has attained a compressive strength of at least 20 MPa.

Concrete shall be removed in such a manner as to prevent damage to the concrete to remain in place and debonding of steel reinforcement beyond the demarcated removal area. Steel reinforcement, prestressing tendons, shear connectors, structural steel, Utilities, and all other components that are to remain in place shall not be damaged or loosened.

Concrete debris shall be removed from the concrete removal area on an ongoing basis, to ensure that concrete removals do not exceed the demarcated boundaries and depths specified for removals in the Contract Documents.

Only equipment specified herein shall be permitted for the removal of concrete.

Construction equipment shall be permitted on the structure provided that all of the following conditions are met:

a) Contamination by oil or other deleterious substances shall be prevented. Contaminated concrete shall be removed according to the Remedial Work subsection.

b) Vehicles, runways, and equipment other than hand held equipment shall not be supported by steel reinforcement.

c) Heavy vehicles such as ready mix concrete trucks or dump trucks are not permitted on any portion of the deck within a span once concrete removals within the deck have commenced in that span.

All debris from the saw cutting operation shall be managed as specified in the Contract Documents.

928.07.02.02 Concrete Removal - Partial Depth, Types A, B, and C

Chipping hammers shall be used for all partial depth concrete removals.

928.07.02.03 Concrete Removal - Full Depth, Structural Component, Complete Deck, and Deck Joint Assemblies

928.07.02.03.01 Sawing Equipment

The use of sawing equipment, except for perimeter treatments of concrete removal areas, shall not be permitted for concrete removal as follows:

a) Within the lap length of steel reinforcement to remain in place.

b) Within 100 mm from the edges and faces of structural steel members and concrete components to remain in place.

Prior to making saw cuts in a concrete deck close to areas of existing structural steel members and other components that are to remain, the concrete surface shall be accurately delineated to locate the underlying edges and faces of structural steel members and other components so not to damage the structural steel members and other components while saw cutting the concrete as specified.

928.07.02.03.02 Chipping Hammers

Chipping hammers shall be permitted in all areas of concrete removal.

928.07.02.03.03 Jackhammers

Jackhammers shall not be used for concrete removal as follows:

a) For partial depth removals.

b) Within 100 mm from concrete to remain in place.

c) Within 25 mm of any steel reinforcement to remain in place.

d) Within 100 mm from the edges and faces of structural steel members to remain in place.

928.07.02.03.04 Rig-Mounted Breakers

Rig-mounted breakers shall not be used for concrete removal as follows:

a) For barrier walls, parapet walls, and deck slabs supported by concrete girders, unless the girders are to be removed.

b) For barrier walls and parapet walls supported by steel beams, unless the deck slab is to be removed.

c) Within the deck joint assembly.

d) Located within a distance from concrete to remain in place equal to the sum of 600 mm and the lap length of steel reinforcement to remain in place as specified in the Contract Documents.

e) Within 600 mm from the edge and faces of structural steel members including shear studs to remain in place.

928.07.02.03.05 Concrete Crusher

Concrete crushers shall not be used for the removal of concrete as follows:

a) Within 2 m of concrete to remain in place.

b) Within 1 m of steel reinforcement to remain in place.

c) Within 300 mm from the edge and faces of structural steel members, including shear studs to remain in place.

928.07.03 Access to Work Area, Work Platform, and Scaffolding

Adequate access shall be provided to the work area, work platform, and scaffolding as required for the following:

a) Concrete surveys by the Contract Administrator.

b) Inspection of work and measurement of the quantities by the Contract Administrator.

c) Quality assurance and acceptance inspections by the Owner.

d) Performance of the Contractor's work, including concrete removals.

928.07.04 Concrete Survey

928.07.04.01 General

The Contractor shall schedule the work to ensure there is no interference with the required concrete survey operations.

928.07.04.02 Covermeter Survey

The Contractor shall allow the Contract Administrator to carry out a bridge deck covermeter survey prior to the first pass of the scarifying equipment of any deck, when concrete removals from the top surface of the deck are specified in the Contract Documents.

When scarifying of the concrete surface is specified in the Contract Documents, the Contractor shall notify the Contract Administrator 24 hours prior to the commencement of the scarifying operation.

The covermeter survey shall be carried out as follows:

a) When the deck is specified to be patched, complete the survey after the waterproofing is completely removed from the top surface of the deck.

b) When an overlay is specified in the Contract Documents, complete the survey after the first pass of the scarifying equipment.

When the specified depth of scarifying is greater than 10 mm, the Contractor shall allow the Contract Administrator a period of at least two hours per 100 m^2 of the bridge deck surface to be scarified, or any part thereof to complete the covermeter survey, prior to commencing the subsequent pass of scarifying.

928.07.04.03 Concrete Removal Survey

928.07.04.03.01 General

The Contractor shall submit written notification to the Contract Administrator to carry out all applicable concrete removal surveys. The notification shall state that the Contractor has completed all applicable work requirements for the concrete removal surveys specified herein and has installed all accesses to the work area, including work platforms and scaffolding required by the Contract Administrator to carry out the surveys.

Immediately prior to the commencement of the concrete removal survey, all equipment, debris, and standing water shall be removed from the surfaces to be surveyed.

When the location and extent of removals are not completely defined in the Contract Documents, the Contract Administrator shall carry out one or both of the following concrete removal surveys as part of determining and demarcating the actual location and extent of removals:

a) Visual and Delamination Survey - A visual and delamination survey shall be carried out for all concrete removals.

   When a structure has an existing overlay that is not to be completely removed, the Contract Administrator shall carry out the delamination survey twice. The first survey is to be carried out on the top surface of the entire overlay. The second survey is to be carried out on the top surface of the original deck, after the existing overlay has been removed, within the removal area.

b) Corrosion Potential Survey (Half-Cell) - When specified in the Contract Documents a corrosion potential survey shall be carried out on all surfaces when concrete is to be removed based on corrosion potential criteria.

When full depth removals are specified in the Contract Documents, the concrete removal surveys on the top of the deck and soffit shall be completed to determine and demarcate the full depth concrete removal areas.

Concrete removals shall not proceed until all the applicable concrete surveys have been completed and reviewed and written permission to proceed has been given by the Contract Administrator.

928.07.04.03.02 Work Requirements

Prior to the concrete removal surveys, the Contractor shall carry out all applicable work, when all or some of the following are specified in the Contract Documents:

a) Scarifying - Complete the scarifying operations.

b) Refacing with Uniform Concrete Removal - Complete the uniform removal of concrete.

c) Removal of Waterproofing, Asphalt, and Coatings - All existing waterproofing membrane, asphalt and coatings shall be removed in such a way to prevent damage to the existing concrete surface.

d) Concrete Removal by Corrosion Potential - The Contract Administrator shall select two widely separated locations for each portion of the structure when the steel reinforcement is continuous. The steel reinforcement within these locations shall be exposed for a length of 150 mm and a clearance of 25 mm all around the bar.

928.07.04.03.03 Time Requirements

The time required by the Contract Administrator to complete the concrete removal survey, including review of the surveys by the Owner, shall be as shown in Table 1 and shall commence upon receipt of the Contractor's written notification to carry out the concrete removal survey. When the area of a structure exceeds the maximum area surveyed per time period shown in Table 1, the time period shall be extended on the basis of prorating the area, rounded up to the nearest Working Day.

The maximum time period required to complete the concrete surveys does not include any days of inclement weather or days when the air temperature is below 5 °C.

928.07.05 Scarifying

928.07.05.01 General

The portion of the structure to be scarified and the depth of scarifying shall be according to the Contract Documents.

Prior to scarifying, all sand and debris shall be removed from the surface of the structure to be scarified. The maximum depth of scarifying in any one pass of the scarifying equipment shall be 10 mm. After the scarifying operation, areas of the structure not scarified to the depth specified in the Contract Documents shall be re-scarified using smaller scarifying equipment or chipping hammers, if necessary, until the required depth is achieved.

The portion of the curb face, barrier wall, or parapet wall that is to be covered by an overlay shall be roughened by scrabbling, chipping, or bush hammering. A surface profile of $5\text{ mm} \pm 2\text{ mm}$ shall be achieved by exposing the aggregates across the entire surface.

All material resulting from the scarifying operation shall be removed from the deck immediately after each pass of the scarifying equipment.

928.07.05.02 Protection of Steel Reinforcement

The Contractor shall immediately notify the Contract Administrator of any exposed steel reinforcement on the concrete surface prior to and at any time during the scarifying operation. Operations shall be adjusted to avoid contacting the steel reinforcement with the scarifying equipment.

The Contract Administrator shall demarcate an area around all exposed steel reinforcement. The concrete shall be removed from within the demarcated area to the depth specified for the adjacent scarifying using chipping hammers or as directed by the Contract Administrator.

Exposed steel reinforcement shall not be cut or removed, unless otherwise directed in writing by the Contract Administrator.

928.07.06 Steel Reinforcement in Concrete Removal Areas

When specified in the Contract Documents, the cutting, bending, and removal of steel reinforcement shall be part of the concrete removals. Cutting and bending of steel reinforcement shall be according to OPSS 905.

When the area of concrete removal with exposed steel reinforcement exceeds 2 m^2, the steel reinforcement shall be retied at every second intersection point and shall be supported to maintain the steel mat in its original location. Supports shall be placed as required and tied securely to the steel reinforcement according to OPSS 905.

928.07.07 Concrete Removals

928.07.07.01 Concrete Removal - Partial Depth, Types A, B, and C

928.07.07.01.01 Perimeter Treatment of Concrete Removal Areas

The perimeter treatment of a partial depth concrete removal area shall be prepared according to the rehabilitation method to be used as follows:

a) Concrete Overlay or Refacing - The perimeter of the removal area shall have a 1H:1V sloped face for the full depth of the removal area. The perimeter shall not be saw cut.

b) Shotcrete - Prior to carrying out concrete removal operations, the perimeter of the removal area shall be saw cut to a depth of 10 mm or to the depth of the steel reinforcement, whichever is less. The perimeter of the removal area shall have a face perpendicular to the original concrete surface of the removal area for the depth specified in the Contract Documents.

c) Concrete Patches - Prior to carrying out concrete removal operations, the perimeter of the removal area shall be saw cut to a depth of 25 mm or to the depth of the steel reinforcement, whichever is less. The perimeter of the removal area shall have a face perpendicular to the original concrete surface of the removal area for the depth specified in the Contract Documents.

Saw cutting for perimeter treatment of concrete removal areas for cases b) and c) above is not permitted when the cut is located as follows:

a) Within the lap length of steel reinforcement to remain in place.

b) Within 100 mm from the edges and faces of structural steel members and concrete components to remain in place.

In these areas, chipping hammers shall be used.

928.07.07.01.02 Depth of Concrete Removal Areas

When existing overlays are to be patched, concrete shall be removed to the top surface of the original deck in the demarcated areas, to allow the Contract Administrator to conduct a second delamination survey.

In reinforced areas, concrete removal shall extend below the steel reinforcement within the boundaries demarcated by the Contract Administrator in the following areas:

a) The entire area of spalls and delaminations.

b) The areas of concrete components when the corrosion potential of the steel reinforcement is more negative than minus 0.35 volts, as determined by the corrosion potential survey when specified in the Contract Documents.

c) All areas of exposed steel reinforcement.

Concrete in these areas shall be removed to a uniform depth of 25 mm behind the first layer of steel reinforcement. Concrete surrounding the second layer of steel reinforcement shall also be removed locally to provide a minimum clearance of 25 mm all around the steel reinforcement. Concrete removal beyond the second layer of steel reinforcement shall be carried out only when directed by the Contract Administrator.

For all other concrete removals demarcated by the Contract Administrator, such as scaling, concrete shall be removed to either of the following:

a) To sound concrete when an overlay or refacing is specified in the Contract Documents.

b) To sound concrete for a uniform depth of at least 50 mm when an overlay or refacing is not specified in the Contract Documents.

928.07.07.02 Concrete Removal for Full Depth

Prior to carrying out the concrete removals for localized full depth repairs in the deck, the perimeter of the removal area on the top surface of the deck shall be saw cut to a depth of 25 mm or to the depth of the steel reinforcement, whichever is less.

After concrete removals from the top of the deck are completed, the perimeter of the removal area along the soffit shall be squared off by saw cutting to a depth of 25 mm or to the depth of the steel reinforcement, whichever is less. The concrete removals shall be completed from the soffit using chipping hammers.

Prior to carrying out any other concrete removals, the perimeter of the demarcated removal area shall be saw cut to a depth of 25 mm or to the depth of the steel reinforcement, whichever is less.

928.07.07.03 Concrete Removal for Structural Component and Complete Deck

Concrete deck or structural component removal shall be carried out according to the Contract Documents, the Working Drawings and this specification.

928.07.07.04 Concrete Removal for Deck Joint Assemblies

Existing deck joint assemblies, including joint filler materials and surrounding concrete, shall be removed according to the requirements of the Contract Documents and this specification.

928.07.08 Remedial Work

The Contract Administrator shall be notified immediately in writing if any of the following work related defects are present, including an explanation of the cause and extent of the defect:

a) Damage to concrete beyond demarcated removal areas.

b) Damage to concrete not specified for removal and damage to steel reinforcement to remain as specified in the Contract Documents.

c) Damage to structural steel and other components that are to remain in place.

d) Contaminated concrete.

A proposal for the remedial work shall be submitted to the Contract Administrator for review. The Contractor shall not proceed with repairs until approval of the proposal has been received in writing from the Contract Administrator.

928.07.09 Management of Excess Material

Management of excess material shall be as specified in the Contract Documents.

928.08 QUALITY ASSURANCE

928.08.01 Acceptance or Rejection

When concrete removals are completed in areas designated for removal, the work shall require inspection by the Contract Administrator to determine if there are any additional removals within the demarcated areas and along the perimeter, to verify that the concrete has been removed to the depth and dimensions specified in the Contract Documents, and to identify any defects in the work. The Contract Administrator shall demarcate any additional areas of concrete removal.

Work related defects listed in the Remedial Work subsection shall be deemed unacceptable and shall be subject to remedial work.

928.09 MEASUREMENT FOR PAYMENT

928.09.01 Actual Measurement

928.09.01.01 Scarifying

Measurement of scarifying shall be by area in square metres of the structure surface area scarified.

The total area shall be calculated to the nearest 0.1 m^2.

Measurement shall not be made of the roughened portions of curb faces, concrete barrier and parapet walls, or of areas that require a second scarifying due to the Contractor's method of operation.

928.09.01.02 Concrete Removal - Partial Depth, Types A, B, and C

928.09.01.02.01 General

Measurement of partial depth concrete removal shall be by area or volume, as specified in the Contract Documents.

928.09.01.02.02 By Area

Measurement shall be by area in square metres of concrete removed. The depth of removal shall be as specified in the Contract Drawings.

The total area shall be calculated to the nearest 0.1 m^2.

928.09.01.02.03 By Volume

Measurement shall be by volume in cubic metres of concrete removed to the depth specified or to the depth approved by the Contract Administrator.

Material removed locally 25 mm around the second layer of steel reinforcement shall not be measured. However, if the Contract Documents specify a uniform removal below the second layer of reinforcing steel, measurement for payment shall be of the volume of concrete removed to the specified depth.

After concrete removal is completed, verification of concrete removal depths shall be completed by the Contract Administrator on a grid system that best describes the profile at the particular area.

Measurement shall be taken by placing a straight edge across the removal area and measuring the distance from the straight edge to the top of the remaining concrete surface, as follows:

a) A minimum of three measurements for each removal area less than or equal to 1.0 m^2.

b) A minimum of ten measurements for every square metre for each removal area greater that 1.0 m^2.

The depths for each removal area shall be measured and averaged to the nearest millimetre.

The total volume shall be calculated to the nearest 0.1 m^3.

928.09.01.03 Concrete Removal - Full Depth

Measurement shall be by volume in cubic metres of concrete removed. Alternatively, full depth concrete removal may be a lump sum item.

The total volume shall be calculated to the nearest 0.1 m^3.

928.10 BASIS OF PAYMENT

928.10.01 Scarifying - Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Material to do the work.

When exposed steel reinforcement necessitates concrete being removed from within the demarcated areas to the depth specified for the adjacent scarifying using chipping hammers, such work shall be paid as Extra Work.

928.10.02 Access to Work Area, Work Platform, and Scaffolding - Item
Concrete Removal - Partial Depth, Type A - Item
Concrete Removal - Partial Depth, Type B - Item
Concrete Removal - Partial Depth, Type C - Item
Concrete Removal - Full Depth - Item
Concrete Removal - Structural Component - Item
Concrete Removal - Complete Deck - Item
Concrete Removal - Deck Joint Assemblies - Item

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

When the Contract does not contain a separate tender item for access to the work area, work platform, and scaffolding, the Contract price for the concrete removal item shall include full compensation for all labour, Equipment, and Material to provide access to the work area, work platform, and scaffolding.

Payment for the appropriate tender item Concrete Removal - Partial Depth Type A, Concrete Removal - Partial Depth Type B, Concrete Removal - Partial Depth Type C, or any combination of the three shall include full compensation for all labour, Equipment, and Material to remove concrete locally around the second layer of reinforcing steel to provide a minimum 25 mm clearance around the reinforcing steel.

When the replacement of corrosion damaged steel reinforcement is required, payment for this work shall be made according to the Extra Work provisions in the Contract Documents.

Costs associated with the work required to repair defects shall be the Contractor’s responsibility at no extra cost to the Owner.

Payment shall not be made of the roughened portions of curb faces and barrier walls or of areas that require a second scarifying due to the Contractor's method of operation.

TABLE 1
Time Requirements for Concrete Removal Surveys

Concrete Component	Maximum Area Surveyed Per Time Period m^2	Time Period Business Days
Bridge deck surface, including sidewalks, concrete barrier, and parapet walls.	3,000	3
Bridge deck soffit, including fascias.	1,500	3
Abutments, wingwalls, and retaining walls.	1,000	2
Piers	500	2
Culverts	500	2

Appendix 928-A, April 2012
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should determine if any of the following are required and, if so, specify them in the Contract Documents.

- Debris platforms. (928.04.02.02)

- Saw cutting lines and depths. (928.06.03)

- Depth and areas for concrete removal (928.07.01)

- Management requirements for debris from saw cutting operations. (928.07.02.01)

- Scarifying depths and areas. (928.07.05.01)

- Corrosion potential survey. (928.07.04.03.01)

- Lap length of steel reinforcement to remain in place. (928.07.02.03.01)

- Cutting, bending, and removal of steel reinforcement. (928.07.05)

- Overlay or refacing areas. (928.07.07.01.02)

- Concrete deck or structural component removal. (928.07.07.03)

- Concrete removal at deck joint assemblies. (928.07.07.04)

- Measurement method for Concrete Removal - Partial Depth, Types A, B, and C

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

No information provided here.

CONSTRUCTION SPECIFICATION FOR STRUCTURE REHABILITATION - CONCRETE PATCHES AND OVERLAYS

TABLE OF CONTENTS

930.01 SCOPE

This specification covers the requirements for the surface preparation, and the placing, finishing, texturing, and curing of concrete and latex modified concrete used in structure rehabilitation.

930.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

930.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

930.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 904	Concrete Structures
OPSS 905	Steel Reinforcement for Concrete
OPSS 919	Formwork and Falsework
OPSS 928	Structure Rehabilitation - Concrete Removal
OPSS 929	Abrasive Blast Cleaning - Concrete Construction

Ontario Provincial Standard Specifications, Material

OPSS 1002	Aggregates - Concrete
OPSS 1301	Cementing Materials
OPSS 1302	Water
OPSS 1305	Moisture Vapour Barrier
OPSS 1306	Burlap
OPSS 1312	Latex Modifiers for Use in Concrete
OPSS 1350	Concrete - Materials and Production

CSA Standards

C22.2 No. 211.2-M1984	Rigid PVC - Unplasticized Conduit
G 30.5-M 1983	Welded Steel Wire Fabric for Concrete Reinforcement
CAN/CSA G 164-M92	Hot Dip Galvanizing for Irregularly Shaped Articles

ASTM International

A 53-90b Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless
D 4285-83-1988 Method for Indicating Oil or Water in Compressed Air

Ontario Ministry of Transportation Publications

MTO Laboratory Testing Manual:
LS601-89 Materials Finer Than 75 μm Sieve in Mineral Aggregates by Washing
LS607-89 Determination of Percent Crushed Particles in Processed Coarse Aggregate

930.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Engineer means a professional engineer licensed by the Professional Engineers Ontario to practice in the Province of Ontario.

Hardwood means wood with a degree of hardness equal to species such as hard maple, oak, or beech.

Layer - Reinforcing Steel means two or more reinforcing bars placed in a plane parallel to a concrete face.

Mat - Reinforcing Steel means transverse and longitudinal layers of reinforcing steel tied together.

Rehabilitation means any modification, alteration, or improvement to a structure or its components that is designed to correct defects or deficiencies.

Structure means any bridge, culvert, tunnel, retaining wall, wharf, dock, guideway, or any part thereof.

Proposal means a Contractor's submission of changes when engineering design is required affecting the original design as stipulated in this specification.

930.04 DESIGN AND SUBMISSION REQUIREMENTS

930.04.01 Design Requirements

930.04.01.01 Proposals

930.04.01.01.01 General

Proposals by the Contractor shall bear the seal and signature of an Engineer.

Three sets of the proposal shall be submitted to the Owner 3 weeks prior to commencement of the work.

930.04.01.02 Screed Rails

An alternative screed rail system to that specified in the Finishing Equipment - Overlays clause may be used. At least 4 weeks prior to the commencement of placing screed rails, 3 complete sets of Working Drawings detailing the proposal shall be submitted to the Contract Administrator. These drawings shall include: type, dimensions of the rails to be used, spacing of screed rail chairs, details of the finishing machine, and the calculations showing the design deflection in the system. One set of these drawings shall be returned marked to indicate required changes. Eight sets of these drawings revised where necessary shall be resubmitted.

When all Owner requirements are satisfied, 2 sets of the Working Drawings shall be returned.

930.04.02 Submission Requirements

930.04.02.01 Cement Certification

Prior to using the cement in the latex modified concrete mix, one copy of the cement supplier's certificate stating that the cement is certified free from early stiffening tendencies shall be submitted to the Contract Administrator.

930.04.02.02 Mix Design

930.04.02.02.01 Concrete and Latex Modified Mortar Mix

The Contractor shall be responsible for designing the mix.

930.04.02.02.02 Latex Modified Concrete

The Contractor shall only design the mix when specified in the Contract Documents.

930.04.02.02.03 Concrete, Latex Modified Concrete, and Latex Modified Mortar Mix

When the Contractor designs the mix, the Contractor shall submit the mix proportions to the Contract Administrator at least 3 weeks prior to production of the concrete.

930.04.02.03 Certificate of Calibration for the Latex Modified Concrete Mixing Plants

A certificate of calibration shall be provided to the Contract Administrator for each of the following:

a) Cement feed meter indicating the cement meter register count and discharge time for 42.64 kg of cement for each mixing unit. The method of test shall be according to the field calibration of cement feed meter specified in the equipment manufacturer's instructions. The minimum quantity of cement for each test run shall be 50 kg.

b) Latex rate of flow and totalizer meters. The meters shall be calibrated according to the tolerances specified in the Latex Modified Concrete Mixing Plant clause. A minimum quantity of 1,000 litres of latex shall be discharged during the calibration of the meters.

c) The water totalizer meter shall be calibrated according to the tolerances specified in the Latex Modified Concrete Mixing Plant clause or a minimum quantity of 1,000 litres.

Each certificate shall be signed by an independent testing agency and shall be dated within 90 Days prior to each use of the specific mixing unit on the Contract. Aggregate gate openings and pointer adjustments, as well as the general operating condition of equipment shall also be checked by the independent testing agency according to the manufacturer's instructions.

The Contract Administrator may require recalibration of the cement feed meter.

930.04.02.04 Certification of Superplasticizer

Prior to using the superplasticizer, one copy of a certificate from the superplasticizer manufacturer stating that the superplasticizer is certified compatible with the cementitious materials and admixtures being used shall be submitted to the Contract Administrator.

930.05 MATERIALS

930.05.01 Cement

The cement shall be according to OPSS 1301.

930.05.02 Concrete and Latex Modified Concrete

930.05.02.01 General

The concrete shall be according to OPSS 1350 and as shown in Table 1.

930.05.02.02 Aggregates

930.05.02.02.01 General

Aggregates including sand for the bonding agents shall be according to OPSS 1002 and the requirements specified herein.

930.05.02.02.02 Aggregates for Overlays

Coarse aggregate shall consist of a minimum of 60% crushed particles when tested according to LS-607. Except for latex modified concrete, aggregates shall have 1.00% by mass maximum passing the 75 μm sieve when tested according to LS-601.

Coarse aggregate for overlays that form the bridge deck riding surface shall be composed of at least 80% siliceous igneous and metamorphic rocks and minerals.

930.05.02.02.03 Aggregates for Latex Modified Concrete Overlays

Aggregates shall have 0.50% by mass maximum passing the 75 μm sieve when tested according to LS-601. All aggregates, estimated quantities required for completion of each stage of the latex modified concrete overlays, shall be stockpiled within the Contract limits or at a site approved by the Contract Administrator at least 3 weeks prior to placing the overlay in that particular stage. The fine aggregate stockpile shall be covered to prevent variation of moisture content in the pile.

When additional aggregate is required, the material shall be similar and come from the same source.

930.05.03 Latex Modifier

The latex modifier shall be according to OPSS 1312 and shall be delivered to the job site in sealed containers with the trade name and date of manufacture affixed to the containers by the manufacturer.

The latex modifier shall be maintained above 5 °C and below 30 °C at all times. Sufficient latex modifier to complete the work shall be delivered to the job site prior to the commencement of the testing of the continuous concrete mixing plant and at least 7 days prior to commencement of the work in which the latex modifier shall be used.

The latex modifier shall be agitated immediately prior to use according to the manufacturer's instructions.

930.05.04 Burlap

Burlap shall be according to OPSS 1306.

930.05.05 Water

Water shall be according to OPSS 1302.

930.05.06 Bonding Agents

930.05.06.01 Cement-Sand

Cement-sand bonding agent shall consist of Portland cement and sand in the ratio of 1:1 by volume mixed with sufficient water to form a stiff mixture. The consistency of the mixture shall be such that it can be applied with a stiff brush to the existing concrete in a thin even coating that shall not run or puddle.

930.05.06.02 Latex Modified

Latex modified bonding agent shall consist of Portland cement, latex modifier, and sand in the ratio of 1.0:0.5:2.0 by volume mixed with sufficient water to produce a consistency such that when applied with a stiff brush to the existing concrete in a thin even coating it shall not run or puddle.

930.05.07 Welded Steel Wire Fabric

The welded steel wire fabric shall be welded galvanized steel and shall be according to CSA G 30.5. Galvanizing shall be according to CAN/CSA G164.

930.05.08 Anchorage Inserts

Anchorage inserts for the attachment of the welded steel wire fabric to the concrete surface shall be galvanized according to CAN/CSA G 164 and be of adequate length and strength to resist a pull-out force of 1.0 kN.

930.05.09 Tie Wire

Tie wire shall be according to OPSS 905.

930.05.10 Moisture Vapour Barrier

The moisture vapour barrier shall be polyethylene film, opaque, white pigmented, according to OPSS 1305, and shall not be less than 100 μm thick.

930.05.11 Drainage Tubes

Rigid PVC drainage tubes shall be according to CSA C22.2 No. 211.2. Galvanized steel drainage tubes shall be according to ASTM A53. Galvanizing shall be according to CSA G.164.

930.05.12 Latex Modified Mortar Mix

The Portland cement and fine aggregate, dry basis, proportions of the mix shall be designated by mass. The latex modifier to cement ratio by mass shall be one part latex modifier to three parts cement.

The water to cement ratio, by mass, shall not be greater than 0.35 which shall include the water in the latex modifier and in the fine aggregate. The latex modifier shall not be diluted. Fine aggregates shall be according to OPSS 1002 and shall contain not less than 3% and not more than 5% moisture by mass.

930.05.13 Superplasticizer

Superplasticizer shall be according to OPSS 1350.

930.06 EQUIPMENT

930.06.01 Mixers

930.06.01.01 General

The equipment used for mixing concrete shall be according to OPSS 1350, except as specified herein for latex modified concrete mixing plant and stationary mixers.

930.06.01.02 Latex Modified Concrete Mixing Plant

Mobile continuous concrete mixing plant shall be used for latex modified concrete and shall not be less than 5 m^3 capacity and shall be equipped with:

a) A storage tank for the latex modifier equipped with a mechanical agitator.

b) Two meters to measure the discharge of latex modifier; one shall record the rate of flow to an accuracy of $\pm$ 0.5 litre per minute and the other shall record the total volume discharged to an accuracy of $\pm$ 1.5%.

c) A meter that records the total quantity of water used in the concrete to an accuracy of $\pm$ 1.5%.

d) A meter, visible at all times with a ticket printout and capable of positive measurement of cement being introduced into the mix.

e) A positive control for the flow of water being introduced into the mix, coordinated with the cement and aggregate feeder mechanisms, and adjustable for minor variations in aggregate moisture.

930.06.01.03 Stationary Mixers

Stationary mixers for the mixing of cement-sand and latex modified bonding agents shall be power driven and capable of uniformly mixing the materials.

930.06.02 Compressor - Air Blasting

The compressor for air blasting shall have a minimum capacity of 3.5 m^3/minute. The compressed air shall be free from oil when tested according to ASTM D4285.

930.06.03 Sawing Equipment - Overlays

The sawing equipment shall be self-propelled and capable of sawing the overlay concrete full depth in one pass.

930.06.04 Work Bridges

A work bridge, riding on the screed rails behind the finishing machine with a working platform not higher than 1.5 m above the finished surface shall be provided to facilitate hand finishing work, concrete inspection, texturing, and placing of curing material. On placements longer than 40 m or wider than 10 m, a second work bridge shall be provided. When two work bridges are required, the trailing work bridge shall ride on the screed rails and shall be used for the purpose of placing the curing material and shall have sufficient clearance to allow for their proper placement.

930.06.05 Straight Edge

The straight edge shall be 3 m long and commercially made of metal.

930.06.06 Finishing Equipment - Overlays

930.06.06.01 Finishing Machine

The finishing machine shall be self-propelled, and travel on rails. It shall be fitted with a rotating cylinder screed, capable of finishing the surface without subsequent hand finishing, an adjustable powered screw auger and a vibrator plate or roller mounted in front of the rotating cylinder screed and behind the power screw auger. It shall be capable of forward and reverse movement under positive control. There shall be provision for raising all screeds to clear the screeded surface and for accurately repositioning the screeds. It shall have adjustable legs fitted with locking devices.

930.06.06.02 Screed Rails

The screed rails shall be straight to within 3 mm in 3 m. The maximum deflection of the screed rails under load shall be 1 mm in a 1.2 m length.

930.06.06.03 Screed Rail Chairs

Screed rail chairs shall be adjustable in height and made of metal. At locations where metal chairs cannot be accommodated, hardwood may be used to support the rail.

930.06.07 Buggies

Buggies used for transporting and placing the concrete may be hand operated or motorized. Motorized concrete buggies shall not be greater than 0.5 m^3 capacity.

930.06.08 Scales

The scales used for the calibration of the mobile continuous concrete mixing plant shall have a minimum capacity of 200 kg with an accuracy of $\pm$ 1 kg in 200 kg. Proof of the accuracy of the scales is required prior to each calibration.

930.06.09 Consolidating Equipment

Consolidating equipment shall be according to OPSS 904.

930.06.10 Hand Finishing Equipment

Only magnesium or wood floats shall be used. Bull floats shall be magnesium.

930.07 CONSTRUCTION

930.07.01 Modification of Deck Drains

Modification of deck drains shall be made prior to waterproofing the deck.

930.07.02 Drainage Tubes in Deck

Installation of drainage tubes shall be done prior to waterproofing the deck.

930.07.03 Place Concrete Overlay
Place Latex Modified Concrete Overlay

930.07.03.01 Operational Constraints

The Contract Administrator shall be notified of the intent to place the overlay 1 Business Day prior to the commencement of the placement of the overlay. The work shall not proceed until the surface preparation has been inspected by the Contract Administrator.

Only the finishing machine and buggies used to place concrete shall be allowed on the abrasive blast cleaned portion of the deck.

Areas of reinforcing steel and concrete prepared for concrete overlay shall be protected at all times during placing operations from the dropping of the bonding agent or concrete from placing equipment or other sources, except at the intended point of discharge. Any such material shall be immediately removed.

Equipment transporting concrete and runways used by equipment transporting concrete shall not be supported by deck reinforcing steel.

Placement of concrete shall not begin until the trial run procedure as specified is complete and permission to place concrete has been given in writing by the Contract Administrator. In the case of unexpected interruptions during placing operations, a construction joint shall be formed by either chopping or sawcutting at the direction of the Contract Administrator and all new concrete shall be covered with polyethylene film. Portions of the concrete overlay with incomplete or unsatisfactory consolidation or finishing shall be removed.

Overlay concrete shall not be placed when the air or deck temperature is below 10 °C or likely to fall below 10 °C or is above 30 °C or likely to rise above 30 °C during the duration of the placing operations.

Longitudinal construction joints shall be permitted only where specified in the Contract Documents.

Concrete shall not be placed adjacent to longitudinal joints in concrete overlay less than 36 hours old. At temperatures less than 10 °C, the Contract Administrator may extend this time requirement.

Neither construction traffic nor highway traffic shall be permitted on the finished surface of the overlay concrete until the curing period has elapsed.

Prior to seasonal shutdown, operations shall be scheduled in such a manner to ensure that the overlay is placed in all areas where concrete removal has commenced.

930.07.03.02 Minimum Thickness of Overlay

The minimum thickness of the overlay shall be 35 mm for the latex modified concrete overlay and 45 mm for the concrete overlay.

930.07.03.03 Surface Preparation

When anode mesh is not used, immediately prior to wetting the deck surface, all dust and loose material shall be removed from the prepared surface of the existing deck concrete by compressed air.

When anode mesh is used, within 4 hours prior to application of the overlay the concrete surface, with anode mesh in place shall be pressure washed with water using a pressure not less than 1.4 MPa to remove debris resulting from drilling of anchor holes and other accumulated dirt adhering to the anode or concrete surfaces.

The deck surface shall be maintained in a wet condition for a period of one hour prior to the application of the bonding agent. Excess water shall be removed from the surface using compressed air, immediately prior to application of the bonding agent.

930.07.03.04 Longitudinal Construction Joints

Lumber with a thickness of 10 to 15 mm less than the nominal thickness of the overlay shall be affixed to the deck to permit the concrete to spread no less than 75 mm and no more than 125 mm beyond the construction joint.

Polyethylene, asphalt, saturated felt, or other suitable debonding material shall be secured beneath the lumber and extended to within 25 mm of the sawcut line.

930.07.03.05 Placing of Screed Rails

Screed rails for the finishing machine shall be supported on screed rail supports at intervals not to exceed 1.0 m.

Supports for the screed rails shall be placed outside the finished concrete, where possible.

The screed rails shall be continued beyond the deck at each end to a length that will enable the finishing machine to be driven beyond the end of deck.

930.07.03.06 Trial Run

A trial run shall be made prior to each placing operation to ensure that the minimum thickness of the overlay is achieved. Where the trial run indicates that an unsatisfactory thickness will result, the screed rails shall be adjusted in order to obtain the minimum thickness and the trial run repeated in the area of screed rail adjustment.

930.07.03.07 Placing

A thin coating of the bonding agent, cement-sand for concrete and latex modified bonding agent for latex modified concrete shall be brushed into the prepared surface. All vertical and horizontal surfaces against which the overlay will be placed shall receive a thorough even coating with no excess of bonding agent in any areas. Excess fine aggregate separated from the bonding agent mixture after application shall be removed from the deck surface. The rate of application of the bonding agent shall be such that the brushed material does not become dry prior to being covered with overlay. At no time shall the bonding agent be placed more than 2 m in front of the overlay placement. Bonding agent not used within 30 minutes after mixing shall not be used.

The overlay shall be placed on the deck and struck off slightly above final grade using concrete rakes.

In the event of an interruption in the placing of the overlay, the exposed edge of the overlay shall be covered immediately with wet burlap. If the delay in placing exceeds 10 minutes, the bonding agent already applied to the deck shall be removed.

When undue delays occur, all overlay material ahead of the deck finishing machine shall be removed and a joint formed.

The overall combination of labour and equipment for proportioning, mixing, placing and finishing the overlay shall be capable of finishing a minimum of 4 m^3 of overlay per hour and shall be arranged that not more than 20 minutes elapses between discharge of the overlay from the mixer and the final finishing.

930.07.03.08 Remedial Work

Debonded and honeycombed areas shall be removed and replaced. Cracks shall be treated according to the requirements shown in Table 2.

930.07.04 Finish and Cure Concrete Overlay
Finish and Cure Latex Modified Concrete Overlay

930.07.04.01 Surface Finish

The overlay shall be mechanically consolidated by the finishing machine and struck off to the final grade. The surface finish shall be free from open tears, plucked aggregates, and local projections. Areas adjacent to the curb that cannot be machine finished and areas not meeting the surface finish requirements shall be finished with hand finishing equipment.

The use of water or other material to aid in finishing shall not be permitted.

The inability to produce a uniform closed surface to the overlay shall be cause for rejection of the overlay in the affected area. Overlay rejected shall be removed and new overlay placed using methods approved by the Contract Administrator.

930.07.04.02 Surface Tolerance

Except across the crown, the surface of the overlay after finishing and prior to any required texturing shall be such that when tested with a 3 m long straight edge placed anywhere in any direction on the surface there shall be no gap greater than 6 mm between the bottom of the straight edge and the surface of the concrete. Where the gap exceeds 6 mm, the overlay shall be either removed and new overlay placed or the overlay shall be refinished so that the requirement for surface tolerance is satisfied.

930.07.04.03 Surface Texture

Where the surface of the overlay forms the wearing surface of the bridge deck, the following surface texturing shall be carried out.

When a tight uniform surface has been achieved, the surface shall be given a texture with a wire broom or comb having a single row of tines. The required texture shall be transverse grooves that may vary from 1.5 mm width at 15 mm centres to 4.5 mm width at 20 mm centres with a groove depth varying from 3.0 to 4.5 mm. The texture shall extend uniformly to within 300 mm of the curb, but no closer than 150 mm.

930.07.04.04 Cure Concrete Overlay

Two layers of wet burlap that have been presoaked by immersion in water for a period of 24 hour immediately prior to placement shall be placed on the concrete overlay within 2 to 4 m from the finishing operation. Strips shall overlap 150 mm and shall be held down without marring the surface of the concrete. The burlap shall be covered with a layer of moisture vapour barrier as soon as the moisture vapour barrier can be applied without deforming the surface of the concrete. The moisture vapour barrier shall be lapped a minimum of 150 mm. Air flow in the space between the moisture vapour barrier and the burlap shall be prevented by holding the moisture vapour barrier down at the edges and all laps. The burlap shall be kept continuously wet during the curing period.

Except as specified in the Sawcutting Construction Joints in Overlays clause, labour and Equipment shall not be allowed on the overlay for 12 hours after placement. The surface shall receive a wet burlap cure for not less than 96 hours. The curing material shall then be removed and the overlay permitted to air dry for not less than 72 hours prior to any application of waterproofing.

930.07.04.05 Curing Latex Modified Concrete Overlay

One layer of wet burlap that has been presoaked by immersion in water for a period of 24 hours immediately prior to placement shall be placed on the surface of the concrete overlay within 2 to 4 m from the finishing operation. Strips shall overlap 150 mm and shall be held down without marring the surface of the concrete. The burlap shall be covered with a layer of moisture vapour barrier as soon as the moisture vapour barrier can be applied and held in place without deforming the surface of concrete. The moisture vapour barrier shall be lapped a minimum of 150 mm. Air flow in the space between the moisture vapour barrier and the burlap shall be prevented by holding the moisture vapour barrier down at the edges and all laps.

Except as specified in the Sawcutting Construction Joints in Overlays clause, labour and Equipment shall not be allowed on the overlay for 12 hours after placement. The surface shall receive a wet burlap cure for not less than 24 hours. The curing material shall then be removed and the overlay permitted to air dry for not less than 72 hours prior to any application of waterproofing. At temperatures less than 10 °C, the Contract Administrator may extend the curing period.

930.07.04.06 Sawcutting Construction Joints in Overlays

As soon as the overlay is able to withstand the weight of the sawcutting equipment without damage and the overlay has sufficient strength to be sawcut without plucking of the aggregate, all free edges shall be sawcut for the full depth of the overlay. A minimum width of 75 mm of overlay shall be removed at each sawcut.

Excess overlay shall be removed using hand tools or chipping hammers. Burlap may be rolled back in areas where excess overlay has to be removed. The overlay shall not be exposed longer than 1 hour.

930.07.04.07 Testing of Continuous Concrete Mixing Plant for Latex Modified Concrete Overlay

930.07.04.07.01 Aggregate Discharge Test

An aggregate discharge test shall be conducted on each mixing unit in the presence of the Contract Administrator. The mixing unit shall be available for this work for 1 Day prior to the first concrete placing operation. A test shall be conducted prior to the first placement of overlay and whenever the aggregate sources are changed or the mixer recalibrated.

930.07.04.07.02 Test for Flow Rate of Latex Modifier

The flow rate of latex modifier shall be determined by the Contractor. The test shall be conducted immediately prior to each placement of overlay and at other times as directed by the Contract Administrator. The tests shall be done in the presence of the Contract Administrator as follows:

a) The flow meter for the latex modifier shall be adjusted to produce a flow rate of 122 $\pm$ 3 kg of latex per cubic metre of concrete. The latex modifier shall be discharged over a period of two minutes into a container that is free from contaminants and provided by the Contractor solely for this purpose. The container shall be weighed on approved scales. The weight of the container shall then be deducted from this figure. The procedure shall be repeated and the flow rate of the latex modifier calculated as the average of the two tests.

b) The flow procedure shall be repeated, as necessary, until the flow rate is adjusted to yield the prescribed quantity of latex modifier.

930.07.04.07.03 Yield Test

A yield test shall be carried out immediately prior to each placement of overlay and at other times, as directed by the Contract Administrator. The yield test shall be carried out by the Contractor in the presence of the Contract Administrator after the mixing units have been loaded with the required aggregates, cement, water, and admixtures or latex modifier. With the cement meter set at zero, the mixer portion of the unit set at an angle of 20 degrees and all controls set for the desired mix, concrete with the specified air content and slump shall be discharged into a 0.2 m^3 container provided by the Contractor. When the container is full, the cement meter shall display a value indicating a discharge of 78 kg of cement.
Where the specified yield is not produced, adjustments shall be made in the aggregate proportions and the test repeated until such time as the yield is within 1.0% of the required yield.

930.07.05 Concrete Patches - Formed Surface
Concrete Patches - Unformed Surface
Latex Modified Mortar Patches
Concrete Refacing

930.07.06.01 General

Typical locations and areas of repair are as specified in the Contract Drawings; however, the actual locations and extent of repair shall be as determined during the layout of the repair area according to OPSS 928.

930.07.06.02 Operational Constraints

The Contract Administrator shall be notified of the intent to place patching material or refacing materials or both 1 Business Day prior to commencement of placing the patching material or refacing materials or both. The work shall not proceed until the surface preparation has been inspected by the Contract Administrator.

Concrete patching shall not be carried out when the air or existing concrete surface temperature is below 10 °C or likely to fall below 10 °C, or is above 30 °C or likely to rise above 30 °C during the placing operation.

Patching operations shall be suspended during rain which, in the opinion of the Contract Administrator, may adversely affect the quality of the work, and portions of the concrete patch with incomplete consolidation or finishing shall be removed.

Construction equipment shall be permitted on the bridge deck and other concrete components subject to the following conditions:

a) Contamination by oil or other deleterious substances shall be prevented.

b) Equipment transporting concrete and runways used by equipment transporting concrete shall not be supported by deck reinforcing steel.

c) Concrete mixing equipment and trucks shall not be placed on or travel over abrasive blast cleaned areas of concrete.

Patching operations shall be scheduled in such a manner to ensure that patching is completed in all areas where concrete removal has commenced, prior to seasonal shutdown.

930.07.06.03 Access to Work Areas, Work Platform and Scaffolding

Adequate access shall be provided to facilitate placement of the patch material, inspection, and measurement by the Contract Administrator.

930.07.06.04 Surface Preparation

Where the new concrete or mortar is to extend over the existing concrete surface, that portion of existing surface shall be roughened by scabbling, chipping or bush hammering. The concrete surfaces receiving new concrete or mortar shall be abrasive blast cleaned to an extent according to OPSS 929.

Abrasive blast cleaned areas shall have the subsequent treatment applied within 36 hours of patching or refacing or shall be reblasted.

All dust and loose material shall be removed from the prepared surface of the repair area by compressed air prior to the application of the bonding agent.

930.07.06.05 Placement of Welded Steel Wire Fabric

When welded wire fabric is required, it shall not be placed until after blast cleaning the existing concrete surface.

The edges of adjoining welded steel wire fabric shall be overlapped by two wire spacings plus 100 mm. The wires shall be kept clean of any substance which may reduce the bond of the repair material to the wire surface.

The welded steel wire fabric shall be securely fastened to the exposed reinforcing steel by ties placed at not more than a 300 mm square grid.

When the exposed reinforcing steel is not capable of providing rigid support for the wire fabric, anchorage inserts shall be used.

Where there is no existing reinforcing steel, the wire fabric shall be fastened to the concrete with anchorage inserts placed at not more than a 300 mm square grid and the minimum clearance between the wire fabric and the existing concrete shall be 20 mm.

Each anchorage insert shall be installed to resist a pull out force of at least 1.0 kN.

930.07.06.06 Formwork and Falsework

The erection and removal of formwork and falsework shall be according to OPSS 919 and shall be placed to provide the specified cover to reinforcing steel or wire mesh or both as specified in the Contract Documents. When this results in over building of the existing concrete surface, a 1H:1V slope shall be provided to meet the existing surface at the edge of the repair area.

930.07.06.07 Concrete Patches - Formed Surface
Concrete Patches - Unformed Surface
Concrete Refacing

930.07.06.07.01 Superplasticizer

Superplasticizer shall only be used when specified in the Contract Documents or approved by the Contract Administrator. When used, it shall be added according to OPSS 1350. The slump of the concrete shall be increased to 150 $\pm$ 30 mm by the addition of the superplasticizer. The superplasticizer shall be added to the concrete on the job site and in strict conformance with the manufacturer's written instructions. The concrete shall be tested for air content after the addition of superplasticizer.

930.07.06.07.02 Construction Joints

Construction joints in concrete shall only be permitted at the locations specified on the Contract Drawings and shall be according to the placing requirements of OPSS 904.

Prior to the placement of concrete, the concrete surfaces to be patched shall be maintained in a wet condition for a period of not less than one hour. Excess water shall be removed from the surface using compressed air immediately prior to application of the bonding agent and the surface shall be coated with a thin brush coating of the cement-sand bonding agent with no excess in any area. The rate of application of the bonding agent shall be such that the brushed material does not become dry prior to being covered with the patching material.

Where the concrete surface to be repaired is inaccessible for the application of bonding agent due to formwork the area to be repaired shall be maintained in a wet condition for a period of one hour and air blasted to remove excess water immediately prior to the placing of concrete.

The placement of concrete shall be according to the construction requirements of OPSS 904.

930.07.06.07.04 Surface Finish

The surface finish of formed surfaces and unformed surfaces shall be according to the construction requirements of OPSS 904.

930.07.06.07.05 Curing Concrete - Unformed Surfaces

Two layers of wet burlap shall be placed on the surface of the concrete as soon as the surface will support it without deformation. Burlap shall be presoaked by immersion in water for a period of 24 hours prior to placing. A layer of moisture vapour barrier shall be placed immediately on the wet burlap.

The concrete shall be cured using the wet burlap covered with moisture vapour barrier for a minimum period of 96 hours. The curing material shall then be removed and the concrete permitted to air dry for not less than 72 hours prior to any application of waterproofing.

Traffic shall not be permitted on the finished surface until the curing period has elapsed.

930.07.06.07.06 Curing Concrete - Formed Surfaces

Curing shall be according to the following:

a) If the formwork is left in place for 96 hours or more, no additional curing shall be required.

b) Where the formwork is removed in less than 96 hours, the concrete shall be cured as specified for unformed surfaces for the remainder of the 96 hour curing period.

930.07.06.08 Latex Modified Mortar Patches

930.07.06.08.01 Placing

Prior to the placement of the mortar, the area to be patched shall be maintained in a wet condition for a period of one hour. Excess water shall be removed from the surface using compressed air immediately prior to the placement of the bonding agent. The surface shall be coated with a thin brush coating of the latex modified bonding agent with no excess in any area. The rate of application of the bonding agent shall be such that the brushed material does not become dry prior to being covered with the mortar. The mixing of the latex modified mortar shall be carried out using mechanical mixers. The latex modified mortar for patching not used within 30 minutes after mixing shall not be used. The latex modified mortar shall not be retempered. The mortar shall be placed and consolidated in the repair area and screeded to the desired level. The surface shall be finished to a smooth and level surface immediately after placement.

The surface shall be closed with no tears or cracks. The inability to produce a uniform closed surface to the patch shall be cause for rejection of the latex modified mortar in the affected area.

930.07.06.08.02 Curing

Latex modified mortar shall be cured according to the requirements of the Curing Latex Modified Concrete Overlay clause. Neither construction traffic nor highway traffic shall be permitted over the patch until the curing period has elapsed.

930.07.07 Remedial Work

Debonded and honeycombed areas shall be removed and replaced. Cracks shall be treated according to the requirements as shown in Table 2.

The method of removal and repair shall be submitted to the Contract Administrator prior to commencement of the work.

930.07.08 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

930.08 QUALITY ASSURANCE

930.08.01 Concrete and Latex Modified Concrete Overlays
Concrete Patches
Latex Modified Mortar Patches
Concrete Refacing

930.08.01.01 Testing

930.08.01.01.01 Sampling, Delivery and Testing of Specimens

Sampling, delivery, and testing of specimens shall be according to OPSS 904. Samples and tests for slump and air content of the concrete shall be made as specified in the Contract Documents.

930.08.01.02 Inspection After Curing

The Contract Administrator shall inspect the work to determine if the completed work contains:

a) areas of debonding.

b) honeycombed areas.

c) cracks.

930.08.02 Testing of Continuous Concrete Mixing Plant for Latex Modified Concrete Overlay

930.08.02.01 General

Tests shall be conducted according to the requirements for testing specified in the Testing of Continuous Concrete Mixing Plant for Latex Modified Concrete Overlay clause of the Construction section.

930.08.02.02 Latex Modifier

Tests shall be performed on the latex modifier.

930.09 MEASUREMENT FOR PAYMENT

930.09.01 Overlays - General

For all types of overlays there shall be no measurement for the following:

a) Concrete discharged prior to the yield test.

b) Concrete produced in excess of that required for the placing operation.

c) Concrete placed on the deck more than 125 mm from the finished edge, after sawcutting of the overlay.

d) Quantity of bonding agent.

930.09.02 Actual Measurement

930.09.02.01 Modification of Deck Drains

For measurement purposes, a count shall be made of the number of deck drains modified.

930.09.02.02 Drainage Tubes in Deck

For measurement purposes, a count shall be made of the number of drainage tubes placed.

930.09.02.03 Place Concrete Overlay

Measurement shall be of the volume of concrete placed in cubic metres by delivery ticket. When their quantities are included on the delivery ticket, deductions shall be made for concrete produced in excess of that required for the placing operation and for that concrete placed on the deck more than 125 mm from the finished edge after sawcutting of the overlay. The total volume shall be calculated to the nearest cubic metre.

930.09.02.04 Place Latex Modified Concrete Overlay

Measurement shall be by volume in cubic metres and shall be calculated from the mixing unit meter register ticket and calibration certificate. A copy of the meter register ticket showing the meter reading at the commencement of the yield test and the completion of each placing operation shall be submitted to the Contract Administrator.

When their quantities are included on the meter register ticket deductions shall be made for concrete produced in excess of that required for the placing operation and for that concrete placed on the deck more than 125 mm from the finished edge, after saw cutting of the overlay.

The total volume shall be calculated to the nearest 0.1 m^3.

930.09.02.05 Concrete Patches, Formed Surface
Concrete Patches, Unformed Surface
Concrete Refacing

930.09.02.05.01 By Area

Measurement shall be by area of the concrete placed in square metres to the depth as specified in the Contract Documents.

The total area will be calculated to the nearest 0.1 m^2.

930.09.02.05.02 By Volume

Measurement shall be of the volume of concrete placed in cubic metres.

The total volume shall be calculated to the nearest 0.01 m^3.

930.09.02.06 Latex Modified Mortar Patches

930.09.02.06.01 By Area

Measurement shall be by area of the mortar placed in square metres to the depth as specified in the Contract Documents.

The total area shall be calculated to the nearest 0.1 m^2.

930.09.02.06.02 By Volume

Measurement shall be by volume of the mortar placed in cubic metres. The volume of in place latex modified mortar shall be calculated to the nearest 0.01 m^3.

930.09.03 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

930.10 BASIS OF PAYMENT

930.10.01

Modification of Deck Drains - Item
Drainage Tubes in Deck - Item
Place Concrete Overlay - Item
Place Latex Modified Concrete Overlay - Item
Finish and Cure Concrete Overlay - Item
Finish and Cure Latex Modified Concrete Overlay - Item
Concrete Patches, Formed Surface - Item
Concrete Patches, Unformed Surface - Item
Latex Modified Mortar Patches - Item
Concrete Refacing - Item

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

TABLE 1
Concrete and Latex Modified Concrete Overlay

	Concrete Overlay, Patches and Refacing	**Latex Modified Concrete Overlay**
Cement Content	OPSS 1350	390 ± 6 kg/m^3
Maximum Nominal Size of Coarse Aggregate	13.2 mm	13.2 mm
Slump	70 mm ± 20 mm	180 mm ± 40 mm *
Air Content	OPSS 1350	6.5% maximum *
Chemical Admixture	OPSS 1303	N/A
Latex Modifier	N/A	122 ± 3 kg/m^3
Nominal Minimum 28 Day Strength	30 MPa	30 MPa
* Five minutes after mixing.		

TABLE 2
Treatment of Cracks

	Maximum Width of a Crack mm	**Depth mm**		
		≤ 15.0	> 15.0 < Full Depth	Full Depth
Overlays and Patches to be Waterproofed and Paved	≥ 1.00	Repair	Repair	Repair
Exposed Facings, Overlays, and Patches	> 0.30	Repair or if the linear measurement of crack per m^2 is 20 m or greater, remove and replace concrete.	Repair or if the linear measurement of crack per m^2 is 10 m or greater, remove and replace concrete.	Repair or if the linear measurement of crack per m^2 is 5 m or greater, remove and replace concrete.

Appendix 930-A, November 2014
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

No information provided here.

MATERIAL SPECIFICATION FOR AGGREGATES - BASE, SUBBASE, SELECT SUBGRADE, AND BACKFILL MATERIAL

TABLE OF CONTENTS

1010.01 SCOPE

This specification covers the material requirements for aggregates for use in base, subbase, select subgrade, granular surface, shouldering, and backfill material.

1010.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

1010.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

1010.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specification, Material

OPSS 1001 Aggregates - General

Ontario Ministry of Transportation Publications

MTO Laboratory Testing Manual:

LS-601 Material Finer than 75 μm Sieve in Mineral Aggregates by Washing
LS-602 Sieve Analysis of Aggregates
LS-607 Percent Crushed Particles in Processed Coarse Aggregate
LS-614 Freezing and Thawing of Coarse Aggregate
LS-616 Petrographic Analysis of Fine Aggregate
LS-617 Percent Particles with Two or More Crushed Faces and Uncrushed Particles in Processed Coarse Aggregate
LS-618 Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus
LS-619 Resistance of Fine Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus
LS-621 Determination of Amount of Asphalt-Coated Particles in Coarse Aggregate

LS-625 Guidelines for Sampling of Aggregate Materials
LS-630 Amount of Contamination of Coarse Aggregates
LS-702 Particle Size Analysis of Soils
LS-703/704 Liquid Limit, Plastic Limit, and Plasticity Index of Soils
LS-709 Permeability of Granular Soils

1010.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Air-Cooled Blast-Furnace Slag means the material resulting from solidification of molten blast-furnace slag under atmospheric conditions. Subsequent cooling may be accelerated by application of water to the solidified surface.

CCIL means the Canadian Council of Independent Laboratories.

Ceramic means porcelain, china, and whiteware (e.g., sinks, toilets, and bidets made from clay and silica fired at a high temperature, excluding clay brick and tile) that is free of organic materials, metal, and plastic.

Deleterious Material means materials from the recycling stream other than glass, ceramic, reclaimed asphalt pavement, and reclaimed concrete material that includes but is not limited to the following: wood, clay brick, clay tile, plastic, gypsum, gypsum plaster, and wallboard.

Duplicate Samples means two samples taken at the same time and location-one to be used for quality assurance testing and the other for referee testing.

Fines means material passing the 75 µm sieve when tested according to LS-601 or LS-602.

Free of Clay means the amount of material with a particle diameter less than 2 µm shall not be greater than 1% of the total sample when tested according to LS-702.

Glass means processed glass obtained from the recycling stream that is free of organic materials, metal, and plastic.

Granular A means a set of requirements for dense graded aggregates intended for use as granular base within the pavement structure, granular shouldering, and backfill.

Granular B means a set of requirements for well-graded aggregates intended for use as granular subbase within the pavement structure and granular backfill. Granular B may be Type I, Type II, or Type III.

Granular M means a set of requirements for dense graded aggregates intended for use on unpaved road surfaces and for the maintenance of unpaved shoulders.

Granular O means a set of requirements for open graded aggregates intended only for use as a free draining granular base within the pavement structure.

Granular S means a set of requirements for dense graded aggregates intended only for use as surface dressing of low volume unpaved roads with an AADT less than 200.

Nickel Slag means the non-metallic product resulting from the production of nickel.

Physical Property means an inherent attribute or feature of an aggregate or soil material. Tests are carried out to determine a materials resistance to weathering or degradation or both.

Quality Assurance (QA) means a system or series of activities carried out by the Owner to ensure that Materials received from the Contractor meet the requirements specified in the Contract Documents.

Reclaimed Asphalt Pavement (RAP) means processed hot mix asphalt material that is recovered by partial or full depth removal.

Reclaimed Concrete Material (RCM) means removed or processed old hydraulic cement concrete.

Referee Testing means testing of a material property or attribute for the purpose of resolving acceptance.

Select Subgrade Material (SSM) means a set of requirements for well-graded non-plastic aggregates used to replace poor subgrade materials and as swamp backfill.

Steel Slag means the non-metallic product resulting from the production of steel in a basic oxygen furnace or electric arc furnace.

1010.05 MATERIALS

1010.05.01 General

Aggregates shall be according to OPSS 1001, unless otherwise specified in this specification.

Aggregates shall meet the physical property requirements shown in Table 1 and the gradation requirements shown in Table 2.

When aggregates are tested according to LS-630, the total amount of wood shall not exceed 0.1% by mass, and the total amount of deleterious material and other contaminants shall not exceed a combined total of 1.0% by mass.

Glass and ceramic material shall be processed to remove all deleterious organic materials. 100% of the processed glass and ceramic material shall pass the 13.2 mm sieve.

When RCM is permitted, RCM shall not contain loose reinforcing materials.

When air-cooled blast furnace slag, nickel slag, and RAP containing steel slag aggregates are used, site-specific notification shall be given by the Contractor to the Ontario Ministry of the Environment (MOE).

When reclaimed materials are permitted, they shall be homogeneously blended.

Steel slag shall not be used.

When a change in the character of the aggregate occurs or when the performance of the aggregate is found to be unsatisfactory, use of those aggregates shall be discontinued until the Contractor can prove to the satisfaction of the Contract Administrator that the source remains acceptable or can be made acceptable.

1010.05.02 Granular A, Granular M, and Granular S

Granular A, Granular M, and Granular S shall be produced by crushing one or more of the following:

a) Quarried bedrock.

b) Boulders, cobbles, gravel, sand, and fines from naturally formed deposits.

c) RAP up to 30% by mass.

d) RCM up to 100% by mass.

e) Air-cooled blast-furnace slag or nickel slag.

f) Glass or ceramic materials up to a combined total of 15% by mass.

Granular A and Granular M containing RAP with steel slag aggregates shall be acceptable for unpaved gravel shoulders only.

1010.05.03 Granular B

Granular B may be Type I, Type II, or Type III.

1010.05.03.01 Granular B Type I and Type III

Granular B Type I and Type III may be produced from naturally formed deposits of sand, gravel, and cobbles or by crushing one or more of the following:

a) Quarried bedrock.

b) Air-cooled blast-furnace slag or nickel slag.

c) RCM up to 100% by mass.

d) RAP up to 30% by mass.

e) Glass or ceramic materials up to 15% by mass combined.

RAP containing steel slag aggregates shall not be allowed.

1010.05.03.02 Granular B Type II

Granular B Type II shall only be produced by crushing:

a) Quarried bedrock.

b) Air-cooled blast furnace slag or nickel slag.

Steel slag and reclaimed materials shall not be used in the production of Granular B Type II.

1010.05.04 Granular O

Granular O shall only be produced by crushing:

a) Quarried bedrock.

b) Cobbles or boulders retained on the 50 mm sieve.

Steel slag and reclaimed materials shall not be used in the production of Granular O.

1010.05.05 Select Subgrade Material

Select subgrade material shall only be produced from natural deposits of non-plastic silt, sand, and gravel material. Reclaimed materials of any type shall not be used.

1010.07 PRODUCTION

1010.07.01 Aggregate Processing, Handling, and Stockpiling

Aggregates that have become mixed with foreign matter of any description or aggregates that have become mixed with each other shall not be used and shall be immediately removed from the stockpile.

1010.08 QUALITY ASSURANCE

1010.08.01 General

QA testing may be carried out by the Owner for the purposes of ensuring that the aggregates used in the work are according to the requirements of this specification. Individual test results shall be forwarded to the Contractor, as they become available.

Test data for each aggregate type shall be managed independently. When more than one source is used for supplying materials, test data from each source and product shall be managed independently.

The Owner shall be responsible for all costs associated with testing for QA purposes, unless otherwise specified in the Contract Documents.

1010.08.02 Laboratory Requirements

The Contract Administrator shall designate the QA laboratories.

An acceptable laboratory conducting tests for physical properties shall be one that holds a current Type D certificate from CCIL for the applicable test methods and also participates in the annual MTO Proficiency Sample Testing Program for the specific tests, except LS-616 and LS-709.

An acceptable laboratory conducting tests for gradation according to LS-602 and percent crushed particles according to LS-607 shall be one that holds a current Type C certificate from CCIL.

Testing shall be conducted by qualified laboratory staff that holds a current certificate from CCIL in aggregate testing.

Equivalent alternate laboratory and technician certifications or laboratory proficiency testing programs may be used to demonstrate similar requirements, provided that they are acceptable to the Contract Administrator.

1010.08.03 Sampling

Sampling shall be according to LS-625.

Duplicate samples shall be taken and sealed by the Contractor in the presence of the Contract Administrator at the time and location determined by the Contract Administrator. When materials contain blended or reclaimed aggregates or both, QA sampling shall be performed on the final blended product.

The mass of each sample shall meet the requirements shown in Table 3. When more than 30 kg is required, the total samples shall be recombined by the QA laboratory prior to testing.

In the event that the Contractor is unavailable to take the sample, no further materials shall be placed in the work until the duplicate samples been taken.

The Contractor shall provide new or clean sample bags or containers that are constructed to prevent the loss of any part of the material or contamination or damage to the contents during shipment. Metal or cardboard containers are unacceptable.

QA samples shall be identified on both the inside and the outside of the sample container.

1010.08.04 Testing and Retention of Samples

When the Contract Administrator elects to carry out QA testing, one of the duplicate samples shall be randomly selected for testing by the QA laboratory and the remaining sealed sample shall be retained by the QA laboratory for possible referee testing.

1010.08.05 Acceptance

QA test results shall be used for acceptance purposes, except when referee testing has been carried out.

When QA test results show that the aggregates meet the requirements of this specification, the aggregates shall be accepted.

When QA test results show that the aggregates do not meet the requirements of this specification, the Contract Administrator shall notify the Contractor that aggregates represented by the test results shall not be accepted. This notification shall take place in writing within 3 Business Days of receipt of the non-conforming data. The Contractor has the option of either removing the aggregates from the work or invoking referee testing. The Contractor may request a reduced price in lieu of removal of aggregates that fail to meet the requirements of this specification. Irrespective of the negotiation of a reduced price payment, the warranty provisions of the Contract Documents shall apply.

At the discretion of the Contract Administrator, irrespective of non-compliance with the requirements of this specification, aggregates may be accepted on the basis of satisfactory field performance.

1010.08.06 Referee Testing

When QA test results do not meet the requirements of this specification, the Contractor has the option of invoking referee testing of the test result that fails to meet the requirements. The Contractor shall notify the Contract Administrator of the selected option in writing within 2 Business Days following written notification of unacceptable material.

The Contract Administrator shall select a referee laboratory acceptable to the Contractor within 3 Business Days following the Contractor's notification to invoke referee testing. Referee test samples shall be delivered to the referee testing laboratory from the QA laboratory by the Contract Administrator. The sealed sample shall be opened in the presence of the Contractor and the Contract Administrator. If referee materials are not available, the Contractor shall be responsible for obtaining and submitting new samples to the referee laboratory from a location to be decided by the Contract Administrator. The Contract Administrator shall be present to witness the sampling.

Referee testing shall be carried out in the presence of the Contract Administrator. When applicable, the referee laboratory shall also test a control aggregate sample for each test method required. The Contractor may observe the testing at no cost to the Owner.

The Contractor and Owner may send a maximum of two representatives each to observe the referee testing. The Contract Administrator shall notify the Owner and Contractor a minimum of 3 Business Days in advance of the date of referee testing. Provided that such notice was given, referee testing shall be carried out regardless of the absence of one or more observers.

Observers shall follow the referee laboratory protocols for access to the premises and testing equipment and shall not unnecessarily impede the progress of the testing. Observers shall be permitted to validate sample identification and view sample condition. Subject to safety requirements, test method and equipment limitations, they shall also be permitted to observe test procedures, take notes, view equipment readings and review completed work sheets while in attendance.

Comments on the non-conformity of the test methods shall be made and corrected at the time of testing.

Referee test results shall be binding on both the Owner and the Contractor.

When a referee test result shows that the aggregates do not meet the requirements of this specification, the aggregates represented by the test result, including aggregates in existing stockpiles or in the Work, shall not be accepted. The Contractor shall remove the aggregates from the Work at no cost to the Owner. The Contractor may request a reduced price in lieu of the removal of aggregates that fail to meet the requirements of this specification. Irrespective of the negotiation of a reduced price payment, the warranty provisions of the Contract Documents shall apply.

When a referee test result shows that the aggregates meet the requirements of this specification, the aggregates represented by the sample shall be accepted.

The Owner shall be responsible for the cost of referee testing provided that the referee test results show that the aggregates meet the applicable specifications. Otherwise, the Contractor shall be responsible for the cost.

TABLE 1
Physical Property Requirements

MTO Laboratory Test and Number	Granular O	Granular A	Granular S	Granular B Type I and Type III	Granular B Type II	Granular M	Select Subgrade Material
Percent crushed particles, % minimum, LS-607	100	60	50	--	--	60	--
Unconfined Freeze-Thaw, % maximum loss, LS-614	15	--	--	--	--	--	--
2 or more crushed faces, % minimum, LS-617	85 (Note 1)	--	--	--	--	--	--
Micro-Deval Abrasion Coarse Aggregate, % maximum loss, LS-618	21	25	25	30 (Note 2)	30	25	30 (Note 2)
Micro-Deval Abrasion, Fine Aggregate, % maximum loss, LS-619	25	30	30	35	35	30	N/A
Asphalt Coated Particles, % maximum, LS-621	0	30	30	30	0	30	0
Amount of Contamination, LS-630	(Note 3)						
Plasticity Index, maximum LS-703/704	0						
Determination of Permeability, k, LS-709	(Note 4)						

Notes:

1. When Granular O is produced from boulders, cobbles, or gravel retained on the 50 mm sieve.
2. The coarse aggregate Micro-Deval abrasion loss test requirements shall be waived if the material has more than 80% passing the 4.75 mm sieve.
3. Granular A, B Type I, B Type III, or M may contain crushed glass or ceramic materials up to a combined total of 15% by mass. Granular A, B Type I, B Type III, M, O, and S shall not contain more than 1% by mass of wood, clay brick and/or gypsum and/or gypsum wall board or plaster. Granular B Type II and SSM shall not contain more than 0.1% by mass of wood.
4. For materials north of the French and Mattawa Rivers only, the coefficient of permeability, k, shall be greater than 1.0×10^{-4} cm/s or alternatively, where past field experience has demonstrated satisfactory performance. Prior data demonstrating compliance with this requirement for k shall be acceptable, provided such testing has been done within the 5 years of the material being used and field performance has continually been shown to be satisfactory.

TABLE 2
Gradation Requirements - Percent Passing

MTO Test	Sieve	Granular							Select Subgrade Material
		A	B (Note 1)			M	O	S	
			Type I (Note 2)	Type II	Type III (Note 2)				
Sieve Analysis, % Passing, LS-602	150 mm	N/A	100	N/A	100	N/A	N/A	N/A	100
	106 mm	N/A	N/A	100	N/A	N/A	N/A	N/A	N/A
	37.5 mm	N/A	N/A	N/A	N/A	N/A	100	N/A	N/A
	26.5 mm	100	50-100	50-100	50-100	N/A	95-100	100	50-100
	19.0 mm	85-100 (87-100, Note 3)	N/A	N/A	N/A	100	80-95	90-100	N/A
	13.2 mm	65-90 (75-95, Note 3)	N/A	N/A	N/A	75-95	60-80	75-100	N/A
	9.5 mm	50-73 (60-83, Note 3)	N/A	N/A	32-100	55-80	50-70	60-85	N/A
	4.75 mm	35-55 (40-60, Note 3)	20-100	20-55	20-90	35-55	20-45	40-60	20-100
	1.18 mm	15-40	10-100	10-40	10-60	15-40	0-15	20-40	10-100
	300 μm	5-22	2-65	5-22	2-35	5-22	N/A	11-25	5-95
	150 μm	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.0-65.0
	75 μm	2.0-8.0 (2.0-10.0, Note 4)	0-8.0 (0-10.0, Note 4)	0-10.0	0-8.0 (0-10.0, Note 4)	2.0-8.0 (2.0-10.0, Note 4)	0-5.0	9.0-15.0 (9.0-17.0, Note 4)	0-25.0

Notes:

1. When Granular B is used for granular backfill for pipe subdrains, 100% of the material shall pass the 37.5 mm sieve.
2. When RAP is blended with Granular B Type I or Type III, 100% of the RAP shall pass the 75 mm sieve. Conditions in Note 1 supersede this requirement.
3. When the aggregate is obtained from an air-cooled blast furnace slag source.
4. When the aggregate is obtained from a quarry or an air-cooled blast furnace slag or nickel slag source.

TABLE 3
Sample Size

Material	Minimum Mass of Individual Field Samples kg
Granular A, S, M, and O	25
Granular B and SSM	50
Granular B and SSM (100% passing 26.5 mm sieve)	25

Note:

A. Each sample container shall hold no more than 30 kg of aggregate. When more than 30 kg is required, additional sample containers shall be used.

Appendix 1010-A, November 2013
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Type of Granular B to be used. (1010.05.03)

The designer should determine if the following is required and, if so, specify it in the Contract Documents:

- If the quality assurance sampling and testing frequencies provided in Appendix 1010-B are to be used, Appendix 1010-B needs to be invoked by reference in the Contract Documents.

- If the payment reduction in lieu of aggregate removal provided in Appendix 1010-C is to be used, Appendix 1010-C needs to be invoked by reference in the Contract Documents.

- If the test data forms in Appendices 1010-D and 1010-E are to be used for submission purposes, Appendices 1010-D and 1010-E need to be invoked by reference in the Contract Documents.

The use of steel slag aggregate is prohibited.

The designer should be aware that aggregates that are wholly or partially comprised of industrial by-products and/or recycled materials such as, but not limited to, air-cooled iron blast furnace slag, nickel slag, and RAP containing steel slag aggregates, may have specific placement and approval requirements or constraints to mitigate adverse affects on the environment based on local conditions and/or municipal and MOE policy. Prior to tendering, when such Owner supplied or specified materials are to be used, the designer should provide site notification to MOE and ensure any applicable environmental placement and approval requirements and constraints are included in the Contract Documents.

RAP content is determined by LS-621, percent Asphalt Coated Particles. However, this test is limited to identifying RAP content in the coarse aggregate portion only. When RAP in fine aggregate is a concern a Petrographic Examination of the material passing the 4.75 mm sieve is recommended. (1010.05.02)

The designer should be aware that quality assurance (QA) testing for the purpose of ensuring material used in the work meet the requirements of OPSS 1010 is not mandatory unless specifically included in the Contract Documents. The designer should determine the need for QA testing based on the size and complexity of the work and specify the required frequencies of QA sampling and testing. Appendix 1010-B provides recommended QA sampling and testing frequencies.

The designer may specify a higher percent crushed requirement to improve performance in higher traffic areas.

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Appendix 1010-A

Related Ontario Provincial Standard Drawings

No information provided here.

Appendix 1010-B, November 2013
FOR USE IN MUNICIPAL CONTRACTS, WHEN REFERENCED IN THE CONTRACT DOCUMENTS

Note: This is a non-mandatory Additional Information Appendix intended to provide supplementary requirements for the OPS specification in a municipal contract, when the appendix is invoked by the Owner. It is written in mandatory language to permit invoking it by reference in the Contract Documents. If the appendix has not been invoked by reference in the Contract Documents, it does not apply.

Supplementary Requirements for Quality Assurance Sampling and Testing Frequency

OPSS.MUNI 1010, Aggregates-Base, Subbase, Select Subgrade, and Backfill Material, is amended as follows:

1010.08 QUALITY ASSURANCE

1010.08.01 General

The first paragraph of subsection 1010.08.01 is deleted in its entirety and replaced with the following:

QA sampling and testing shall be carried out by the Owner for the purposes of ensuring that the aggregates used in the work are according to the requirements of the Contract Documents. QA sampling and testing shall be carried out at the frequency specified in Table B-1. Individual test results may be forwarded to the Contractor as they become available.

Table B-1 is added.

TABLE B-1
Sampling and Testing Frequency for Physical Property Requirements

Quantity from Each Source or Process t	**Granular A; Granular B - Type I, II, and III; Granular M; Granular O; and Select Subgrade Material**
≤ 5,000	One sample.
> 5,000 (Note 1)	One sample per 5,000 tonnes.

Note:

1. When the quantity of material is:

   a) Less than one-half the quantity required for a sample, then that quantity shall be added to the quantity representing the previous sample.

   b) Greater than or equal to one-half the quantity required for a sample, then that quantity shall require its own sample.

Appendix 1010-B

Table B-2 is added.

TABLE B-2
Sampling and Testing Frequency for Gradation Requirements

Quantity from Each Source or Process t	Granular A, O, and M	Granular B - Type I, II, and III, and Select Subgrade Material
< 250	At the Contract Administrator's discretion.	
≥ 250 and ≤ 1,000	One sample.	
> 1,000 (Note 1)	One sample per 1,000 tonnes.	

Note:

1. When the quantity of granular material is:

   a) Less than one-half the quantity required for a sample, then that quantity shall be added to the quantity representing the previous sample.

   b) Greater than or equal to one-half the quantity required for a sample, then that quantity shall require its own sample.

Appendix 1010-C, November 2013
FOR USE IN MUNICIPAL CONTRACTS, WHEN REFERENCED IN THE CONTRACT DOCUMENTS

Note: This is a non-mandatory Additional Information Appendix intended to provide supplementary requirements for the OPS specification in a municipal contract, when the appendix is invoked by the Owner. It is written in mandatory language to permit invoking it by reference in the Contract Documents. If the appendix has not been invoked by reference in the Contract Documents, it does not apply.

Supplementary Requirements for Reduced Price Payment In Lieu of Aggregate Removal

When a tested sample of aggregates shows that the aggregates do not meet the requirements of this specification, the aggregates represented by the test result, including material in existing stockpiles or in the Work, shall not be accepted. The Contractor may request a reduced price in lieu of removal provided the applicable test results:

a) Do not exceed the requirement for LS-614 by more than 25% of the specified value.

b) Do not exceed the requirement for LS-618 by more than 10% of the specified value.

c) Do not identify a plasticity index within the material when determined according to LS-703/704 and the requirement for LS-602 on the 75 µm is met.

d) Meet all other requirements of this specification.

Irrespective of a reduced price payment, the warranty provisions of the Contract Documents shall apply.

Appendix 1010-D, November 2013
FOR USE IN MUNICIPAL CONTRACTS, WHEN REFERENCED IN THE CONTRACT DOCUMENTS

Note: This is a non-mandatory Additional Information Appendix intended to provide supplementary requirements for the OPS specification in a municipal contract, when the appendix is invoked by the Owner. It is written in mandatory language to permit invoking it by reference in the Contract Documents. If the appendix has not been invoked by reference in the Contract Documents, it does not apply.

OPSS 1010 - Aggregate Test Data - Granulars
Physical Properties

Contract No.:	Contractor:	Contract Location:	
Name of Testing Laboratory:		Telephone No.:	Fax No.:
Sampled by (Print Name):		Date Sampled (YY/MM/DD):	Date Tested (YY/MM/DD):
Granular Type:		Quantity (tonnes) :	
Source Name/Location:		Aggregate Inventory Number (AIN) :	

Laboratory Test and Number	Requirements								Test Results		
	A	B Type I	B Type II	B Type III	M	O	S	SSM	Reference Material	Sample	Meets Requirements (Y/N)
Crushed Particles, % minimum, LS-607	60	--	100	--	60	100	50	--			
Unconfined Freeze-Thaw, % maximum loss, LS-614	--	--	--	--	--	15	--	--			
2 or more Crushed Faces, % minimum, LS-617	--	--	--	--	--	85 (Note 1)	--	--			
Micro-Deval Abrasion, Coarse Aggregate % maximum loss, LS-618	25	30 (Note 2)	30	30 (Note 2)	25	21	25	30 (Note 2)			
Micro-Deval Abrasion, Fine Aggregate % maximum loss, LS-619	30	35	35	35	30	25	30	--			
Asphalt Coated Particles, % maximum, LS-621	30	30	0	30	30	0	30	0			
Amount of Contamination, LS-630	**(Note 3)**										
Plasticity Index, maximum, LS-703/704	**0**										
Determination of Permeability, *k*, LS-709	**(Note 4)**										

Notes:
1. When Granular O is produced from boulders, cobbles, or gravel retained on the 50 mm sieve.
2. The coarse aggregate Micro-Deval abrasion loss test requirement shall be waived if the material has more than 80% passing the 4.75 mm sieve.
3. Granular A, B Type I, B Type III, or M may contain up to 15 percent by mass crushed glass or ceramic materials. Granular A, B Type III, M, O, and S shall not contain more than 1.0 percent by mass of wood, clay brick and/or gypsum and/or gypsum wall board or plaster. Granular B Type II and SSM shall not contain more than 0.1 percent by mass of wood.
4. For materials north of the French/Mattawa Rivers only, the coefficient of permeability, *k*, shall be greater than 1.0×10^{-4} cm/s or field experience has demonstrated satisfactory performance. Prior data demonstrating compliance with this requirement for *k*, shall be acceptable provided that such testing has been done within 5 years of the material being used and field performance has continually been shown to be satisfactory.

I hereby certify that testing has been carried out by a properly qualified/certified test technician:

Issued by: _____ _____ _____
PRINT NAME | TESTING LABORATORY REPRESENTATIVE SIGNATURE | DATE

Received by: _____ _____ _____
PRINT NAME | CONTRACT ADMINISTRATOR REPRESENTATIVE SIGNATURE | DATE

Copies to: Contract Administrator Contractor

Appendix 1010-E, November 2013
FOR USE IN MUNICIPAL CONTRACTS, WHEN REFERENCED IN THE CONTRACT DOCUMENTS

Note: This is a non-mandatory Additional Information Appendix intended to provide supplementary requirements for the OPS specification in a municipal contract, when the appendix is invoked by the Owner. It is written in mandatory language to permit invoking it by reference in the Contract Documents. If the appendix has not been invoked by reference in the Contract Documents, it does not apply.

OPSS 1010 - AGGREGATE TEST DATA - GRANULARS
GRADATION REQUIREMENTS, LS-602

Contract No.:	**Contractor:**	**Contract Location:**	
Name of Testing Laboratory:		**Telephone No.:**	**Fax No.:**
Sampled by (Print Name):		**Date Sampled (YY/MM/DD):**	**Date Tested (YY/MM/DD):**
Granular Type:		**Quantity (tonnes) :**	
Source Name/Location:		**Aggregate Inventory Number (AIN) :**	

Sieve Size	**Gradation Requirement, % Passing**								**Test Result**	
	A	**B (Note 1)**			**M**	**O**	**S**	**SSM**	**Sample**	**Meets Requirements (Y/N)**
		Type I (Note 2)	**Type II**	**Type III (Note 2)**						
150 mm	--	100	--	100	--	--	--	100		
106 mm	--	--	100	--	--	--	--	--		
37.5 mm	--	--	--	--	--	100	--	--		
26.5 mm	100	50-100	50-100	50-100	--	95-100	100	50-100		
19.0 mm	85-100 (87-100, Note 3)	--	--	--	100	80-95	90-100	--		
13.2 mm	65-90 (75-95, Note 3)	--	--	--	75-95	60-80	75-100	--		
905 mm	50-73 (60-73, Note 3)	--	--	32-100	55-80	50-70	60-85	--		
4.75 mm	35-55 (40-60, Note 3)	20-100	20-55	20-90	35-55	20-45	40-60	20-100		
1.18 mm	15-40	10-100	10-40	10-60	15-40	0-15	20-40	10-100		
300 µm	2-55	2-65	5-22	2-35	5-22	--	11-25	5-95		
150 µm	--	--	--	--	--	--	--	2-65		
75 µm	2.0-8.0 (2.0-10.0, Note 4)	0-8.0 (0-10.0, Note 4)	0-10.0	0-8.0 (0-10.0, Note 4)	2.0-8.0 (2.0-10.0, Note 4)	0-5.0	9.0-15.0 (9.0-17.0, Note 4)	0-25.0		

Notes:
1. When Granular B is used for granular backfill for pipe subdrains, 100% of the material shall pass the 37.5 mm sieve.
2. When RAP is blended with Granular B Type I or Type III, 100 percent of the RAP shall pass the 75 mm sieve. Conditions in Note 1 supersede in this requirement.
3. When the aggregate is obtained from an iron blast furnace slag source.
4. When the aggregate is obtained from a quarry or blast furnace slag or nickel slag source.

I hereby certify that testing has been carried out by a properly qualified/certified test technician:

Issued by: _____ (PRINT NAME) _____ (TESTING LABORATORY REPRESENTATIVE SIGNATURE) _____ (DATE)

Received by: _____ (PRINT NAME) _____ (CONTRACT ADMINISTRATOR REPRESENTATIVE SIGNATURE) _____ (DATE)

Copies to: Contract Administrator Contractor