INVITATION TO TENDER

REHABILITATION OF APRON I PCC PANELS

PRINCE GEORGE AIRPORT AUTHORITY

DATE OF ISSUE: March 27, 2017

Closing Location:
Mail, courier or hand delivered to:

Prince George Airport
Cuyler Green, Director of Operations
10 - 4141 Airport Road
Prince George, BC, Canada V2N 4M6

Closing date and time:
One (1) complete original and one (1) copy of each Tender are requested by 2:00:00 pm Pacific Time April 12, 2017

Contact:
All enquiries must be in written form and directed to our Consultant, Tetra Tech EBA Inc. at:

Kevin Alexander, AScT, CCA
Fax: 250-862-2941
Email: kevin.alexander@tetratech.com

Project No. TRN.AIRP03113-01

INVITATION TO TENDER

Prince George Airport Authority (the "Owner") invites tenders for the Rehabilitation of Apron I PCC Panels. This is an open invitation to tender for qualified contractors with a demonstrated history of airfield construction projects. References for previous construction history on relevant airside projects may be requested by the Prince George Airport Authority. You are invited to submit a Tender for the Work in accordance with the "Tender Documents" listed in Appendix "A" of the Tender Form contained in this Tender Package.

1. Pre-Tender Site Visit

An optional (recommended) pre-tender site visit will be held at the Prince George Airport, time as shown below. Design consultant and the Owner will be available to answer questions regarding the tender. Any new information that is requested or generated will be included in an Addendum that will be issued at least two days prior to the Tender Close.

2. Instructions to Tenderers

See the Instructions to Tenderers supplied in the Tenderer Package.

3. Form of Tender

See the Form of Tender supplied in the Tenderer Package.

4. Outline of Anticipated Timing

Pre-Tender Site Meeting:	11:00 am local time; April 4, 2017
Tenders to be Received by:	2:00 pm local time; April 12, 2017
Commencement of the Work:	Within 14 days of Notice of Award
Substantial Performance of the Work:	August 11, 2017
Total Performance of the Work:	August 25, 2017

5. Bid Security

See IT 12 of the Instructions to Tenderers.

6. Contract Security (Performance Bond and Labour & Materials Payment Bond etc.)

See IT 19 of the Instructions to Tenderers.

7. Time and Date and Address for Tenders

See IT 2.2 of the Instructions to Tenderers.

8. Inquiries

All inquiries are to be directed to the Owner's Representative as follows:

Kevin Alexander, AScT, CCA
Tetra Tech EBA Inc.
Email: kevin.alexander@tetratech.com. Fax: 1.250.862.2941

9. Addenda

The Owner may make changes to the Tender Documents by way of Addenda. See IT 6 of the Instructions to Tenderers.

10. Tender Opening

Tenders will **not** be opened publicly.

END OF INVITATION TO TENDER

INSTRUCTIONS TO TENDERERS

Owner: Prince George Airport Authority.

Contract: Rehabilitation Of Apron I PCC Panels

These Instructions to Tenderers are contractual and they bind each Tenderer and govern the consideration of each Tender by the Owner.

PART 1 DEFINITIONS

1.1 In these Instructions:

.1 "Addendum" means a document issued under IT 5, IT 6 or IT 7;

.2 "Agreement" means the agreement between the Owner and the Contractor to perform the Work required by the Contract Documents;

.3 "Closing Time" means the deadline specified for receipt of Tenders by the Owner;

.4 "Consultant" means Tetra Tech EBA Inc., 150, 1715 Dickson Avenue, Kelowna, BC V1Y 9G6, Fax: 250.862.2941;

.5 "Tender Documents" means

.1 Instructions to Tenderers;

.2 Tender Form;

.3 Agreement;

.4 General Conditions;

.5 Supplementary Conditions;

.6 Specifications;

.7 Drawings; and

.8 Addenda (if any).

.6 "Contractor" means the Tenderer to whom the Contract has been awarded in accordance with IT 19;

.7 "Drawings" means the graphic and pictorial portions of the Contract Documents;

.8 "GC" is, when used in conjunction with a numeral, a reference to the section of the General Conditions with the same numeral;

.9 "General Conditions" means the terms and conditions of that name that are contained in the Agreement, including any changes, additions or deletions to the General Conditions contained in the Supplementary Conditions;

.10 “IT" is, when used in conjunction with a numeral, a reference to the article or section of the Instructions to Tenderers with the same numeral;

.11 "Notice of Award" means the notice of award of the Contract given in accordance with IT 19;

.12 "Owner" means Prince George Airport Authority, Attention: Cuyler Green, #10 – 4141 Airport Road, Prince George, BC, Canada V2N 4M6.

.13 “Provisional Work / Provisional Item” means work which may be described in the Schedule of Contract Unit Prices that will be undertaken, in whole or in part, and included in the Work at the election of the Owner. Tenderers must complete all the unit prices on the Tender Form for such Provisional Work/Provisional Items. Such tender prices shall not include any general overhead costs, or other costs, or profit, not directly related to the Provisional Work/Provisional Items. Notwithstanding that the Owner may elect not to proceed with the Provisional Work, in whole or in part. The tender prices for any Provisional Work, shall be included in the Tender Price for the purpose of any price comparison between tenders.

.14 "Tender" means a tender submitted to the Owner in accordance with the Instructions to Tenderers;

.15 "Tenderer" means anyone who submits a Tender; and

.16 “Tender Form" means the tender form contained in the Contract Documents and any appendices to it that are expressly contemplated by the Contract Documents.

1.2 Any word or expression that is not defined in these Instructions to Tenderers has the meaning given to it in the definition section of the Agreement.

PART 2 SUBMISSION OF TENDERS

2.1 Tenders must be submitted on the Tender Form, every part of which must be completely filled out and must either be typewritten or printed legibly in ink.

2.2 Tenders must be submitted in a sealed envelope addressed to the Owner marked clearly on the front as a Tender for the Work, including the project name and any number set out on page 1 of the Tender Form.

2.3 Faxed or e-mailed Tenders are not acceptable and must be rejected, but a Tender already delivered by a Tenderer may be changed by a fax received by the Owner not later than the Closing Time in accordance with IT 2.4. If a Tenderer changes a Tender by fax, the Tenderer accepts all risk associated therewith, including the risk of:

.1 An incomplete or lost fax;

.2 A lack of confidentiality;

.3 A failure, breakdown or inadequacy of any telecommunications equipment or service, including of the Tenderer, Owner, Consultant or any third party; and

.4 The inability of the fax to be received by the Closing Time because the facsimile equipment or telephone line is busy or out of paper.

2.4 A Tender, and any changes to the Tender, must be received by the Owner not later than the Closing Time. A Tender, or any change to a Tender, received after the Closing Time will not be opened and must be rejected.

2.5 The Owner may, in its sole discretion, extend the Closing Time by notice given to Tenderers at least 24 hours before the Closing Time.

2.6 A Tender is an offer by the Tenderer to enter into the Contract with the Owner on the terms and conditions contained in the Contract Documents.

2.7 All work to commence after **Notice of Award** and to achieve Substantial Performance of the Work by **August 11, 2017.**

PART 3 INSPECTION OF THE PLACE OF THE WORK AND ENQUIRY AS TO WORK

3.1 The Tenderer must inform itself as to all aspects of the Work, including Place of the Work site conditions of any kind (including subsurface soil and other conditions), before submitting a Tender. The Tenderer has full responsibility to be familiar with and make allowance in the Tender for all conditions that might affect the Tender, including local conditions, weather, access, quantities and nature of the Work, materials required, existence of utilities, jurisdiction of other authorities and all other circumstances.

3.2 All inquiries shall be directed to Kevin Alexander, AScT, CCA
Email: kevin.alexander@tetratech.com
Fax: 1.250.862.2941

3.3 The Tenderer acknowledges that a pre-tender site visit will be held on **April 4, 2017 at 11:00am** Local Time at the Prince George Airport Boardroom in the Terminal Building and that the Tenderer has an opportunity to visit the Place of the Work at that time. While the pre-tender site visit is optional it is recommended.

3.4 By submitting a Tender, the Tenderer represents that it has examined the Place of the Work and all conditions as just described or elected not to, and that the Tenderer agrees that no additional payment, and no time extensions, shall be claimable or due because of difficulties relating to conditions at the Place of the Work which were reasonably foreseeable. The Owner is not liable for any expense, damage or loss incurred as a result of any misunderstanding or error by the Tenderer regarding the Work or conditions affecting it, including the Place of the Work conditions.

PART 4 QUALIFICATIONS, MODIFICATIONS, ALTERNATIVE TENDERS

4.1 Tenders which contain qualifications, or omissions, so as to make comparison with other Tenders difficult, may be rejected by the Owner in its sole discretion.

4.2 The Tenderer may, at the Tenderer's election, submit an alternative tender which varies the materials, products, designs or equipment from those approved under the Tender Documents, but such an alternative tender must be in addition to, and not in substitution for, a tender which conforms to the requirements of the Tender Documents.

PART 5 SUBSTITUTIONS

5.1 No substitutions will be allowed for the materials, products or equipment indicated in the Tender Documents.

PART 6 ADDENDA AND COMMUNICATIONS

6.1 Prior to the Closing Time, any change or addition to the Tender Documents must be issued by the Consultant as an Addendum. A copy of each Addendum must be given to all Tenderers and each Addendum becomes part of the Tender Documents. The Owner may instruct the Consultant to make changes to the Tender Documents by way of Addenda at any time prior to 24 hours before the Closing Time.

6.2 The Tenderer must indicate that it has received copies of all Addenda, and that its Tender has been completed in accordance with all Addenda, by completing the relevant part of the Tender Form.

6.3 Only the Owner and Consultant are authorized to communicate with Tenderers.

PART 7 INTERPRETATION OF CONTRACT DOCUMENTS

7.1 If the Tenderer is in doubt as to the correct meaning of any provision of the Tender Documents, the Tenderer may, in writing, request clarification from the Consultant.

7.2 If the Tenderer discovers any contradictions or inconsistencies in the Tender Documents or their provisions, the Tenderer may notify the Consultant in writing and, if the Consultant considers it necessary, the Consultant may issue an Addendum to provide clarification of the Tender Documents.

7.3 No oral interpretation or representations from the Owner, any representative of the Owner, or the Consultant affects, alters or amends any provision of the Tender Documents or binds the Owner.

PART 8 APPENDICES TO TENDER FORM

8.1 A Tenderer must include and complete the following appendices to the Tender Form:

.1 Appendix A – List of Tender Documents;

.2 Appendix B – List of Subcontractors;

.3 Appendix C – Schedule of Contract Unit Prices;

.4 Appendix D – Contractor’s Qualifications; and

.5 Appendix E – Equipment and Personnel Statement.

PART 9 PRICES

9.1 Prices must be given as and where indicated in the Tender Form. Failure to give a price for any item makes the Tender incomplete and the Tender must be rejected.

9.2 If the Tender contains an error in extending unit prices or lump sums, or both, the total Tender Price is the total resulting from correct extension by the Owner of the prices or addition of the lump sums, or both.

9.3 Any quantities of Work set out in the Tender Documents are only estimates of quantity and the Owner does not represent, warrant or guarantee to the Tenderer that actual quantities of Work will be as estimated.

9.4 The Tenderer understands that where Provisional Work Cost Sums are included in the Schedule of Contract Unit Prices, only actual expenditures made upon the written authority of the Consultant shall be paid out of these Provisional Work Cost Sums, and that if the Provisional Work Cost Sum is not sufficient to cover the Work required, then the Contract Price shall be increased, and if the Provisional Work Cost Sum is greater than required for the Work, then the Contract Price shall be decreased.

PART 10 EXECUTION OF TENDER AND CAPACITY

10.1 If the Tenderer is an individual or partnership, the Tender Form must be executed by the individual or all partners, as the case may be, and must be witnessed in the case of an individual's signature. The individual signing must indicate the capacity in which he or she signs where indicated in the Tender Form.

10.2 If the Tenderer is a corporation, the Tender Form must be executed by the authorized signatories of the corporation. The full and correct legal name of the corporation, its incorporation number or extra-provincial registration number and business address must be given in the Tender Form, together with the names and signatures of authorized signatories.

10.3 If the Tenderer is a corporation incorporated outside British Columbia, that corporation must be registered as an extra-provincial corporation under the *Company Act* (British Columbia). Proof of extra-provincial registration must be submitted with the Tender. A Tender submitted by a corporation that is not extra-provincially registered as required by this section must be rejected. Failure to submit proof of extra-provincial registration may be cause for rejection of the Tender. This section does not apply to a corporation incorporated under the *Canada Business Corporations Act* (Canada).

10.4 All signatures on the Tender Form must be in original handwriting.

PART 11 AMENDMENT OR REVOCATION OF TENDERS

11.1 The Tenderer may amend or revoke a Tender by giving written notice delivered by hand, mail or fax to the Owner at any time up until the Closing Time. An amendment or revocation that is received after the Closing Time must not be considered and does not affect the Tender as submitted.

11.2 An amendment or revocation must be signed by an authorized signatory of the Tenderer in the same manner as provided for in IT 10.

11.3 Any amendment that expressly or by inference discloses the Tenderer's Tender price or other material element of the Tender such that, in the opinion of the

Owner, the confidentiality of the Tender is breached, will invalidate the entire Tender.

PART 12 SECURITY

12.1 The Tender must be accompanied by the security for the Tender in the amount of 10% of the Tender Price. A bid bond must be issued by a corporation licensed to carry on the business of surety in British Columbia. Only cash, certified cheques or clean, irrevocable and unconditional bank letters of credit are considered cash equivalents to such a bid bond.

12.2 The security required by IT 12.1 secures the Tenderer's obligation. If the Tenderer fails to perform that obligation, the security is forfeited to the Owner without affecting any other right or remedy the Owner may have against the Tenderer.

12.3 The Owner must return any security deposited under IT 12.1 as soon as is practicable after its receipt of the performance bond and labour and materials payment bond required to be given by the Contractor. If no Contract is awarded, all security deposited will be returned.

PART 13 DURATION OF TENDERS

13.1 After the Closing Time, a Tender shall remain valid and irrevocable for sixty (60) days after the Closing Time.

PART 14 QUALIFICATIONS OF TENDERS

14.1 By submitting a Tender, the Tenderer is representing that it has the competence, qualifications, resources, and relevant experience required to do the Work and perform the Work as required by the Contract.

PART 15 SUBCONTRACTORS

15.1 The Owner reserves the right to object to any of the subcontractors listed in a Tender. If the Owner objects to a listed subcontractor then the Owner will permit the Tenderer to, within five days, propose a substitute subcontractor acceptable to the Owner provided that there is no resulting adjustment in the Tender price or the completion date. The Tenderer shall not be required to make such a substitution and if the Owner objects to a listed subcontractor, the Tenderer may, rather than propose a substitute subcontractor, consider its Tender rejected by the Owner and, by written notice signed in the same manner as provided for in IT 10, withdraw its Tender. The Owner must, in that event, return the Tenderer's tender security.

PART 16 REJECTION OF TENDERS

16.1 The Owner has the right, in its sole discretion, not to award a Contract at all and has the right, in its sole discretion, to reject any or all Tenders (including the lowest Tender), without having or giving a reason for doing so.

16.2 The Owner has the right, in its sole discretion, to evaluate any or all Tenders, and to consider whether to award any Contract at all, on any basis it considers desirable, including the overall cost of the Tenders in relation to the Owner's budget for the Work, the ability of the Tenderer or Tenderers to perform the

Work, the finances or credit-worthiness of the Tenderer or Tenderers, and any experience of the Tenderer or Tenderers in performing work of a kind comparable to the Work. In no event is the Owner liable for the Tenderer's cost of preparing the Tender.

16.3 Unless otherwise expressly provided in these Instructions to Tenderers, the Owner is entitled, in its sole discretion, to waive any informality, incompleteness or error in any Tender, including failure to provide tender security as required.

16.4 Unless otherwise expressly provided in these Instructions to Tenderers, and without limiting the generality of IT 16.1, 16.2 or 16.3, the Owner may, but is not required to, in its sole discretion, reject any Tender which:

.1 Is conditional or obscure in any respect,

.2 Does not conform strictly with the requirements of the Contract Documents, or

.3 Is not accompanied by the Tender Security required by IT 12.

PART 17 FREEDOM OF INFORMATION LEGISLATION

17.1 Each Tenderer acknowledges and agrees that part or all of their Tenders may be subject to disclosure under the *Freedom of Information and Protection of Privacy Act* (British Columbia). A Tenderer that wishes to protect its Tender from disclosure should specifically identify information within the Tender that constitutes a trade secret, or business or commercial information, that it is explicitly supplied in confidence and the release of which could significantly harm the competitive position, or interfere with the negotiating position, of the Tenderer. The Tenderer acknowledges and agrees that the Owner cannot assure the Tenderer that information contained in a Tender will remain confidential and will not be disclosed, since the *Freedom of Information and Protection of Privacy Act* (British Columbia) may require disclosure of that information. Each Tender acknowledges and agrees that it is solely responsible to determine whether that legislation will protect any information contained in the Tender from disclosure.

PART 18 CONTRACT AWARD

18.1 The Contract is awarded and entered into without further act of either the Owner or the Tenderer when the Owner delivers to the successful Tenderer a signed Notice of Award. Notice of Award must be given in writing in accordance with the notice requirements set out in the Agreement and is not effective unless and until given in that manner. Before the Contractor begins the Work, and as a condition precedent to the right of the Contractor to begin the Work, the Contractor must execute and deliver the Agreement to the Owner. If the Agreement is not executed and delivered within ten days after the Notice of Award has been given, the Owner is entitled in its sole discretion to give notice to the Contractor terminating the Contract upon delivery of that notice.

PART 19 INSURANCE AND BONDING

19.1 If a Notice of Award is delivered to the Tenderer, within 15 days of receipt of the Notice of Award, the Tenderer must deliver to the Owner each of the following:

.1 The performance security required in the supplementary conditions;

.2 A copy of the insurance policies as specified in the general conditions, and proof that all such insurance is in place and paid for; and

.3 Proof, satisfactory to the Owner, that the Contractor is registered with the Worker's Compensation Board of British Columbia and that all assessments and other amounts payable by the Contractor to that Board are fully paid up to the last required payment.

19.2 The Contractor agrees with the Owner that failure by the Contractor to perform its obligations under IT 20 or IT 18, or to substantially begin the Work by the date set out in the Agreement, is a repudiation of the Contract that entitles, but does not oblige, the Owner to treat the Contract as terminated and, without affecting any other right or remedy the Owner may have against the Contractor, award the Contract to another Tenderer.

PART 20 GENERAL PROVISIONS

20.1 The Tender constitutes a contract between the Tenderer and the Owner, on the terms and conditions of these Instructions to Tenderers and of the Tender Form, which terminates on either the award of the Contract or the rejection of the Tender or all Tenders, as the case may be, but which does not merge with the Contract as against the Contractor.

20.2 The obligations of the Contractor are joint and several obligations of each of the persons who have submitted the Tender as the Tenderer or as members of a joint venture or partnership comprising the Tenderer.

END OF INSTRUCTIONS TO TENDERERS

Submitted To: Prince George Airport Authority

We, _____
(Company Name)

of _____
(Business Address)

_____

having examined the **Tender** Documents as listed in **Appendix "A"** to **Appendix "E"** in this Tender, and Addenda No.____ to No. ___ inclusive,
all as issued by Tetra Tech EBA Inc. and having visited the Project Site; hereby offer to enter into a Contract to perform the Work required by the Tender Documents for the estimated price of

_____

Dollars ($_____) in Canadian funds, which price includes any specified cash and contingency allowances **as well as Provisional Items** and the applicable taxes in force at this date except as may be otherwise provided in the Tender Documents.

Appendices to Tender:

The information on Subcontractors, Schedule of Contract Unit Prices, Contractor's Qualifications, Equipment and Personnel Statement as called for in the Tender Documents is provided in the attached Appendices and forms an integral part of this Tender.

Declarations:

We hereby declare that:

a. we agree to perform the Work in compliance with the required completion schedule stated in the Tender Documents to attain Substantial Performance of the Work by **August 11, 2017**;

b. no person, firm or corporation other than the undersigned has any interest in this Tender or in the proposed Contract for which this Tender is made;

c. this Tender is open to acceptance for a period of sixty (60) days from the date of Tender closing.

Signatures:

Signed, sealed and submitted for and on behalf of:

Company: _____
(Name)

_____
(Street Address or Postal Box Number)

_____
(City, Province and Postal Code)

(Apply SEAL above)

Signature: _____

Name & Title: _____
(Please Print or Type)

Witness: _____

Dated at _____ this _____ day of _____, 2017.

APPENDIX "A" to Tender Form

Tender Submitted by: _____

LIST OF TENDER DOCUMENTS
The following is the list of the Tender Documents Referred to in the Tender for the above named Project.

Section Number	Section Title	No. of Pages
00100	Invitation To Tender	2
00200	Instructions To Tenderers	8
00300	Tender Form (Including Appendices A-E)	9
00500	Form of Agreement	1
00710	General Conditions	1
00810	Supplementary General Conditions	10
-------	CCDC 18 Including Agreement	35
	SPECIFICATIONS	
00 00 00	Index to Specifications	2
	GENERAL REQUIREMENTS	
01 11 00	Summary of Work	3
01 14 00	Work Restrictions	2
01 21 00	Allowances	1
01 31 19	Project Meetings	3
01 32 16.07	Construction Progress Schedule - Bar (GANTT) Chart	3
01 33 00	Submittal Procedures	5
01 35 13.13	Special Procedures: Airports in Use	3
01 35 43	Environmental Procedures	3
01 45 00	Quality Control	4
01 52 00	Construction Facilities	4
01 71 00	Examination and Preparation	4

Drawings List - Bound Separately:

	COVER SHEET
C1.0	SITE PLAN
C2.0	PLAN OF CONSTRUCTION OPERATIONS – SECTION 1
C2.1	PLAN OF CONSTRUCTION OPERATIONS – SECTION 2
C2.2	PLAN OF CONSTRUCTION OPERATIONS – SECTION 3
C2.3	PLAN OF CONSTRUCTION OPERATIONS – SECTION 4
C3.0	CONCRETE PANEL REHABILITATION PLAN
C4.0	CONCRETE PANEL REHABILITATION DETAILS I
C4.1	CONCRETE PANEL REHABILITATION DETAILS II
C5.0	MANHOLE CONCRETE TOP DETAILS
C6.0	PAINT MARKINGS PLAN

APPENDIX "B" to Tender Form

Tender
Submitted by: _____

LIST OF SUBCONTRACTORS

The following are the Subcontractors we propose to use for the Divisions or Sections of Work listed hereunder.

(If not used, bar and initial the space below)

Division or Section of Work	Name of Subcontractor

APPENDIX "C" to Tender Form

Tender Submitted by: _____

Schedule of Contract Unit Prices

Item No.	Description of Work	Unit	Estimated Quantity	Unit Price	Total Cost
A	**General Requirements**				
1	Section 01 35 13.13 – Mobilization/ Demobilization/ Permits/ Temporary Facilities/ Bonding/ Insurance	LS	1		
2	Section 01 35 13.13 - Temporary 1.8m High Steel Fencing (Red Lights Supplied by Owner)	LS	1		
3	Section 01 71 00 – Construction Survey / As-built Survey / Record Documents	LS	1		
4	Section 01 21 00 – Cash Allowance for Security Escorts	LS	1		
	Subtotal A				
B	**Rehabilitation of PCC Panels**				
1	Section 32 13 13 - Sawcut and Remove Existing 350mm Thick PCC Panels Full Depth and Dispose Off-Site	m^2	155		
2	Section 32 13 13 - Sawcut and Remove Existing 300mm Thick PCC Panels Full Depth and Dispose Off-Site	m^2	950		
3	Section 32 13 13 - Water, compact, grade existing Granular Base Course, Install Dowels (Owner supplied), Bond Breaker and Construct New PCC Panels to match existing 350mm Thickness	m^2	155		
4	Section 32 13 13 - Water, compact, grade existing Granular Base Course, Install Dowels (Owner supplied), Bond Breaker and Construct New PCC Panels to match existing 300mm Thickness	m^2	950		
5	Section 03 30 20 - Sawcut and Seal New PCC/PCC and PCC/HMAC Joints	m	600		
6	Section 03 30 20 - Sandblast and Seal PCC/PCC and PCC/HMAC Joints	m	2,500		
7	Section 33 05 13 - Sawcut, Partial Depth Repair of Ex. Concrete MH Top	LS	1		

Item No.	Description of Work	Unit	Estimated Quantity	Unit Price	Total Cost
8	Section 32 13 13 - Sawcut, Partial Depth Concrete Panel Repairs	m^2	1		
9	Section 32 17 23 - Permanent Apron Paint Markings	LS	1		
10	Section 32 17 23 - Temporary Apron Markings	LS	1		
	Subtotal B				

SUBTOTAL A, & B	
5% GST	
TOTAL TENDER PRICE (WITH GST)	

APPENDIX "D" to Tender Form

Tender
Submitted by: _____

CONTRACTOR'S QUALIFICATIONS

The Contractor states that the following is a true account of its qualifications and experience on Work similar to the Work in this project.

Construction Project	Year	Cost	Consulting Engineer

APPENDIX "E" to Tender Form

Tender
Submitted by: _____

EQUIPMENT AND PERSONNEL STATEMENT

1.	Personnel Work Classification By Trade	Hourly Charge Out Rate*

2.	Equipment	Hourly Charge Out Rate*

* To be used for force account work if authorized by the Owner.
All rates to be all-inclusive, equipment rates include the operator.

PART 1 - GENERAL

1. CCDC-18 FORM OF AGREEMENT

.1 The Form of Agreement, pages 1-7 inclusive, of the Canadian Construction Documents Committee designated as CCDC 18-2001 edition, together with all amendments and supplements thereto as described hereafter shall apply in their entirety to this Contract.

.2 Copies of this document are reproduced wherein request.

.3 Execution of the contract must be on original “Form of Agreement” documents.

END OF SECTION

PART 1 - GENERAL

1. GENERAL CONDITIONS

.1 The General Conditions of the Unit Price Contract, Articles GC1.1 to GC12.3 inclusive, of the Canadian Construction Documents Committee designated as CCDC-18, 2001 edition, are the General Conditions between the Owner and Contractor.

.2 This document has been reproduced herein.

2. SUPPLEMENTARY GENERAL CONDITIONS

.1 Refer to Document 00810 for amendments to these General Conditions.

END OF SECTION

The following amendments and the following SUPPLEMENTARY CONDITIONS pertain to amendments and supplements of the ARTICLES OF AGREEMENT, DEFINITIONS and GENERAL CONDITIONS of the Standard Construction CCDC-18 2001 CIVIL WORKS CONTRACT, and shall form part of the Contract between the Owner and the Contractor.

ARTICLES OF AGREEMENT

ARTICLE A-1 THE WORK

Delete Article A -1.3 and replace with the following:

1.3 Perform the work in accordance with the schedule referred to in GC 3.5 and attain Substantial Performance of the Work by **Friday, August 11, 2017,** subject to an adjustment in Contract Time as provided for in the Contract Documents.

ARTICLE A-3 CONTRACT DOCUMENTS

Add the following to Article A – 3.1 as part of the Contract Documents:

3.1
- Supplementary Conditions
- Specifications
- Plan of Construction Operations
- Drawings
- Instructions to Tenderers
- Tender Form
- Addenda

ARTICLE A-8 SUCCESSION

Delete Article A – 8.1 and replace with the following:

8.1 The Contract shall ensure to the benefit of and be binding upon the parties hereto, their respective heirs, legal representatives, successors and permitted assigns.

DEFINITIONS

The following Definitions shall also apply to all Contract Documents:

28. “Airport” means the Prince George Airport, British Columbia.

29. “Plan of Construction Operations” means the Owner’s operational plan for the **Rehabilitation of Apron I PCC Panels at Prince George Airport, British Columbia.**

30. “Substantial Performance of the Work” is as defined in the Builders' Lien Act. If such legislation is not in force or does not contain such definition, Substantial Performance of the Work shall have been reached when the Work is ready for use or is being used for the purpose intended as is so certified, in writing, by the Owner.

31. "Her Majesty" means Her Majesty the Queen in Right of Canada as represented by the Minister of Transportation and Infrastructure, and any person authorized in writing by the Minister of Transportation and Infrastructure to act on his or her behalf, and shall include the successors and assigns of Her Majesty.

GC 1.1 CONTRACT DOCUMENTS

Delete GC 1.1.7 and replace with the following:

1.1.7 If there is a conflict within the Contract Documents:

.1 the order of priority of documents, from highest to lowest, shall be:

- The Agreement between the Owner and the Contractor,
- The Definitions,
- Supplementary Conditions,
- The General Conditions,
- The Specifications,
- Plan of Construction Operations,
- The Drawings,
- Instructions to Tenderers,
- Tender Form,
- Addenda

.2 figured dimensions shown on a drawing shall govern even though they may differ from dimensions scaled on the same drawing;

.3 drawings of larger scale shall govern over those of smaller scale of the same date;

.4 Notwithstanding the foregoing, documents of later date shall always govern.

GC 1.4 ASSIGNMENT

Delete GC 1.4.1 and replace with the following:

1.4.1 The Contractor shall not assign the Contract or a portion thereof without the prior written consent of the Owner and a sale, transfer or assignment of shares in the Contractor which results in a change in the control of that Contractor different from that which exists at the date hereof shall be deemed an assignment of this Contract and the consent of the Owner to such sale, transfer or assignment shall be required.

GC 2.1 AUTHORITY OF THE CONSULTANT

Delete GC 2.1.3 and replace with the following:

2.1.3 If the employment of the Consultant is terminated, the Owner shall immediately appoint or reappoint another Consultant whose status under the Contract Documents shall be that of the former Consultant.

GC 3.1 CONTROL OF THE WORK

Add the following as GC 3.1.3:

3.1.3 In order to minimize interference with the operation of the Airport and inconvenience to passengers and all other persons within the Airport premises, the Contractor will perform the Work or parts thereof on weekends or nights and during the week in accordance with the Plan of Construction Operations (PCO) or as otherwise required by the Consultant.

GC 3.5 CONSTRUCTION SCHEDULE

Delete GC 3.5.1.1 and replace with the following:

3.5.1.1 Prepare and submit to the Consultant within fifteen (15) days after the Contract is awarded to the Contractor, a construction schedule that indicates the timing of the major activities of the Work and various stages thereof and provides sufficient detail of the critical events and their inter-relationship to demonstrate, to the satisfaction of the Consultant, that the Work and the stages thereof will be performed in conformity with the Plan of Construction Operations.

GC 3.9 LABOUR AND PRODUCTS

Delete GC 3.9.1 and replace with the following:

3.9.1 Unless otherwise specified in the Contract Documents, the Contractor shall provide and pay for labour, Products, tools, Construction Equipment, water, heat, light, power, transportation and other facilities and services necessary for the performance of the Work in accordance with the Contract.

GC 3.12 USE OF THE WORK

Add the following as GC 3.12.3:

3.12.3 The Owner reserves the right to take possession and use any completed or partially completed portion of the Work regardless of the time of completion of the entire Work, provided that doing so does not interfere with the balance of the Contractor's Work. Such taking possession or use of the Work or part thereof shall not be construed as Substantial Performance of the Work or part thereof or as final certificate of payment or as an acknowledgement of fulfillment of the Contract. If the Owner takes possession and uses any completed or partially completed portion of the Work the one (1) year

Warranty referred to in GC 12.3.1 relating to such part of the Work is one (1) year from the date the Owner takes possession and uses any completed or partially completed portion of the Work.

Add the following as GC 3.12.4:

3.12.4 The Contractor shall comply with all reasonable requirements of the Owner relating to the safety and protection of the Airport and the management and operation of the Airport and all security regulations and procedures established by the Owner and the Department of Transport with respect to the security at the Airport and shall comply with all the terms, conditions and provisions contained in the Plan of Construction Operations (PCO).

GC 5.4 BASIS OF PAYMENT FOR COST PLUS WORK

Cost Plus Work is not anticipated during this project. If all other payment methods for extra work fail for any reason, Cost Plus Payment may be utilized including a combined Contractor's overhead and profit of 10% of the sum of the expenses referred to in GC 5.4.2.

GC 5.6 PROGRESS PAYMENTS

Delete GC 5.6.1 and replace with the following:

5.6.1 The Consultant will issue to the Owner, no later than fifteen (15) Working Days after the receipt of an application for payment from the Contractor submitted in accordance with GC 5.5 - APPLICATIONS FOR PROGRESS PAYMENT, approval for payment in the amount applied for or in such other amounts as the Consultant determine to be properly due. If the Consultant amends the application, the Consultant will promptly notify the Contractor in writing giving reasons for the amendment.

Delete GC 5.6.2 and replace with the following:

5.6.2 The Owner shall make payment to the Contractor on account as provided in Article A-5 of the Agreement - PAYMENT, no later than the last Working Day of the month following the month the Contractor applies for payment pursuant to GC 5.5.

Add the following as GC 5.6.4:

5.6.4 Without restricting any right of setoff given or implied by law, the Owner may setoff against any amount payable under the Contract Documents to the Contractor any amount payable to the Owner by the Contractor.

GC 5.10 FINAL PAYMENT

Modify GC 5.10.4 as follows:

5.10.4 Delete 5 Working Days and replace with fifteen (15) Working Days.

GC 6.5 DELAYS

Delete the last sentence of GC 6.5.1 and replace with the following:

6.5.1 The Contractor shall be reimbursed by the Owner for reasonable costs incurred by the Contractor as a result of such delay except where the Owner requires that the execution of the Work be suspended pursuant to GC 7.1.7 and GC 7.1.8 and in that event the Contractor will be entitled to compensation for standby time only as referred to in GC 7.1.9.

Delete the last sentence of GC 6.5.3 and replace with the following:

6.5.3 The Contractor shall not be entitled to payment for costs, losses or expenses incurred by the delays referred to in GC 6.5.3.1 and shall not otherwise be entitled to payment for reasonable costs incurred by the delays referred to in GC 6.5.3.2, GC 6.5.3.3 and GC 6.5.3.4 unless such delays results from actions by the Owner.

Delete GC 6.5.4 and replace with the following:

6.5.4 No extension shall be made for delay and no payment on account of any delay shall be paid unless notice in writing of the claim is given to the Consultant not later than ten (10) Working Days after the commencement of delay, provided however, that in the case of a continuing cause of delay only one notice of claim shall be necessary.

Add the following as GC 6.5.6:

6.5.6 In the event of a shut down of the Work, the Contractor shall, at no cost to the Owner, be responsible for the care, maintenance and protection of the Work for the entire period of the shut down.

Add the following as GC 6.5.7:

6.5.7 Where, in the opinion of the Consultant, the rate of progress of Work is insufficient to enable the Work or certain stages thereof to be completed in the manner and by the dates specified in the schedules referred to in GC 3.5.1.1, the Contractor shall take all necessary steps that the Consultant requires in writing to expedite the progress of the Work.

Add the following as GC 6.5.8:

6.5.8 Time is of the essence of the Contract.

Add the following as GC 6.5.9:

6.5.9 If the completion of the Work or certain stages thereof is not achieved on the dates specified in the schedules referred to in GC 3.5.1.1 for reasons that are attributable to the Contractor or its Subcontractors or suppliers or where there is not Substantial Performance of the Work for reasons that are attributable to the Contractor or its Subcontractors or suppliers but is subsequently completed, the Contractor shall pay to the Owner for the period of delay all costs and expenses incurred by the Owner as a result of such delays.

GC 7.1 OWNER'S RIGHT TO PERFORM THE WORK, STOP THE WORK OR TERMINATE THE CONTRACT

Add the following as GC 7.1.7:

7.1.7 If the Owner is of the opinion that execution of the Work should be stopped due to an emergency or for safety or security reasons or to protect the Airport, the Consultant may require the Contractor to suspend execution of the Work for either a specified or unspecified period by giving written notice to the Contractor.

Add the following as GC 7.1.8:

7.1.8 The Contractor, upon receiving notice from the Consultant of the Owner's requirement pursuant to GC 7.1.7, shall immediately suspend all operations except those which, in the Consultant's opinion, are necessary for the care and preservation of the Work and the Product. During the period of suspension the Contractor shall remain responsible for the Work and the Product to the same extent as if there was no suspension.

Add the following as GC 7.1.9:

7.1.9 During the period of suspension the Contractor shall not be entitled to payment for costs or expenses incurred as a result of such suspension except for the Contractor's entitlement to compensation for standby time as referred to in the Specifications (01801).

Add the following as GC 7.1.10:

7.1.10 Upon the Owner being satisfied that the issues relating to emergency, safety, security or Airport protection have been settled, the Consultant shall give notice to the Contractor that the period of suspension has expired and the Contractor shall forthwith thereafter resume the execution of the Work.

GC 11.1 INSURANCE

Delete GC 11.1.1 and replace with the following:

11.1.1 Without restricting the generality of GC 12.1 - INDEMNIFICATION, the Contractor shall provide, maintain and pay for the following insurance coverage:

A. "All Risks" Contractor's Equipment Insurance for full replacement cost covering any owned and non-owned mobile equipment, property and construction or testing tools, and, machinery and equipment used by the Contractor in the performance of the Work, including boiler insurance on temporary boilers and pressure vessels, if applicable.

B. Automobile and Aircraft Liability Insurance with respect to automobiles and aircrafts (if any) used directly or indirectly in the performance of the Work which are owned, leased chartered or used by the Contractor and covering liability for:

- Bodily injury;
- Death; and
- Damage to property

with a limit of not less than $5,000,000.00 inclusive for each and every loss.

Such policy may contain exclusionary language relative to liability incurred while vehicles are operating within airside.

C. The foregoing policies, with the exception of ICBC automobile coverage, shall:
- Contain a waiver of subrogation in favour of the Owner and all persons with whom the Owner may be participating in the Project of which the Work may be the whole or a part;
- Be endorsed or provide the Owner with no less than sixty (60) days' prior notice by registered mail in advance of cancellation;
- Be primary and non- contributing to any other insurance available to the Owner, except as noted in "B" above;
- Be maintained continuously from the commencement of the work until ten (10) days following the date of the Total Performance of the Work.

Delete GC 11.1.2 and replace with the following:

11.1.2 Prior to commencement of the Work and upon the placement, renewal, amendment or extension of all or any part of the above insurance, the Contractor shall promptly provide the Consultant or Owner with confirmation of coverage and, if required, a certified true copy of the policy certified by an authorized representative of the Insurer together with copies of any amending endorsements. All insurance and policies shall be with insurers approved by and in a form acceptable to the Consultant or Owner.

Delete GC 11.1.3 and replace with the following:

Add the following as GC 11.1.6:

11.1.6 The party found to be at fault for any claim(s) will be responsible for payment of any and all applicable deductible(s).

Add the following as GC 11.1.7:

11.1.7 It is the responsibility of the party relying on the insurance coverage referred to above to review the actual policy documents to determine the actual extent of coverage provided and to confirm all limits, terms, conditions and exclusions. In the event of any error in the description of the coverage, explicit or implied, or any discrepancy whatsoever between the insurance coverage referred to herein and the policy documents, the latter shall prevail. The Owner or its directors, officers, employees or agents are not responsible for any error, omission or misstatement of any nature arising out of or contained in this GC 11.1.

GC 11.2 CONTRACT SECURITY

Delete GC 11.2.1 and replace with the following:

11.2.1 The Contractor shall, prior to commencement of the Work, purchase, provide and maintain:
(a) Performance Bonds being no less than fifty percent (50%) of the contract amount, and,
(b) Labour and Material Payment Bonds being no less than fifty percent (50%) of the of the contract amount.

Delete GC 11.2.2 and replace with the following:

11.2.2 Such bonds shall be issued by a duly licensed surety company authorized to transact a business of suretyship in the province or territory or Place of the Project and shall be maintained in good-standing until the fulfilment of the Contract. All such bonds shall be in a form acceptable to and approved by the Owner and Her Majesty and both the Owner and Her Majesty shall be named as obligees pursuant to such bonds or such bonds shall, with the consent of the bonding company, be validly assigned to the Owner and Her Majesty.

The language in the Multiple Obligee Rider form must conform to the example in Attachment C, in wording and form.

GC 12.1 INDEMNIFICATION

Delete GC 12.1.1 and replace with the following:

12.1.1 The Contractor shall indemnify and hold harmless Her Majesty, the Owner and Consultant, its agents and employees from and against claims, demands, losses, costs, damages, actions, suits or proceedings (herein called “claims”) by third parties that arise out of, or are attributable to the Contractor’s performance of the Contract provided such claims are:

.1 attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property; and

.2 caused by negligent acts or omissions of the Contractor or those directly employed or engaged by the Contractor and for whose acts the Contractor may be liable;

.3 made in writing within a period of six (6) years from the date of Substantial Performance of the Work as set out in the certificate of Substantial Performance of the Work, or within such shorter period as may be prescribed by any limitation statute of the province or territory of the Place of the Work.

The Owner expressly waives the right to indemnify for claims other than those stated above.

Modify GC 12.1.2 as follows:

12.1.2 Delete $2,000,000.00 and replace with $5,000,000.00.

GC 12.2 WAIVER OF CLAIMS

Delete GC 12.2.1, GC 12.2.2 and GC 12.2.3.

Add as Part 13:

PART 13 - ACCELERATION OF THE WORK

13.1 The Owner may, at any time, give written direction to the Contractor for the Contractor to accelerate the Work in which the Contractor shall use his reasonable best efforts which may include hiring additional labour and equipment and/or working additional hours except where to proceed with the Work more quickly. If at the time of such direction by the Owner:

(i) The Contractor is behind the construction schedule due to a cause within the control of the Contractor, then the cost of such acceleration shall be borne by the Contractor;

(ii) the Contractor is not behind the construction schedule or is not behind due to a cause within the Contractor's control, then the cost of such acceleration shall be for the account of the Owner.

Add as Part 14:

PART 14 - SEVERABILITY

14.1.1 Any provision of this Contract which is found to be illegal, invalid, void, prohibited or unenforceable will be:

(a) Separate and severable from this Contract; and

(b) Ineffective to the extent of such illegality, invalidity, avoidance, prohibition or unenforceability,

without affecting any of the remaining provisions of this Contract which will remain in force, be binding upon the parties and be enforceable to the full extent of the law.

END OF SECTION

REHABILITATION OF APRON I PCC PANELS

INDEX TO SPECIFICATIONS

Prince George Airport

END OF SECTION

PART 1 - - GENERAL

1. RELATED SECTIONS

.1 Section 01 35 13.13 – Special Project Procedures: Airport in Use

2. WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises of Apron I concrete aircraft parking stands full depth replacement and partial depth repairs on portions of the approximate 252 concrete panels constructed in 1986 and 2003. The work also includes sawcutting and joint sealing of all of the 252 panel joint area. Work to be undertaken includes, but is not limited to the following:

.1 Coordination with the Prince George Airport Authority and Airport Security to schedule the Commissionaires, airside access, closures and general airside movements.

.2 Sawcut and remove selected existing concrete panels full depth, prepare underlying gravel subgrade, install bond breaker, epoxy coated dowels and construct new full depth concrete panels (Owner supplied epoxy coated dowels and baskets);

.3 Sawcut and remove selected areas of existing concrete panels partial depth, prepare underlying concrete substrate, install concrete repair product;

.4 Sawcut and remove partial depth of existing concrete manhole top, prepare underlying concrete substrate, install steel reinforcement and install concrete repair product;

.5 Remove existing joint sealant and back rod, sawcut, clean and install new backer rod and concrete joint sealant;

.6 Provide and remove temporary line markings;

.7 Paint permanent line markings;

.8 Temporary fencing with red obstruction lights;

.9 Survey layout and quantities;

.10 Quality control testing.

3. CONTRACT METHOD

.1 Construct Work under unit price contract.

4. WORK SEQUENCE

.1 Construct Work in stages as shown on the drawings to provide for continuous airport usage. Do not close off public usage of facilities until use of one stage of Work will provide alternate usage.

.2 Maintain fire access/control.

5. OWNER OCCUPANCY

.1 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

6. OWNER FURNISHED ITEMS

.1 Owner furnished items are as identified in tender documents and are as follows:

.1 Temporary plastic low barricades, fillable with water to provide resistance to movement by jet blast.

.2 Steady burning red lights (solar powered) for above low barricades and/or Contractor supplied temporary 1.8m high fencing.

.3 Epoxy coated dowels and baskets for the Work.

7. EXISTING SERVICES

.1 Notify the Owner and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give the Owner 72 hours' notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by Owner with minimum disturbance to operation.

.3 Submit schedule to and obtain approval from Owner for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

.4 Where unknown services are encountered, immediately advise Engineer and confirm findings in writing.

.5 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

.6 Record locations of maintained, re-routed and abandoned service lines.

8. DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:

.1 Contract Drawings;

.2 Specifications;

.3 Addenda;

.4 Approved Plan of Construction Operations (PCO);

.5 Reviewed Shop Drawings and Submittals;

.6 List of Outstanding Shop Drawings;

.7 Change Orders;

.8 Other Modifications to Contract;

.9 Field Test Reports;

.10 Copy of Approved Work Schedule;

.11 Health and Safety Plan and Other Safety Related Documents;

.12 Other documents as specified.

PART 2 - PRODUCTS

1. NOT USED

PART 3 - EXECUTION

1. NOT USED

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 32 16.07 – Construction Progress Schedules - Bar (GANTT) Chart.

.2 Section 01 35 13.13 – Special Project Procedures: Airport in Use.

1.2 ACCESS AND EGRESS

.1 Maintain temporary "access to" and "egress from" work areas, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.3 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Owner to facilitate work as stated.

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Use of site shall be limited to the designated areas by work and storage.

.4 Where security is reduced by work provide temporary means to maintain security.

.5 Closures: protect work temporarily until permanent enclosures are completed.

1.4 EXISTING SERVICES

.1 Notify, the Owner and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Owner 72 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.

.3 Provide for personnel pedestrian and vehicular traffic.

.4 Construct barriers in accordance with the Plan of Construction (PCO) Drawings.

1.5 SPECIAL REQUIREMENTS

.1 Submit schedule in accordance with Section 01 32 16.07 – Construction Progress Schedules - Bar (GANTT) Chart.

.2 Ensure that Contractor personnel employed on site become familiar with and obey regulations including the PCO, safety, fire, traffic, and security regulations.

.3 Keep within limits of work and avenues of ingress and egress.

.4 Ingress and egress of Contractor vehicles at site is limited to those indicated by the Plan of Construction Operation, and may only be allowed under escort.

1.6 SECURITY ESCORT

.1 Personnel employed on this project must be escorted when executing work in airside areas. Personnel must be escorted in all areas after normal working hours.

.2 The Owner will provide the security escort personnel at no cost to the Contractor however the Contractor must coordinate provide minimum 72 hours' notice to schedule the security staff.

1.7 NON-SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not allowed anywhere on the airside of airport.

Part 2 PRODUCTS

2.1 NOT USED

Part 3 EXECUTION

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 CASH ALLOWANCES

.1 Include in Tender Price specified cash allowances.

.2 Cash allowances, unless otherwise specified, cover net cost to the Contractor of services, products, construction machinery and equipment, freight to the Prince George Airport, handling, unloading, storage, installation and other authorized expenses incurred in performing Work including Provincial Sales Tax (PST) if applicable.

.3 Tender Price, and not cash allowance, includes Contractor's overhead and profit in connection with such cash allowance.

.4 Tender Price will be adjusted by written order to provide for excess or deficit to each cash allowance.

.5 Where costs under a cash allowance exceed amount of allowance, the Contractor will be compensated for any excess cost incurred and substantiated plus a 10% allowance on the excess amount to cover Contractor handling costs.

.6 Include progress payments on accounts of work authorized under cash allowances in Consultant's monthly certificate for payment.

.7 Prepare schedule jointly with Consultant to show when items called for under cash allowances must be authorized by Consultant for ordering purposes so that progress of Work will not be delayed.

.8 Cash allowances for Work specified in the Contract Documents are as follows:

.1 Security Escorts – A cash allowance has been provided to cover the provision of security escorts for the project. The Contractor shall be responsible for payment of the security escorts and escort vehicle based on submitted timesheets approved by the Consultant.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

.1 This section specified requirements for project meetings including the pre-construction, progress and safety meetings as required by the Contract Documents or as required by the Consultant or Owner.

2. ADMINISTRATIVE

.1 The Consultant shall schedule and administer project and safety meetings throughout the progress of the work.

.2 Provide physical space and make arrangements for meetings.

.3 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.4 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants and affected parties not in attendance.

.5 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

3. PRECONSTRUCTION MEETING

.1 Immediately upon issuance of “Issued for Construction” drawings, the Consultant will schedule a meeting of parties in the contract to discuss and resolve administrative procedures and responsibilities.

.2 Senior representatives of the Owner, the Consultant, Contractor, major Subcontractors, field inspectors, supervisors, and others as required will be in attendance.

.3 Meeting will be held within five days of issuance of “IFC” drawings.

.4 Establish time and location of meeting and notify parties concerned minimum five days before meeting.

.5 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.6 Agenda to include:

.1 Appointment of official representative of participants in the Work;

.2 Schedule of Work and progress scheduling;

.3 Discussion of safety;

.4 Discussion of Plan of Construction Operations (PCO) and work restrictions;

.5 Schedule of submission of shop drawings, samples. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures;

.6 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities;

.7 Delivery schedule of specified equipment;

.8 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements;

.9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures;

.10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals;

.11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals;

.12 Monthly progress claims, administrative procedures, photographs, and hold backs;

.13 Appointment of inspection and testing agencies or firms;

.14 Insurances, transcript of policies;

.15 Record drawings.

4. PROGRESS MEETINGS

.1 During course of Work, the Consultant will schedule progress/safety meetings weekly.

.2 Contractor, major Subcontractors involved in Work, the Consultant and/or representative(s) and affected airport users are to be in attendance.

.3 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within three days after meeting.

.4 Agenda to include the following:

.1 Review, and approval of minutes of previous meeting;

.2 Review of Work progress since previous meeting;

.3 Review safety concerns;

.4 Field observations, problems, conflicts;

.5 Problems which impede construction schedule;

.6 Review of off-site fabrication delivery schedules;

.7 Corrective measures and procedures to regain projected schedule;

.8 Revision to construction schedule;

.9 Progress schedule, during succeeding work period;

.10 Review submittal schedules: expedite as required;

.11 Maintenance of quality standards;

.12 Review proposed changes for effect on construction schedule and on completion date;

.13 Other business.

END OF SECTION

PART 1 - GENERAL

1. RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

2. DEFINITIONS

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: original accepted plan (for project, work package, or activity), plus or minus accepted scope changes.

.4 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.5 Master Plan: summary-level schedule that identifies major activities and key milestones.

.6 Milestone: significant event in project, usually completion of major deliverable.

.7 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.8 Project Planning, Monitoring and Control System: overall system operated by Consultant to enable monitoring of project work in relation to established milestones.

3. REQUIREMENTS

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

4. SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit to Consultant within 5 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

5. PROJECT MILESTONES

.1 Project milestones form interim targets for Project Schedule.

6. PROJECT SCHEDULE

.1 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

.1 Award;

.2 Shop Drawings, Samples;

.3 Permits;

.4 Mobilization;

.5 Removals;

.6 Earthworks;

.7 Granular;

.8 Concrete Paving;

.9 Asphalt Paving;

.10 Pressure Grouting;

.11 Line Painting;

.12 Testing and Commissioning;

.13 Supplied item required dates.

7. PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

8. PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current accepted dates shown on baseline schedule.

.2 Weather related delays with their remedial measures will be discussed and negotiated.

PART 2 - PRODUCTS

1. NOT USED

PART 3 - EXECUTION

1. NOT USED

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

.1 This section specifies general requirements and procedures for Contractor's submissions of shop drawings, product data, samples and mock-ups to the Consultant for review.

2. ADMINISTRATIVE

.1 Submit to the Consultant submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal 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 the Consultant. 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 considered rejected.

.6 Submittals shall be in a reproducible or electronic form acceptable to the Consultant. Facsimile versions of submittals are not acceptable

.7 Notify the Consultant, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.8 Verify field measurements and affected adjacent Work are co-ordinated.

.9 Contractor's responsibility for errors and omissions in submission is not relieved by the Consultant's review of submittals.

.10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by the Consultant review.

.11 Keep one copy of each submission, reviewed and accepted, on site.

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 Submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in Province of British Columbia, Canada.

.3 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 co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow eight days for the Consultant's review of each submission.

.5 Adjustments made on shop drawings by the Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the Consultant prior to proceeding with Work.

.6 Make changes in shop drawings as the Consultant may require, consistent with Contract Documents. When resubmitting, notify the Consultant in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter 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.

.8 Submissions 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;

.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.

.9 After the Consultant's review, distribute copies.

.10 Submit electronic copy of shop drawings for each requirement requested in specification sections and as the Consultant may reasonably request.

.11 Submit electronic copy of product data sheets or brochures for requirements requested in specification sections and as requested by the Consultant where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit electronic copy of test reports for requirements requested in specification Sections and as requested by the Consultant.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within three years of date of contract award for project.

.13 Submit electronic copy of certificates for requirements requested in specification Sections and as requested by the Consultant.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit electronic copy of manufacturers' instructions for requirements requested in specification Sections and as requested by the Consultant.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by the Consultant.

.1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.16 Submit electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by the Consultant.

.17 Delete information not applicable to project.

.18 Supplement standard information to provide details applicable to project.

.19 If upon review by the Consultant, no errors or omissions are discovered or if only minor corrections are made, copy 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.

4. SAMPLES

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to the Consultant's site office.

.3 Notify the Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Adjustments made on samples by the Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the Consultant prior to proceeding with Work.

.5 Make changes in samples, which the Consultant may require, consistent with Contract Documents.

.6 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

5. MOCK-UPS

.1 Not Used.

6. CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit WorkSafe BC status.

.2 Submit transcription of insurance and performance security immediately after award of Contract.

END OF SECTION

Part 1 GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Movement of equipment and other special procedures that must be considered when construction is being carried out while the airport facility is in use.

1.2 RELATED SECTIONS

.1 Transport Canada Aerodrome Standards and Recommended Practices, TP312E.

.2 Plan of Construction Operations (PCO).

1.3 MEASUREMENT FOR PAYMENT

.1 Mobilization and demobilization shall be measured per lump sum.

.1 The item shall consist of the mobilization and removal of all necessary equipment and facilities to the project site in preparation for the work to be done under the Contract.

.2 Payment will be made at the Contract lump sum price for item "Mobilization / Demobilization / Permits / Temporary Facilities/ Bonding/ Insurance". This price shall be full compensation for furnishing all labour, materials, tools, equipment, transportation, and incidentals necessary to complete this item as accepted by the Consultant.

.3 Partial payment for this item will be made only twice during the contract duration, as work progresses. The two partial payments will be made as follows:

.1 When 50 percent of the original contract amount is earned, 50 percent of the amount bid for this item will be paid.

.2 When 100 percent of the original contract amount is earned, 100 percent of the amount bid for this item will be paid.

.2 Temporary 1.8m high steel fencing shall be measured per lump sum.

.1 This item shall consist of supply of temporary 1.8m high steel fencing, installation to withstand jet blast/prop wash, winds, maintenance, and removal of temporary fencing at the end of the project. Steady burning solar red lights will be provided by the Owner, the Contractor shall secure and remove the lights to fencing as required.

.2 The Contractor shall relocate temporary steel fencing as specified in the Plan of Construction Operations for the work on various Sections, for the duration of the project.

.3 Payment will be made at the Contract lump sum price for item "Temporary Fencing". This price shall be full compensation for furnishing all labour, materials, tools, equipment, transportation, and incidentals necessary to complete this item.

1.4 GENERAL PROTECTION

.1 Do not disrupt airport business except as permitted by Consultant and stated in the approved PCO.

.2 Provide temporary protection for safe handling of public, personnel, pedestrians and vehicular traffic: to Section 01 56 00 - Temporary Barriers and Enclosures.

.3 Provide barricades and lights where directed.

1.5 MOVEMENT OF EQUIPMENT AND PERSONNEL

.1 In areas of airport not closed to aircraft traffic:

- .1 Obtain Consultant's approval on scheduling of Work.
- .2 Control movements of equipment and personnel as directed by the Airside Escort.
- .3 Obey directions from the Airside Escort instantly.
- .4 All construction activity is monitored by the airside escort. Airside Escort will be provided by the Owner.
- .5 All instructions from the airside escort regarding airport rules, safety and conduct while on airside are to be obeyed immediately.
- .6 All work must be planned and executed in conformance with the approved Plan of Construction Operations (PCO).

1.6 UNSERVICEABLE AREAS

.1 Mark off areas made unserviceable for aircraft by Work of this Contract by providing plainly visible danger markings by day and red lights by night.

.2 Open flames and inflammable fuels are not permitted.

.3 Mark with red lights as directed by Consultant.

.4 The Contractor will provide the taxiway closure marking(s). The Contractor shall place and maintain the taxiway closure marking as indicated in the PCO.

1.7 TRENCHING

.1 Not Used.

1.8 AIRPORT FACILITIES

.1 Coordinate with the Owner for permits and procedures to locate and / or disclose the underground facilities such as cables, pipes and ducts.

Part 2 EXECUTION

2.1 APPLICATION

.1 Temporary fencing and red lights must be of standard dimensions and placed in accordance with the Plan of Construction Operations and TP 312E, 4th Edition.

.2 Prevent fencing, low barriers and red lights from moving due to wind and jet blast.

END OF SECTION

Part 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies the requirements for protection of the environment during the execution of the Work.

1.2 REFERENCES

.1 Definitions:

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

.2 Reference Standards:

.1 All references to this Specifications, Standards, or Methods shall be understood to refer to the latest adopted revision, including all amendments.

.2 Canadian Construction Documents Committee (CCDC)

.1 CCDC 18.

.3 Canadian Environmental Assessment Act (CEAA 2012).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Prior to commencing construction activities or delivery of materials to site, provide Environmental Protection Plan for review and approval by Consultant.

.3 Ensure Environmental Protection Plan includes comprehensive overview of known or potential environmental issues to be addressed during construction.

.4 Address topics at level of detail commensurate with environmental issue and required construction task[s].

1.4 FIRES

.1 Fires and burning of rubbish on site not permitted.

1.5 DRAINAGE

.1 Provide temporary drainage and pumping required to keep excavations and site free from water.

.2 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.

.3 The Contractor shall ensure that water does not collect in excavations from rainfalls during working hours or after hours when the Contractor is not onsite.

.4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 WORK ADJACENT TO WATERWAYS

.1 Construction equipment to be operated on land only.

.2 Do not use waterway beds for borrow material.

.3 Waterways to be free of excavated fill, waste material and debris.

.4 Design and construct temporary crossings to minimize erosion to waterways.

.5 Do not skid logs or construction materials across waterways.

.6 Avoid indicated spawning beds when constructing temporary crossings of waterways.

1.7 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Control emissions from equipment and plant to local authorities' emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.

.1 Provide temporary enclosures where indicated and as directed by Consultant.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

.5 All spills of any nature must be reported to the Owner and cleaned up immediately to the satisfaction of the Owner.

1.8 NOTIFICATION

.1 Consultant will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Consultant of proposed corrective action and take such action for approval by Consultant.

.1 Do not take action until after receipt of written approval by Consultant.

.3 Consultant will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Part 2 PRODUCTS

2.1 NOT USED

Part 3 EXECUTION

3.1 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Bury of rubbish and waste materials on site are not permitted.

.3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

.1 This section specifies the requirements for the Quality Control and testing laboratory services to be provided by the Contractor during the execution of the work.

2. RELATED REQUIREMENTS SPECIFIED ELSEWHERE

.1 Particular requirements for inspection and testing designated by the Consultant to be carried out by testing laboratory are specified under various sections of the specifications.

3. REFERENCES

.1 All references to this Specifications, Standards, or Methods shall be understood to refer to the latest adopted revision, including all amendments.

4. MEASUREMENT PROCEDURES

.1 No separate payment will be made for quality control and/or testing laboratory services. Unit rates and lump sum price bid shall include all labour, materials, tools, equipment, etc. as required by the Contractor to complete the quality control testing as specified under the various sections.

.2 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 the Consultant may require verifying acceptability of corrected work.

5. CONTRACTOR'S RESPONSIBILITIES

.1 Quality control testing and testing laboratory services shall consist of but not limited to the following:

.1 Soil and aggregates density and moisture content testing.

.2 Density/compaction testing.

.3 Portland Cement Concrete quality control and product acceptance testing.

.4 Hot mix asphalt concrete quality control and product acceptance testing.

.5 All testing as specified under the various sections of the specifications.

.2 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.

.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 accepted by the Consultant.

6. INSPECTION

.1 Allow the Consultant 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.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or acceptance by the Consultant instructions, or law of Place of Work.

.3 If the Contractor covers or permits to be covered Work that has been designated for special tests, inspections or acceptance before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.4 Consultant will order 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.

7. INDEPENDENT QUALITY ASSURANCE INSPECTION AGENCIES

.1 Independent Quality Assurance Inspection/Testing Agencies will be engaged by the Consultant for purpose of inspecting and/or testing portions of Work.

.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 the Consultant at no cost to the Owner. Pay costs for re-testing and re-inspection.

8. 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.

9. PROCEDURES

.1 Notify appropriate agency and the Consultant 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 orderly sequence to not cause delays 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.

10. REJECTED WORK

.1 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 the Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of the Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by the Consultant.

11. REPORTS

.1 Submit one copy of inspection and test reports to Consultant, coincidental with the timing the Contractor receives same or as accepted by the Consultant.

.2 Provide copies to the subcontractor of work being inspected or tested.

12. TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

.2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by the Consultant and may be authorized as recoverable.

13. MILL TESTS

.1 Submit mill test certificates as required of specification sections.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

.1 This section specifies the requirements for temporary facilities during the execution of the Work.

2. REFERENCES

.1 All references to this Specifications, Standards, or Methods shall be understood to refer to the latest adopted revision, including all amendments.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 1.189 - 2000, Exterior Alkyd Primer for Wood.

.2 CGSB 1.59 - 97, Alkyd Exterior Gloss Enamel.

.3 Canadian Standards Association (CSA International)

.1 CSA-A23.1-14/ A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-0121 – M1978 (R2003), Douglas Fir Plywood.

.3 CAN/CSA-S269.2 M87 (R2003), Access Scaffolding for Construction Purposes.

.4 CAN/CSA-Z321-96 (R2006), Signs and Symbols for the Occupational Environment.

.4 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as of: May 14, 2004.

3. MEASUREMENT PROCEDURES

.1 Payment for construction facilities described herein shall be paid for under Section 01 35 13.13 – Special Procedures: Airports in Use.

4. SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

5. INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by the Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

.4 Provide construction facilities in order to execute work expeditiously.

.5 Remove from site all such work after use.

.6 Provide and maintain adequate access to project sites.

.7 In the event of snowfall, the Contractor shall provide snow removal as required during the period of work.

.8 Clean roads, runways, taxiways and apron areas where used by the Contractor's equipment and as directed by the Consultant.

6. SITE STORAGE/LOADING

.1 Confine work and operations of employees by the Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of the Work with weight or force that will endanger the Work.

7. CONSTRUCTION PARKING

.1 Designated parking space will be made available on site. Maintain and administer these spaces as directed.

.2 Provide and maintain adequate access to project site.

8. SECURITY

.1 Provide and pay for responsible security personnel to guard Contractor’s site and contents of site after working hours and during holidays, as appropriate.

9. EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in 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 manner to cause least interference with work activities.

.3 Provide adequate weather tight sheds with raised floors, for storage of materials, tools and equipment which are subject to damage by weather.

10. SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

11. CONSTRUCTION SIGNAGE

.1 No other signs or advertisements, other than warning signs, are permitted on site.

12. PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by the Consultant.

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

.4 Protect travelling public from damage to person and property.

.5 The Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.7 Construct access and haul roads necessary.

.8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

.9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.10 Dust control: adequate to ensure safe operation at all times.

.11 Location, grade, width, and alignment of construction and hauling roads: subject to acceptance by the Consultant.

.12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations as accepted by the Consultant.

.13 Provide snow removal during period of the Work.

.14 Remove, upon completion of work, haul roads designated by the Consultant.

13. CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

14. WATER SUPPLY

.1 Arrange, pay for and maintain temporary water supply in accordance with governing regulations and ordinances.

15. POWER

.1 Arrange, pay for and maintain temporary electrical power supply in accordance with governing regulations and ordinances.

.2 Install temporary facilities for power such as pole lines and underground cables to approval of local power supply authority.

PART 2 - PRODUCTS

1. NOT USED

PART 3 - EXECUTION

1. TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

PART 1 - GENERAL

1. REFERENCES

.1 Owner's identification of existing survey control points and property limits.

2. RELATED SECTIONS

.1 Section 01 78 00 – Closeout Submittals.

3. MEASUREMENT FOR PAYMENT

.1 Payment for construction and as-built surveys will be made at the contract lump sum price for “Construction Survey/ As-builts / Record Documents”. This price shall be full compensation for furnishing all labour, materials, tools, equipment, transportation and incidentals necessary to complete this item and shall include final submission of As-builts in AutoCad format as required by the Consultant.

4. QUALIFICATIONS OF SURVEYOR

.1 The Contractor shall supply a competent fully equipped survey crew to carry out work as listed below. Unsuitable or unqualified personnel shall be removed from the project and replaced immediately with qualified personnel.

5. SURVEY REFERENCE POINTS

.1 Existing base horizontal and vertical control points are designated on drawings.

.2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.3 Make no changes or relocations without prior written notice to the Consultant.

.4 Report to the Consultant when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.5 Costs to replace geodetic bench marks or legal survey pins as a result of Contractor negligence will be deducted from the Contractor’s payment. In particular, legal pins shall be laid out by a competent registered Canada Land Surveyor.

6. GENERAL REQUIREMENTS

.1 All layout of the Work shall be the responsibility of the Contractor.

.2 The Contractor shall set all Work stakes and/or marks necessary to complete the work and be responsible for the preservation of all stakes and marks. The layout of the Work shall be as required to ensure tolerances are achieved.

.3 The Consultant will furnish the Contractor with a complete set of construction drawings. The Contractor shall provide the Consultant with a copy of all vertical control grades as established from the information provided. Should the Contractor's survey utilize a control points network, the Contractor shall provide to the Consultant a copy of coordinates and elevations of the control points.

.4 If at any time during the progress of the Work any error shall appear or arise in the position, levels, dimensions or alignment of any part of the Work, the Contractor shall stop working on that portion of the Work and notify the Consultant. If the Contractor proceeds with the Work after a discrepancy is discovered, he does so at his own risk. The Contractor shall make allowances in his work schedule for delays of this nature and shall not claim or be paid for stand by or shut down.

7. CONSTRUCTION SURVEY LAYOUT

.1 The Contractor shall provide stakes and/or marks required to properly identify critical changes in transverse/ longitudinal slopes or grade breaks in addition to the intervals specified below for each material layer. **Nails are not permitted.**

.1 The Contractor shall provide asphalt and milling grades referenced to finished pavement elevations. The Contractor shall be responsible for establishing grades for cold milling and base and intermediate asphalt lifts as required. The interval for setting grades shall be 10 metres in the longitudinal direction of paving and 5 metres in the transverse direction and at each change in transverse slope and/or the width of the paving mat as agreed to by the Contractor and the Consultant. Tighter grades may be required in specific variable depth milling area.

.2 The interval for setting grades for Portland Cement Concrete (PCC) construction shall be the dimensions for each individual PCC panel, or in general a 5.000 or 6.000 metre grid.

.3 Table 1 consists of survey layout for miscellaneous items to be provided by the Contractor. Layout requirements may be changed as mutually agreed upon with the Contractor and the Consultant.

Table 1 – Survey Layout Provisions

ITEM	LOCATION LAYOUT	OFFSET LAYOUT	ELEVATION	COMMENTS
Paint Markings	√			Marks at 10 m intervals on tangent lines. Marks at 5 m intervals on curves. Marks to center or edge of numbers and letters.

8. CONTRACTOR'S RESPONSIBILITIES

.1 The Contractor must satisfy himself before commencing any work as to the meaning and intent of all marks and stakes. Should the Contractor discover or suspect any apparent error or omission in the Drawings, Specifications, stakes, marks, engineering tests, or other measurements done or provided by the Consultant, the Contractor shall immediately bring such apparent error or omission to the attention of the Consultant. The Consultant will make corrections and interpretations as may be necessary for the fulfillment of the intent of the Drawings and Specifications.

.2 The Contractor shall be responsible for transferring the information from the Drawings, Specifications, or other measurements provided by the Consultant for performance of the Work in accordance with the Contract Documents.

9. EXISTING SERVICES

.1 Before commencing work, coordinate with the Owner to establish location and extent of service lines in area of the Work.

.2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by the Consultant.

10. RECORDS

.1 Maintain a complete, accurate log of control, and survey work as it progresses.

.2 Record locations/elevations of maintained, re-routed, and abandoned service lines.

11. SUBMITTALS

.1 Submit name and address of the Surveyor to the Consultant.

.2 Throughout the duration of the project, the Contractor shall submit as-built survey information to the Consultant for review. In addition, upon completion of the project, the Contractor shall submit a complete set of markup drawings to the Consultant.

.3 On request of the Consultant, submit documentation to verify accuracy of field engineering work.

12. SUBSURFACE CONDITIONS

.1 Promptly notify the Consultant in writing if subsurface conditions at the Place of Work differ materially from those indicated in the Contract Documents, or a reasonable assumption of probable conditions based thereon.

.2 After prompt investigation, should the Consultant determine that conditions do differ materially; instructions will be issued for changes in the Work as provided in Changes and Change Orders.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

.1 This Section specifies the requirements for the cleaning of the project site and the completed work during the time of the Work and at the completion of the work.

2. REFERENCES

.1 All references to this Specifications, Standards, or Methods shall be understood to refer to the latest adopted revision, including all amendments.

3. MEASUREMENT PROCEDURES

.1 No separate payment will be made under this section. Include costs in the appropriate tender items.

4. GENERAL

.1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

.2 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.3 Dust control shall be exercised as required and as directed by the Consultant. Contractors shall supply the necessary water truck(s) as required for dust control purposes.

5. PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including other than that caused by the Owner or other Contractors.

.2 Clear snow and ice, and remove from site.

.3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.4 Provide on-site containers for collection of waste materials and debris.

.5 Provide and use marked separate bins for recycling.

.6 Dispose of waste materials and debris off site.

.7 For work on or around airside pavements, provide continuous cleaning of dust and debris as necessary to prevent damage to aircraft.

.8 Prevent materials and rubbish from blowing onto aircraft maneuvering areas and becoming a hazard to aircraft operations.

.9 The Contractor must demonstrate that he has sufficient equipment (pressure sprayers, vacuums, brushes, sweepers, trucks) and manpower to clean the asphalt and concrete and debris and slurry during sawcutting operations. The Contractor must also contain the slurry from flowing out of the specific site area during work operations.

.10 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

6. FINAL CLEANING

.1 When the Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining the Work.

.2 Remove waste products and debris, and leave the Work area clean.

.3 Prior to final review remove surplus products, tools, construction machinery, and equipment.

.4 Remove waste materials from site at regularly scheduled times or dispose of as directed by the Consultant. Do not burn waste materials on site.

.5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.6 Clean lighting reflectors, lenses, and other lighting surfaces.

.7 Remove dirt and other disfiguration from exterior surfaces.

.8 Sweep and wash clean paved areas.

.9 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

.10 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.11 Remove snow and ice.

.12 Underground drainage structures

.1 All underground pipes shall be flushed with water in the presence of the Consultant to remove any construction debris from the pipes.

.13 Manholes, Catch basins and Electrical Vaults.

.1 All debris and water shall be removed from the underground structure with a hydrovac unit at the completion of the project.

.14 Pavement Surfaces

.1 All pavements shall be cleaned of mud, cement slurry or other deleterious materials prior to final inspection.

.15 Landscaped Surfaces

.1 Rake surface to remove debris except in newly planted areas where debris shall be handpicked.

7. WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with governing agencies.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

.1 This Section specifies the requirements for the preparation of Project Record Documents by the Contractor for submission to the Consultant at the completion of the Work.

2. RELATED SECTIONS

.1 Section 01 71 00 – Examination and Preparation.

3. MEASUREMENT FOR PAYMENT

.1 Payment for closeout submittals described herein shall be paid for under Section 01 71 00 – Examination and Preparation.

4. ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to contract completion with the contractor's representative and the Consultant to:

.1 Verify Project requirements.

.2 Review manufacturer's installation instructions and warranty requirements.

.2 The Consultant is to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine reasonable response time.

.3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.

.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

5. ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Two weeks prior to Substantial Performance of the Work, submit to the Consultant, two final copies of operating and maintenance manuals in English.

.3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in the Work.

.4 Provide evidence, if requested, for type, source and quality of products supplied.

6. FORMAT

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings.

.1 Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems, under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab.

.1 Bind in with text; fold larger drawings to size of text pages.

.9 Provide as-built survey CAD files in *.dwg format on CD.

7. CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project;

.1 Date of submission, names.

.2 Addresses, and telephone numbers of Contractor with name of responsible parties.

.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

8. AS-BUILT DOCUMENTS AND SAMPLES

.1 The Consultant will provide one set of white prints for record drawing purposes.

.2 Maintain, in addition to requirements in General Conditions, at site for the Consultant one record copy of:

.1 Contract Drawings;

.2 Specifications;

.3 Addenda;

.4 Change Orders and other modifications to Contract;

.5 Reviewed shop drawings, product data, and samples;

.6 Field test records;

.7 Inspection certificates;

.8 Manufacturer's certificates.

.3 Store record documents and samples in field office apart from documents used for construction.

.4 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.

.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.5 Maintain record documents in clean, dry and legible condition.

.1 Do not use record documents for construction purposes.

.6 Keep record documents and samples available for inspection by the Consultant.

9. RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Maintain project record drawings and record accurately deviations from Contract documents.

.2 Record changes in red and submit set of prints to the Consultant at completion of the project.

.3 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

.4 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

.5 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.2 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.

.3 Field changes of dimension and detail.

.4 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.5 Field changes of dimension and detail.

.6 Changes made by change orders or field order.

.7 Details not on original Contract Drawings.

.8 References to related shop drawings and modifications.

.6 Specifications: 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.

.7 Other Documents: maintain the manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

.8 Provide digital photos, if requested, for site records.

10. FINAL SURVEY

.1 Submit final site survey drawings, certifying that elevations and locations of completed Work are in conformance, or non-conformance with the Contract Documents.

11. EQUIPMENT AND SYSTEMS

.1 Not Used.

12. DELIVERY, STORAGE AND HANDLING

.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 for review by the Consultant.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

.1 This section specifies the requirements for the supply and construction of formwork for Cast-In-Place and Concrete Paving concrete items as indicated by the Contract Documents or as directed by the Consultant.

2. RELATED SECTIONS

.1 Section 03 30 00 - Cast-in-place Concrete.

.2 Section 32 13 13 – Concrete paving.

3. REFERENCES

.1 All references to this Specifications, Standards, or Methods shall be understood to refer to the latest adopted revision, including all amendments.

.2 Canadian Standards Association (CSA International)

.1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-O86S1, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.

.3 CSA-O121-08 (R2013), Douglas Fir Plywood.

.4 CSA-O151-09 (R2014), Canadian Softwood Plywood.

.5 CSA-O153-13, Poplar Plywood.

.6 CAN/CSA-O325-07 (R2012), Construction Sheathing.

.7 CSA-O437 Series-93 (R2011), Standards for OSB and Waferboard.

.8 CAN/CSA-S269.3-M92 (R013), Concrete Formwork, National Standard of Canada

.3 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

4. MEASUREMENT FOR PAYMENT

.1 No measurement shall be made under this section. Include costs in items of work for which concrete formwork is required.

5. SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit shop drawings for formwork.

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada.

.3 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CAN/CSA-S269.3-M92 (R013) for formwork drawings.

.4 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

.5 Indicate sequence of erection and removal of formwork for review by the Consultant.

.6 When slip forming and flying forms are used, submit details of equipment and procedures for review by the Consultant.

6. DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with regulatory agencies.

.2 Place materials defined as hazardous or toxic in designated containers.

.3 Divert wood materials from landfill to a recycling facility as accepted by the Consultant.

.4 Divert plastic materials from landfill to a recycling facility as accepted by the Consultant.

.5 Divert unused form release material from landfill to an official hazardous material collections site as accepted by the Consultant.

PART 2 - PRODUCTS

1. GENERAL

.1 Products shall meet the standards set out in the referenced standards and requirements of this section.

2. MATERIALS

.1 Formwork materials:

.1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121-08 (R2013), CAN/CSA-O86S1, CSA O437 Series-93 (R2011), Series CSA-O153-13.

.2 For concrete with special architectural features, use formwork materials to CSA-A23.1-14/A23.2-14.

.3 Rigid insulation board: to CAN/ULC-S701-11.

.4 Formwork shall G1S exterior grade Douglas Fir Plywood, steel or other suitable form grade material. Forms shall not have patches, broken edges, or joint widths greater than 1.5 mm.

.2 Pan forms: permanent as indicated.

.3 Form ties:

.1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.

.2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.

.4 Form liner:

.1 Plywood: Douglas Fir to CSA-O121-08 (R2013), grade.

.2 Waferboard: to CAN/CSA-O325-07 (R2012).

.5 Form release agent

.1 Non-staining chemical type form release agent.

.6 Form stripping agent: colourless mineral oil, biodegradable, free of kerosene, with viscosity between 70 and 110 seconds Saybolt Universal, 15 to 24 mm^2/s at 40 ºC, flashpoint minimum 150 ºC, open cup.

PART 3 - EXECUTION

1. FABRICATION AND ERECTION

.1 The Contractor shall assume full responsibility for the structural adequacy of the forms to withstand all concrete and construction loads.

.2 Verify lines, levels and centres before proceeding with formwork and ensure dimensions agree with drawings.

.3 Obtain the Consultant's acceptance for use of earth forms framing openings not indicated on drawings.

.4 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

.5 Forms shall be constructed that the finished concrete will conform to the shape, dimensions and tolerances as specified.

.6 Refer to architectural drawings for concrete members requiring architectural exposed finishes.

.7 Do not place shores and mud sills on frozen ground.

.8 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.9 Fabricate and erect formwork in accordance with CAN/CSA-S269.3.3-M92 (R013) to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1-14/A23.2-14.

.10 Align form joints and make watertight.

.1 Keep form joints to minimum.

.11 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.

.12 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.13 Construct forms for architectural concrete, and place ties as indicated.

.1 Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.

.14 Clean formwork in accordance with CSA-A23.1-14/A23.2-14, before placing concrete.

.15 When slip forming is used, submit details as indicated in Part 1 Section 5 - Submittals.

2. REMOVAL AND RESHORING

.1 Forms shall not be removed until concrete has attained sufficient strength that no damage to strength or continuity of concrete will occur when forms are removed. Obtain acceptance from the Consultant prior to removing formwork.

.2 Remove forms in a manner to prevent damage to concrete. Use only wooden edges to wedge between the form and the concrete.

.3 Re-use formwork subject to requirements of CSA-A23.1-14/A23.2-14.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

.1 This section specifies the requirements for the supply and installation of reinforcing steel for the partial depth concrete top repair of a manhole as indicated by the Contract documents or as directed by the Consultant.

2. RELATED SECTIONS

.1 Section 03 10 00 – Concrete Forming And Accessories.

.2 Section 32 1313 – Concrete Paving.

3. MEASUREMENT PROCEDURES

.1 No measurement will be made under this Section.

.1 Include costs in items of work for which reinforcing steel is required.

4. REFERENCES

.1 All references to this Specifications, Standards, or Methods shall be understood to refer to the latest adopted revision, including all amendments.

.2 American Concrete Institute (ACI)

.1 SP-66, ACI Detailing Manual 2004.

.1 ACI 315, Details and Detailing of Concrete Reinforcement.

.2 ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.

.3 American Society for Testing and Materials International (ASTM)

.1 ASTM A143/A143M, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

.2 ASTM A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

.3 ASTM A497/A497M, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.

.4 ASTM A775/A775M, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

.4 Canadian Standards Association (CSA International)

.1 CSA-A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-A23.3-14, Design of Concrete Structures.

.3 CSA-G30.18-09, Carbon steel bars for concrete reinforcement.

.4 CSA-G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.5 CAN/CSA-G164-M92 (2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.6 CSA-W186-M1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.5 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC, Reinforcing Steel Manual of Standard Practice 2004.

5. SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and ACI 315.

.3 At least four weeks prior to commencing work provide to the Consultant.

.1 A certified copy of mill test report of reinforcing steel, showing physical and chemical analysis.

.2 Proposed source of material to be supplied.

.4 Submit shop drawings including placing of reinforcement and indicate:

.1 Bar bending details.

.2 Lists.

.3 Quantities of reinforcement.

.4 Indicate sizes, spacings, locations of chairs, spacers, and hangers.

.5 Detail lap lengths and bar development lengths to CSA-A23.3-14, unless otherwise indicated.

.1 Provide type A, B, C tension lap splices where indicated.

.6 When Chromate solution is used as replacement for galvanizing non-prestressed reinforcement, provide product description for review and acceptance by the Consultant prior to its use.

.7 Quality Assurance: in accordance with Section 01 45 00 – Quality Control and as described in Part 2, Section 3 – Source Quality Control.

.1 Mill Test Report: provide the Consultant with certified copy of mill test report of reinforcing steel, minimum four weeks prior to beginning reinforcing work.

.2 Submit in writing to the Consultant proposed source of reinforcement material to be supplied.

6. DELIVERY, STORAGE AND HANDLING

.1 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 Place materials defined as hazardous or toxic in designated containers.

PART 2 - PRODUCTS

1. MATERIALS

.1 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18-09, unless indicated otherwise.

.2 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA-G30.18-09.

.3 Deformed steel wire for concrete reinforcement: to
– ASTM A1064/A1064M

.4 Welded steel wire fabric: to ASTM A1064/A1064M –

.1 Provide in flat sheets only.

.5 Welded deformed steel wire fabric: to ASTM A1064/A1064M.

.1 Provide in flat sheets only.

.6 Epoxy Coating of non-prestressed reinforcement: to ASTM A775/A775M.

.7 Galvanizing of non-prestressed reinforcement: to included in A23.3-04 (R2010), minimum zinc coating 610 g/m^2.

.8 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2-14.

.9 Mechanical splices: subject to acceptance by the Consultant.

.10 Plain round bars: to CSA-G40.20/G40.21-13.

2. FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2-14, ACI 315 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.1 ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures unless indicated otherwise.

.2 Obtain Consultant's acceptance for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon acceptance by the Consultant, weld reinforcement in accordance with CSA-W186-1990 (R2012).

.4 Welding shall be performed by a company certified by the Canadian Welding Bureau in accordance with CSA-W47.1-09 (R2014).

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

.1 Ship epoxy coated bars in accordance with ASTM A775A/A775M.

3. SOURCE QUALITY CONTROL

.1 Provide the Consultant with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum four weeks prior to beginning reinforcing work.

.2 Inform the Consultant of proposed source of material to be supplied.

PART 3 - EXECUTION

1. PREPARATION

.1 Galvanizing to include chromate treatment.

.2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

2. PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2-14.

.2 Reinforcing steel shall not be spliced unless indicated by the Contract documents or accepted by the Consultant.

.3 Reinforcement of size and layout indicated by the Contract documents shall be accurately placed and aligned. Place all dowels accurately.

.4 Reinforcing steel shall be adequately supported by proper chairs, spacers, hangers, and ties to prevent movement during placement of concrete.

.5 Reinforcing steel shall be placed to meet standard tolerances.

.6 Use plain round bars as slip dowels in concrete.

.1 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.

.2 When paint is dry, apply thick even film of mineral lubricating grease.

.7 Prior to placing concrete, obtain the Consultant's acceptance of reinforcing material and placement.

.8 Ensure cover to reinforcement is maintained during concrete pour.

.9 Protect epoxy coated portions of bars with covering during transportation and handling.

3. FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

.1 This section specifies the requirements for supply and application of joint sealants as indicated by the Contract Documents or as directed by the Consultant.

2. RELATED SECTIONS

.1 Section 32 13 13 - Concrete Paving.

3. SUBMITTALS

.1 At least two weeks prior to commencing work submit the following to the Consultant.

.1 Manufacturer's test data and certification that the products supplied meet the requirements of this section.

.2 Submit samples of joint sealant and foam backer rod if requested by the Consultant.

4. MEASUREMENT PROCEDURES

.1 Payment for Sawcutting and Sealing of Joints shall be at the unit price bid per lineal metre. Measurement for payment shall be based on actual lineal metres of PCC/PCC and PCC/HMAC joint sealing constructed and accepted by the Consultant. No separate payment shall be made for extra sawcutting or joint sealing necessary to repair edges damaged by the Contractor. Payment at the tendered unit price shall be full compensation for sawcutting, removal of concrete laitance, cleaning of joints using high pressure washer, high pressure air lance, supply and installation of compatible backer rod and joint sealant, cleanup and other work incidental to this section.

.2 Payment for Sand blasting and Sealing of Joints shall be at the unit price bid per lineal metre. Measurement for payment shall be based on actual lineal metres of PCC/PCC and PCC/HMAC joint sealing constructed and accepted by the Consultant. No separate payment shall be made for extra sandblasting or joint sealing necessary to repair edges damaged by the Contractor. Payment at the tendered unit price shall be full compensation for sandblasting, removal of concrete laitance/dust, cleaning of joints using high pressure washer, high pressure air lance, protection of surrounding infrastructure, supply and installation of compatible backer rod and joint sealant, cleanup and other work incidental to this section.

PART 2 - PRODUCTS

1. MATERIALS

.1 Backer rod: to ASTM D5249 Type 1, non-gassing, heat-resistant, round foam rod, 12 mm diameter compatible with joint sealant.

.2 Joint sealant products are to be jet fuel resisitant and are as follows:

.1 PCC/HMAC: Crafco Roadsaver Silicone SL, or accepted equivalent.

.2 PCC/PCC: Crafco Roadsaver Silicone SL, or accepted equivalent.

.3 If accepted equivalent is hot poured jet fuel resistant sealant: to ASTM D3569.

PART 3 - EXECUTIONS

1. EQUIPMENT

.1 Not Used.

2. PREPARATION

.1 Saw cut new concrete joints to dimensions as shown on the drawings or specified by the Consultant.

.2 Remove all existing sealant by plow or other method, sand blast existing joints to remove any remaining residue to provide clean vertical surface for sealant to bond.

.3 Flush joints with water to remove saw slurry immediately after sawing.

.4 Clean and dry saw cut joints using lance with oil-free hot compressed air, applied at minimum pressure of 600 kPa.

.5 Follow manufacturer's specifications for any additional joint preparation requirements.

.6 Dispose of material removed from joints as directed by Consultant.

3. APPLICATION OF SEALANT

.1 Do not use sealant material that has been frozen.

.2 Install backer rod and apply sealant as per manufacturers' recommendations. Ensure joints are clean and dry immediately before installing backer rod and applying sealant.

.3 Fill joints with sealant immediately after cleaning. Maintain tip of cone or wand close to bottom of routed groove during filling.

.4 Fill joints only when air temperature is above 10°C, daily low temperature does not fall below 5°C, and no rain is forecast. Obtain acceptance from Consultant to apply joint jealant if temperature is below 10°C and expected to fall below 5°C.

.5 Pour sealant in joint so that cooled cured sealant fills crack from the bottom up to a level 6 mm below the pavement surface.

4. FINAL CLEANUP

.1 Upon completion and curing of the joint sealing compound, the Contractor shall remove all remaining concrete slurry and sandblasting sand from the pavement surface.

.2 The pavement surface shall be cleaned using high-pressure water; power brooms and vacuum trucks as required.

.3 Debris from the cleaning process shall not be allowed to flow into the drainage system including manholes, catch basins and drainage ditches.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

.1 This section specifies the requirements for cleaning of pavement surfaces and/or the removal of existing paint markings prior to painting new paint markings as shown in the Contract Documents or as directed by the Consultant.

2. RELATED SECTIONS

.1 Section 32 17 23 - Pavement Markings.

3. MEASUREMENT FOR PAYMENT

.1 No separate payment for pavement cleaning prior to painting or temporary tape installation will be made. Include cost in the appropriate line item.

4. WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.2 Place materials defined as hazardous or toxic in designated containers.

.3 Do not dispose of unused solvent materials into landfill. Divert materials to municipal hazardous materials depot as per governing agencies.

PART 2 - PRODUCTS

1. MATERIALS

.1 Abrasives and solvents used for removal of paint, oil, grease, curing compound, rubber deposits: proprietary products specially designed for pavement cleaning, subject to acceptance by Consultant.

PART 3 - EXECUTION

1. REMOVING PAVEMENT MARKINGS

.1 Remove rubber tire deposits and paint markings, in areas designated by Consultant, by water or shot blasting or other method acceptable to the Consultant.

.2 Exercise care to avoid dislodging of coarse aggregate particles, excessive removal of fines, damage to bituminous binder or damage to joint and crack sealers.

.3 Do not heat pavement surfaces above 120°C, when using heater planning equipment.

.4 Upon request of the Consultant perform demonstration of proposed method on a test section prior to commencing work. Modify procedures as directed by the Consultant if the pavement surface is damaged.

.5 Remove and dispose of debris created by the removal process.

2. PAVEMENT SURFACE CLEANING

.1 Remove sealing compound which has protruded excessively, where directed by Consultant. Dispose of removed material as directed by Consultant.

.2 Remove dust, contaminants, loose and foreign materials, oil and grease, in areas designated and by method acceptable to the Consultant.

.3 Methods of cleaning include using high pressure water, sand blasting and shot blasting.

.4 Obtain acceptance of the Consultant for proposed method prior to commencing work.

.5 Upon request of the Consultant perform a demonstration of proposed method on a test section prior to commencing work. Modify procedures as directed by the Consultant if the pavement surface is damaged.

.6 Remove and dispose of cleaning agents as directed by the Consultant.

.7 Do not allow debris or cleaning agents to enter drainage courses or storm sewer systems.

.8 Use rotary power brooms, vacuum sweepers supplemented by hand brooming.

END OF SECTION

PART 1 - GENERAL

1. SECTION INCLUDES

.1 Requirements for removal, producing and placing Portland Cement Concrete for airfield pavements such as PCC panels and concrete transitions to lines, grades and typical cross sections as indicated by the Contract Documents or as directed by the Consultant.

.2 Acceptance criteria, requirements for the remedying of defects and the Contractor's responsibilities in protecting the pavement until handover to the Owner are also included.

2. RELATED SECTIONS

.1 Section 01 32 16.07 - Construction Progress Schedule Bar (GANTT) Chart.

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 03 10 00 - Concrete Forming and Accessories.

.4 Section 03 30 20 - Sawcutting and Sealing of Airfield Panel Joints.

3. MEASUREMENT PROCEDURES

.1 Measure removal of existing concrete panels full depth in square meters. Payment under this item will include all equipment and operations involved in sawcutting full depths, protection of adjacent concrete and/or asphalt pavement structures, cleaning and disposal of laitance and disposal off-site, breaking as required and removing concrete full depth, sweeping, dust control, loading, hauling, stockpiling if required, cleaning and disposal off-site, tipping fees.

.2 Measure partial depth concrete repair in square metres. Payment includes sawcutting to depths required, concrete chipping/jack hammering, protection of underlying concrete substrate, disposal of concrete off-site, cleaning, priming, supply and installation of approved concrete repair product, spacer boards as required, mixing, finishing, curing, protection, loading, hauling, stockpiling if required, sweeping, cleaning, and all materials and labour required to complete this item.

.3 Portland Cement Concrete paving for panels shall be measured in square meters per the design thickness as shown on the drawings and square metres of actual surface area completed and accepted by the Consultant.

.1 Payment at the tendered unit price shall be full compensation for preparation of base, supply and installation of formwork, supply and installation of bond breaker materials, layout/drilling/epoxy, drilling, installation, placement, greasing and protection of epoxy coated smooth dowels/baskets, cutting of baskets if required, concrete mix design(s), supply (including some panels with synthetic microfiber concrete), testing, trial testing, placing, finishing, protection and curing of concrete, initial sawcutting of contraction joints as shown on the drawings and all other work incidental to this section. **(Epoxy coated dowels and baskets supplied by Owner).**

.2 A maximum payment of 75% for Portland Cement Concrete placed shall be made until all of the 28 day compressive and/or flexural strength test results are available and are acceptable to the Consultant.

4. REFERENCES

.1 All references to this Specifications, Standards, or Methods shall be understood to refer to the latest adopted revision, including all amendments.

.2 American Concrete Institute (ACI)

.1 ACI 306 R-10 Cold Weather Concreting

.2 ACI 305 R-10 Hot Weather Concreting

.3 American Society for Testing and Materials International, (ASTM).

.1 ASTM A775/A775M, Specification for Epoxy-Coated Reinforcing Steel Bars.

.2 ASTM C171, Specification for Sheet Materials for Curing Concrete.

.3 ASTM C260, Specification for Air-Entraining Admixtures for Concrete.

.4 ASTM C309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.5 ASTM C457/C457M, Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete.

.6 ASTM C494/C494M, Specification for Chemical Admixtures for Concrete.

.7 ASTM D1752, Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

.8 ASTM D2628, Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.

.9 ASTM D3569, Specification for Joint Sealant, Hot-Applied, Elastomeric, Jet-Fuel-Resistant Type for Portland Cement Concrete Pavements.

.10 ASTM D5329, Test Methods for Sealants and Fillers, Hot-Applied, For Joints and Cracks in Asphaltic and Portland cement Concrete Pavements.

.11 ASTM D6690, Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

.4 Canadian Standards Association (CSA International).

.1 CAN/CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

.2 CAN/CSA A3000-13, Cementitious Materials Compendium.

.3 CAN/CSA G30.18, Carbon Steel Bars for Concrete Reinforcement.

5. ACRONYMS AND TYPES

.1 Cement: hydraulic cement or blended hydraulic cement (XXb - where b denotes blended).

.1 Type GU or GUb - General use cement.

.2 Fly ash:

.1 Type F - with CaO content less than 15 %.

.3 GGBFS - Ground, granulated blast-furnace slag.

6. SUBMITTALS

The following items shall be submitted to the Engineer a minimum of two (2) weeks prior to installation of the concrete panels:

.1 Submittals in accordance with Section 01 33 00 – Submittal Procedures

.2 Aggregates

.1 Submit proposed source location and provide access for sampling if requested by the Engineer.

.2 Submit petrographic analysis of proposed aggregate(s). A qualified testing laboratory shall preform the petrographic analysis.

.3 Submit records of tests for compliance with standard requirements for deleterious materials and physical properties as specified in CAN/CSA A23.1, Table 12. The test results older than 12 months shall not be accepted.

.3 Mix Design

.1 At least two weeks prior to commencing work, provide the mix design for the concrete to be used in the construction of PCC airfield paving and results of trial mix design production for review prior to commencing work.

.2 Provide certification that the mix proportions will produce concrete of specified durability and yield and that strength will comply with CSA-A23.1.

.3 Mix design documentation shall include all components of the mix, quantities of materials used and all admixtures. Proprietary concrete mixes without mix design shall not be accepted.

.4 Submit verification that the mix design is adjusted to mitigate alkali aggregate reactivity (AAR) in accordance with CSA A23.2-27A. In the absence of expansion testing (CSA-A23.2-14A), aggregate should be considered moderately reactive and the level of prevention 5-75 years of service life.

.4 Material Certification

.1 Provide manufacturer's test data and certification by qualified independent inspection and testing laboratory that the following materials meet requirements of this section.

.1 Portland cement

.2 Supplementary Cementing Materials

.3 Admixtures

.4 Joint Fillers

.5 Curing Materials

.5 Paving Plan

.1 The Contractor shall submit a detailed paving plan to the Engineer for review and acceptance, detailing the following:

.1 A detailed plan illustrating sequence of pavement panel construction.

.2 A detailed concrete pavement construction schedule prepared in the format as described in Section 01 32 16.07 - Construction Progress Schedule Bar (GANTT) Chart.

.3 Contingency plans to deal with the interruption in concrete supply, breakdown of equipment and inclement weather conditions during paving operations.

.4 Modifications to the production and paving operation to accommodate production rates lower than the recommended minimum contained in this specification.

.5 Plan shall indicate proposed locations and methods to provide temporary drainage and pumping as necessary to keep site free from water. The plan shall also indicate proposed methods to prevent discharge of water containing suspended materials into watercourses, sewer and drainage systems.

.2 The paving plan shall only be changed upon review and acceptance from the Engineer.

.3 Acceptance of the plan by the Engineer will not relieve the Contractor of any responsibility in attaining a defect free product.

.6 Quality Control Plan

.1 The Contractor shall submit a detailed Quality Control plan for review and acceptance of the Engineer, detailing the following:

.1 Quality Control Roles and Responsibilities with stating names and roles of each person involved on Quality Control activities.

.2 Name of Quality Control testing firm / laboratory that is certified by CCIL, Category I with A23.2-3C and 8C.

.3 Documents control, storage and handling procedure.

.4 Testing, and reporting procedure for each material installed.

.5 Quality Control Sampling and Testing Schedule.

.2 Minimum requirements for quality control are provided in this Section.

.7 Concrete pours: submit accurate records of poured concrete items indicating date/time and location of pour, quality, air temperature and test samples taken as part of Quality Control testing.

.8 Concrete hauling time: maximum allowable time of 90 minutes for concrete to be delivered to site of Work and discharged after batching.

7. QUALIFICATIONS

.1 Installer: Company or persons specializing in Portland Cement Concrete paving with minimum five years concrete paving experience.

8. ENVIRONMENTAL REQUIREMENTS

.1 Commence placing operations only when air temperature is at or above 5 ºC and forecast is to remain at or above 5 ºC for 24 hours after completion of paving.

.2 The Consultant may direct that paving operations be suspended if weather patterns detrimental to pavement construction are encountered or forecasted.

.3 Refer to Annex D of CSA 23.1-09: Guidelines for Curing and Protection. When the evaporation rate exceeds 1.0 kg/m^2/hr, measures shall be taken to prevent excessive moisture loss from the surface of unhardened concrete; when the rate exceeds 0.5 kg/m^2/hr, such measures may be needed.

9. WASTE MANAGEMENT AND DISPOSAL

.1 Concrete washing and/or dumping on site is not acceptable.

10. CONCRETE BATCH PLANT PRODUCTION RECORDS

.1 For Ready-mix concrete batch plants, production records shall be made available to the Consultant upon request. The batch plant production record shall include the batch record for each individual load of concrete which shall include the following information.

.1 Delivery ticket number;

.2 Concrete mix design description;

.3 Design slump, mm, ± mm;

.4 Design air content, %, ± %, ± %;

.5 Design flexural strength, MPa;

.6 Batch time (of initial addition of water and cement);

.7 Start of mixing time;

.8 End of mixing time;

.9 Mixing time;

.10 Start of discharge time;

.11 Completion of discharge time;

.12 Truck number;

.13 Target and actual batch quantities for:

.1 Cement;

.2 Fly Ash;

.3 Water;

.4 Coarse aggregate(s);

.5 Fine aggregate(s);

.6 Admixtures;

.7 Aggregates moisture contents.

PART 2 - PRODUCTS

1. MATERIALS

.1 Hydraulic Cement: to CAN/CSA A3001, Type: GU or GUb.

.2 Fly ash: to CAN/CSA A3001, Type F.

.3 Aggregates: to CAN/CSA-A23.1-14 Table 12, and to following requirements. Adjust water as required to compensate for minor variations in aggregate moisture.

.1 Coarse aggregate:

.1 Combined grading of blended coarse aggregate to be within limits of Table 11 (Group 1) of CSA A23.1-14.

.2 Gradation: to CAN/CSA-A23.1, Table 11 (Group 1), nominal sizes 20 mm and 40mm aggregate for concrete pavement.

.2 Fine aggregate:

.1 Gradation: to CAN/CSA-A23.1, Table 10 and be within limits of FA1.

.4 Water for use in Portland cement concrete and for curing shall be clear and free from injurious amounts of oil, acid, alkali, soluble chlorides, organic matter, sediment, or any other deleterious substances. Water shall meet the requirements of CSA A23.1.

.5 Monomolecular film (Evaporation reducer) – Confilm by BASF, or accepted equivalent. Application in accordance with the manufacturer's recommendations.

.6 Curing compound: to ASTM C309, Type 2 (white pigmented), Class B.

.7 Joint sealant product shall be as per Section 03 30 20 – Sawcutting and Sealing of Airfield Panel

.8 Dowels and tie-bars: to CSA G30.18.

.1 Smooth Dowels: corrosion resistant, clean, straight and free from flattened or burred ends, plain round bars of grade 400 or better conforming to CSA-G30.18 and epoxy-coated to ASTM A775/A775M.

.2 Deformed Dowels: corrosion resistant, clean, straight and free from flattened or burred ends, of grade 400 or better conforming to CSA-G30.18 and epoxy-coated to ASTM A775/A775M.

.3 Tie-Bars: deformed steel bars of grade 400, in compliance with CSA G30.18 and epoxy-coated to ASTM A775/A775M.

.9 Protective covers and insulation for cold weather concreting: to CAN/CSA-A23.1, Section7.7.3.4.2.

.10 Hot weather concreting: to CAN/CSA-A23.1-14, Section7.7.3.4.1

.11 Chairs, bolsters, bar supports and spacers to CSA A23.1 and as indicated by the Contract Documents.

.12 Adhesive for anchoring dowels and tie-bars to existing concrete shall be:

.1 Acrylic adhesive / epoxy pressure injected using a dual component injection gun with mixing at the nozzle.

.13 Material used for edge spall repairs shall be compatible with the concrete mix used for paving and shall be reviewed for acceptance by the Engineer, prior to use.

2. MIXES

.1 Concrete mix design to be reviewed by the Engineer and shall comply with the CSA A23.1, Table 1, Table 2 and Table 4 requirements for class of exposure C-2, non-structurally reinforced concrete exposed to chlorides with or without freezing and thawing conditions. Additional requirements in Part 2, Section 2.3.

.2 Mix Properties

.1 Use Type GU (general use hydraulic cement with a minimum **cement** content 310 kg/m^3

.2 Fly ash Type F shall be utilized in concrete mix to minimize shrinkage and curling of concrete pavements, up to 20% by total mass of cementing materials.

.3 Maximum water to cementing materials ratio 0.45.

.4 Air content when tested in accordance with CAN/CSA-23.2-4C, immediately after discharge: 5% to 8% for 20mm aggregate or 4% to 7% for 40mm aggregate.

.5 Slump at point of final placement, when tested in accordance with CSA A23.2-5C to be:

.1 20 mm ± 10 mm for slip form paving.

.2 45 mm ± 15 mm for fixed form paving with mechanical paver.

.3 80 mm ± 20 mm for hand placing when accepted by the Engineer.

.3 Mix performance

.1 Flexural strength when tested in conformance with CSA-A23.2 – 8C: at 28 days, Modulus of Rupture to be 4.2 MPa.

.2 Compressive strength when tested in accordance with CAN/CSA-23.2 – 9C: average 28 day compressive strength to be minimum 32 MPa. The design of 28 day compressive strength shall be established on the trial batch testing to develop the relationship between compressive strength and specified flexural strength. Higher compressive strength than that for Class C-2 may be required to meet flexural strength requirements.

.3 Maximum spacing factor (ASTM C457) – 0.230 mm. No single test with the spacing factor more than 0.230mm will be accepted. The provision of CSA A23.1-09, Section 4.3.3.3.a shall not apply.

.4 Minimum air content in hardened concrete – 3%.

.5 The results obtained by computerized air-void analyzers shall not be accepted.

3. TRIAL MIXES

.1 As soon as possible after commencement of the Contract, the Contractor shall undertake laboratory and plant/equipment trial mixes complying with the requirements of this specification. These results of these trial mixes shall satisfy the Consultant that the materials and designed concrete mix will be capable of proper consolidation, by machine or hand methods, for its full depth and the specified flexural and compressive strengths will be obtained. The Contractor shall pay for all costs associated with the trial mixes.

.2 Trial mixes shall be used to develop the relationship between modulus of rupture and compressive strength when tested in accordance with CSA A23.2 at ages of 3, 7 and 28 days. A minimum of 3 test beams and 3 test cylinders shall be made for each trial mix and tested at the described frequency, and the results shall be submitted to the Consultant. If the average flexural strength at 7 days is less than 80% of the specified minimum 28 day flexural strength, check mix and adjust to ensure the required strength is obtained.

.3 If the concrete in selected paving areas has to be deposited by a concrete pump requiring special mixes such as higher cement content, high sand/stone ratios and/or high slump, separate trial mixes shall be developed to assure that the quality and durability properties of the concrete are met. Trial testing results shall include the relationship between modulus of rupture and compressive strength at same ages and the same frequency described in Part 2 Section 3. 2.

.4 The Contractor shall supply results of measurements of the air-void system parameters as per ASTM C457, modified point count method. Testing shall be conducted by the testing laboratory, certified by CCIL in accordance with CSA A283, Category II. A mix design accepted by the Engineer shall not be varied during the course of the work unless acceptance is obtained from the Engineer in writing. Any change to the source of cementing materials, aggregate source and admixtures will require a new trial batch testing and a new correlation between the compressive and flexural strength of concrete.

1. SAMPLING AND TESTING

.1 During the progress of the work tests will be carried out on materials and workmanship in order to ensure compliance with the requirements of the specifications.

.2 Quality Assurance Testing

.1 The Owner shall be responsible for Quality Assurance for determination of rejection or acceptance of the work and verification purpose; however, these tests are not part of the Quality Control requirements which the Contractor shall still fulfill. Quality assurance testing will be carried out by the testing agency designated by the Engineer. The testing agency shall be certified by CCIL in accordance with CSA A283, Category I with A23.2-3C and 8C.

.3 Quality Control Testing

.1 Quality control testing is the responsibility of the Contractor throughout every stage of the work, from the production of aggregates to the final accepted product. Quality Control testing shall be performed by the Contractor's designated testing laboratory to ensure conformance with the specifications. The Contractor shall be required to conform to certain minimum testing requirements, as noted in Table 1 below.

.2 The Contractor shall use professional engineering services and a qualified testing laboratory certified by CCIL in accordance with CSA A283, Category I with A23.2-3C and 8C. The testing laboratory conducting air void characteristics (linear traverse test) shall have a CCIL or MTO certification to conduct the testing. All Quality Control technicians shall be CCIL certified to test concrete. Copies of the certification shall be provided to the Engineer.

.3 The minimum frequencies of Quality Control testing are described in Table 1. Results of all Quality Control tests shall be tabulated and made available to the Engineer at any time. The purpose of Quality Assurance and Quality Control is not to create duplicate testing, but rather complementary.

.4 The following is the required minimum concrete testing to be performed by the contractor's Quality Control on a continual basis throughout the duration of the project. These tests do not replace initial conformance and certification tests as outlined previously in this specification.

TABLE 1

Item	Frequency
CONCRETE:	
Unit Weight	Every 40 m^3
Slump	Every 40 m^3
Air	Every 40 m^3
Cylinders	Every 40 m^3
Beams	Every 80 m^3

.5 Quality Control tests shall be performed at point of discharge of mix onto accepted base or into forms. When concrete is discharged using a concrete pump, sampling shall be at the end of a discharge hose.

PART 3 - EXECUTION

1. TRIAL AREA

.1 Prior to placing concrete, the Contractor shall construct a trial area and shall include jointing. Jointing shall include vertical face construction joints at the commencement and termination of the trial area, transverse contraction joints and sawcutting and sealing of joints.

.2 The trial area shall be a minimum of 12 m in length and one panel in width. NOTE – the Engineer may allow the trial area to be the outside row of the apron at the Engineer's discretion. However, if the trial area does not meet the specification requirements as noted in Item 3.1.8, the trial area shall be removed and disposed of at no cost to the Owner.

.3 If the trial area is not in full compliance with the specifications it shall be repeated until it passes all the requirements of the specifications.

.4 The trial area shall be used to demonstrate the capability of the machinery and methods used to produce the desired placement, installation of reinforcing tie-bars and dowels, concrete strength, surface level and tolerance, texture, and methods of joint forming and sealing. Concrete curing regimes shall be agreed with the Engineer during the trial.

.5 During the trial the depth and timing of the initial saw cutting shall be determined by the Contractor.

.6 Sawcutting and sealing of joints on the trial area may be scheduled to coincide with work on the other areas of the airport new pavement.

.7 The Contractor shall extract a minimum of two eight-inch long cores from the trial area to test for the air void content characteristics in accordance with the ASTM C457 Standard Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete.

.1 Each core shall be tested for surface and interior air-void system. The concrete with the satisfactory air-void system for freeze-thaw durability will have a spacing factor L not exceeding 0.230 mm. No single test with the spacing factor more than 0.230mm will be accepted. The provision of CSA A23.1-09, Section 4.3.3.3.a shall not apply.

.2 The air content of the core interior, and concrete surface determined on hardened concrete, shall have minimum air content of 3%.

.3 The testing shall be performed by a laboratory certified in CCIL Category I with A23.2-3C and 8C certified in conducting ASTM C457 either by CCIL or MTO. The results obtained by computerized air-void analyzers shall not be accepted.

.4 At the same time, the surface of the cores will be examined for symptoms of over finishing such as trapped air below surface, excessive amount of cement paste and surface dusting or scaling.

.8 The Contractor shall be responsible for the costs for cores for additional trial areas if required.

.9 The Contractor shall repeat the trial where:

.1 The concrete is defective as described in Part 3 Section 16 of these specifications.

.2 The surface levels are outside the permitted tolerances.

.3 The surface texture does not meet the requirements of the specifications.

.4 The results of the 7 day cylinder and beam tests fail to meet 80% of the specified minimum 28 day strength.

.10 The Contractor shall allow a minimum of 10 and a maximum of 15 working days after completion of the trial for final acceptance.

.11 In the event of deficiencies in the trial area, the Contractor shall construct a new trial area at no cost to the Owner.

.12 After final acceptance of the test section the Contractor may proceed with placing of concrete on the project.

2. EQUIPMENT

.1 The use of mobile volumetric concrete mixers shall not be allowed.

.2 Concrete plant: certified in accordance with CAN/CSA-A23.1.

.1 The recommended minimum production rate for the Portland cement concrete batch plant is 80m^3 per hour.

.2 Plant must be capable of incorporating fly ash into the concrete mixer.

.3 Production of concrete in accordance with CSA A23.1-14, Clause 5.2.

.3

.1 The recommended minimum production rate for the Portland cement concrete batch plant is 80 m^3 per hour.

.2 Plant must be capable of incorporating fly ash into the mixing chamber.

.4 Where fixed form paving is used provide equipment with following features:

.1 Scratch template for checking contours of base to operate from side forms and be provided with adjustable rods projecting down to base course at maximum 300 mm intervals.

.2 Mechanical self-propelled spreader capable of moving concrete forward and laterally and designed to spread, consolidate and finish concrete to finished cross-section.

.3 Vibrator locations and spacings whether surface or internal shall be installed as per manufacturer's specifications or as directed by the Consultant.

.1 Internal vibrators: frame-mounted 50 mm size vibratory units with vibrating tubes extending into slab at intervals slightly less than twice

manufacturers “radius of action”, but not less than 600 mm clear space between tubes of units.

.4 Mechanical, self-propelled finisher with two independently operated transverse screeds.

.5 Long-handled floats shall not be less than 3600 mm in length and 150 mm in width, stiffened to prevent flexibility and warping. Float to be aluminum or magnesium, straight, smooth, sufficiently light to avoid sinking into concrete surface, operated mechanically or manually from edge to edge while advancing longitudinally. Floats shall be operated mechanically or manually from edge to edge while advancing longitudinally. Floating shall pass gradually from one side of the pavement to the other. Forward movement along the centerline of the pavement shall be in successive advances of not more than one-half the length of the float. Any excess water or laitance in excess of 3 mm thick shall be removed and wasted. Placement rate: minimum 80 m3 per hour.

.5 Where slip form paving is used provide equipment with following features:

.1 Self-propelled slip form paver with four crawler type tracks, designed to spread, consolidate, screed and float finish fresh concrete to required cross section, lines and grades in one complete pass so that a minimum of hand finishing will be necessary to provide a dense and homogeneous pavement in conformance with the plans and specifications. Side forms and finishing screeds shall be adjustable to the extent required to produce the specified pavement edge and surface tolerance.

.2 Paver to be approved by Consultant.

.3 Mechanism for extruding the pavement to be continuously adjustable and capable of placing concrete to width and depth as shown on drawings without insert for the frame. Frame insertion to increase the paving width is not acceptable.

.4 Pavement line and surface elevation to be automatically controlled from taut string or wire, or by laser equipment.

.5 Slip form paver shall have automatic horizontal and vertical alignment controls to be used in conjunction with string lines or laser equipment on both sides of paver.

.6 Internal type vibrators: frame-mounted 50 mm size vibratory units with vibrating tubes extending into slab at intervals slightly less than twice manufacturers “radius of action.”

.7 Acceptable concrete slip form pavers to have a minimum placement rate of 80 m^3 per hour.

.1 Provide details in tender submission of proposed paver(s) to be used.

.8 High volume placer/spreader capable of accepting from end dump trucks, conveying concrete to the grade and spreading to the desired width, and striking off at a predetermined width and depth of the application.

.1 Provide details in tender submission of proposed placer/spreader(s) to be used.

.6 Provide following miscellaneous equipment where required:

.1 Edging tool.

.2 Water truck equipped with pump, hoseline and fine spray nozzle.

.3 Self-propelled automatic spray machine spanning fresh concrete, equipped with fine spray nozzles suitable for application of membrane curing compound uniformly over surface and exposed edges, and with wind skirt to permit proper application during windy conditions.

.4 Self-propelled concrete saws equipped with rubber-tired wheels, readily adjustable blade depth controls, and sawing line guide pointers both front and rear. Provide adequate number of units to complete sawing at rate required and have ample supply of suitable saw blades and at least one standby sawing unit available on job site before concrete placement is started.

.5 Straight edges, 3.0 m in length to test finished surfaces.

.6 Heating kettle or tank for heating sealing compound:

.1 Double boiler with space between inner and outer shells filled with oil, asphalt or other material for heat transfer.

.2 Equip for positive temperature control of sealing compound.

.3 Equip with readily calibrated device which accurately registers temperature of sealing compound.

.7 Pressure applicator capable of applying sealant at 100 kPa by means of hose and wand fitted with size of tip suitable for cracks.

.1 Capable of maintaining temperature of sealant as per manufacturer's recommendation during application.

.8 Manual pouring cone.

.9 Self-propelled concrete saws equipped with rubber-tired wheels, readily adjustable blade depth controls and sawing line guide pointers both front and rear.

.10 Small diameter diamond bladed pavement saws or mechanical rotary routers specifically designed for following random irregular cracks without tearing,

chipping or spalling edge of cracks and capable of producing clean, vertical side walls. Open “V” type grooves not permitted.

.11 Mixer: in accordance with manufacturer's recommendations.

3. FORMWORK

.1 Install in accordance with Section 03 10 00 - Concrete Forming and Accessories and to following requirements:

.1 For fixed form paving:

.1 Provide steel or wood forms of sufficient strength to support and keep alignment under weight of spreading and finishing machines.

.2 Use of wood forms for fillet areas to be approved by Consultant.

.3 Set forms true to line and grade, join neatly and tightly and stake securely to resist concrete pressure and impact from tampers without springing.

.1 Allowable tolerance shall be 6 mm in 3 m of horizontal alignment and 5 mm in vertical alignment.

.4 Clean and oil forms before each use.

.5 Obtain Consultant's approval of forms before placing concrete.

.6 Leave forms in place for minimum of 24 hours after concrete placement or as directed by the Consultant.

.7 Remove forms in a manner to prevent damage to concrete. Do not pry with crowbars or heavy tools against concrete edges. Use only wooden wedges to wedge between the form and the concrete.

.8 Build-up of forms to meet concrete design thickness requirements not to exceed 75 mm.

.2 For slip form paving:

.1 Provide sufficient length of slip form trailing behind paver to prevent slumping at slab edge. Ensure rigid lateral support. Slab sides to have a smooth dense surface finish free of segregation and exposed coarse aggregate.

.2 Set grade and line for laser equipment or control string or wire from bench marks/line and grade established by Consultant.

4. BASE PREPARATION

.1 In accordance with Section 32 11 23 – Aggregate Base Course and the following.

.2 Soft, yielding materials or other portions of granular base that will not compact to specification shall be removed and replaced with suitable material. Base material to be brought to a firm unyielding condition with a uniform density. It shall be compacted at or above optimum moisture content to 100% Modified Proctor Dry Density.

.3 Base to consist of specified material and have a compacted thickness of not less than specified.

.4 Prepared base shall be checked for conformity with the cross-section and grade tolerances. Finished surface of base shall not deviate more than 10 mm above and 10 mm below specified grade and cross-section, and surface shall not deviate more than 10 mm at any place on a 3 m template.

.5 Repair damage to base resulting from hauling or equipment operations.

.6 Prior to placing concrete, base shall be thoroughly wetted. Wetting shall be carried out, such that standing water is not present on grade.

.7 Ensure surface is clean of all debris, loose granular material, dirt, water, etc.

.8 Surface condition of base to be approved by Consultant before placing concrete.

5. REINFORCING STEEL AND DOWELS

.1 Place reinforcing steel, dowels and tie-bars as indicated on the contract drawings and to Section 03 20 00 - Concrete Reinforcing.

.2 Smooth Dowels **(Owner Supplied)**: corrosion resistant, clean, straight and free from flattened or burred ends, plain round bars and be epoxy-coated to ASTM A775/A775M.

.3 Smooth Dowel bars shall be coated with a bond-breaking compound such as grease or a form release agent or be enclosed with a tight fitting plastic sheath.

.4 Dowels bars shall be installed horizontal and aligned perpendicular to concrete face.

.5 Tolerances for dowel placement shall be a deviation of not more than one degree from alignment of the pavement and within a tolerance of ± 6 mm in the vertical and horizontal planes of the pavement.

.6 Dowel bars shall not be located within 300 mm of a panel joint.

.7 Place sufficient number of joint dowel assemblies in advance of paver to avoid delay in concrete placement.

.8 Where new concrete is doweled to existing concrete, drill holes in mid slab of the existing concrete. Place dowels and pack solidly with non-shrink grout or epoxy to positively position and anchor the dowels.

.9 Fixed Form Paving

.1 Dowel bars shall be secured in openings in the form face for fixed form paving.

.10 Slip-Form Paving

.1 Dowel bars may be inserted through temporary side forms located behind the paver, or mechanically inserted into the plastic concrete by approved devices associated with the slip-form paver.

.2 Dowel bars shall be inserted in a manner such that no voids are created around the dowel bar and no distortion of the pavement surface occurs.

.3 The Consultant may direct the Contractor to drill and epoxy dowel bars into the concrete face if satisfactory results do not occur with insertion of dowel bars.

.11 Place sufficient number of joint dowel assemblies in advance of paver to avoid delay in concrete placement.

.12 Remove oil, grease, dirt and deleterious material from reinforcing bars before placing concrete.

.13 Steel placement to be approved by Consultant before placing concrete.

6. TRANSPORT AND DELIVERY OF MIX

.1 Time from initial mixing to final placing to be not more than 90 minutes if mix is transported by agitating equipment (e.g. truck mixer) in accordance with CSA A.23.1-14, Clause 5.2.4.2.1- Delivery with Agitating Equipment. This time is reduced to 60 minutes if concrete temperature, as discharged, exceeds 30° C.

.2 Transport mix by non-agitating equipment only if;

.1 Time from addition of cement to time of placing not to exceed 45 minutes.

.2 Haul units to be of sufficient capacity to transport at least one regular size batch from mixer.

.3 Haul routes to be well maintained to prevent undue disturbance of concrete mix during transport.

7. PLACING

.1 Commence placing operations only when air temperature is at or above 5°C and forecast is to remain at or above 5°C for 24 hours after completion of paving.

.2 Commence placing operations only when probability of precipitation is less than 40% for the time period for the day's paving operation.

.3 The Consultant may direct that paving operations be suspended if weather patterns detrimental to pavement construction are encountered or forecast.

.4 Refer to Annex D of CSA 23.1-14: Guidelines for Curing and Protection. When the evaporation rate exceeds 1.0 kg/m^2/hr, measures shall be taken to prevent excessive moisture loss from the surface of unhardened concrete; when the rate exceeds 0.5 kg/m^2/hr, such measures may be needed.

.5 Place concrete to lines, grades and depths as indicated.

.6 Discharge concrete into forms as soon as practical after mixing.

.7 If a concrete pump is used to discharge concrete into forms, it shall be proven by demonstration to be able to pump the specified concrete through required line length and at the placement rates without impairing or detracting from the specified quality and durability requirements from concrete. Pipelines made from aluminum alloys shall not be used.

.8 Construct pavement lanes in sequence approved by Consultant and in accordance with the approved paving plan.

.9 Use hand placing where machine spreading is not feasible.

.10 Spread uniformly with approved equipment to thickness sufficient to allow for proper consolidation and finishing. Do not apply external tractive force to paver.

.11 Operate with continuous forward momentum. Schedule concrete supply to minimize interruptions.

.12 Insert dowels and tie bars as indicated.

.13 When completing concrete placement for day, carry placement through to schedule joint location.

.14 Where concrete placement is stopped for more than 30 min due to breakdowns, weather or other reasons, construct extra bulkhead and construction joint as directed by Consultant. Bulkhead to be located at a scheduled transverse joint location. Prior to continuing concrete placement in that lane, install load transfer devices as detailed on the drawings or as directed by the Consultant.

.15 No concrete shall be mixed, placed, or finished when the natural light is insufficient, unless an adequate and approved artificial lighting system is operated.

.16 Do not place concrete on frozen surface or standing water.

.17 No concrete shall be placed during rain.

.18 When rain appears imminent paving operation should cease. Protect freshly laid concrete from rain damage and adverse weather condition and in accordance with CAN/CSA A23.1. Extend protective coverings over edges of concrete and arrange so as not to bear on unprotected edges.

.1 Protective coverings shall be fastened securely to prevent movement during high winds or jet blast.

.2 Contractor shall provide watchpersons as directed by the Consultant to ensure protective coverings do not impact on airport operations.

.19 Concrete placed when the ambient temperature is at or above 27 degrees C to be cured by continuous water curing from soaker hoses providing complete coverage of the pavement to minimize the temperature rise of the concrete.

.20 When concrete has been placed in cold weather and the site temperature is expected to drop below 5 degrees C, insulating curing blankets or other suitable material shall be placed on the concrete pavement and weighted to prevent movement. Curing to continue until the cumulative number of days, or fraction thereof, during which the temperature of the concrete is above 10 degrees C, has totaled a minimum of 7 days. Alternatively, if compressive tests of cylinders cured under field conditions achieve at least 80% of the specified compressive strength, curing may be discontinued.

.21 Concrete pavement placed in cool weather shall experience a minimum of 30 day air-drying period, following final curing, before first application of de-icing salts.

.22 The Contractor shall be responsible for the quality and strength of the concrete placed during cold weather, and any concrete injured by frost action shall be removed and replaced at the Contractor's expense.

8. CONSOLIDATION

.1 Provide proper vibration to consolidate and fluidize the concrete mass. Vibrate sufficiently to eliminate honeycomb effect, but do not over vibrate which can cause segregation or elimination of entrained air content.

.2 When internal vibrators are used:

.1 For slab depths up to 200 mm, mount vibrators parallel to base at mid depth. For slab depths greater than 200 mm, mount vibrators with tips minimum 50 mm above base and tops minimum 50 mm beneath pavement surface.

.2 Maintain minimum 150 mm surcharge of concrete above vibrators during placing and consolidation.

.3 Operate at between 9000 and 12000 vibrations per minute at minimum amplitude of 1 mm.

.3 When surface vibrators are used:

.1 Synchronize units on each individual screed or pan.

.2 Operate at minimum of 3,500 vibrations per minute and minimum amplitude of 0.4 mm.

.3 Treat each pavement section to at least one pass but not more than two passes of vibratory equipment unless otherwise directed by Consultant.

.4 Stop vibrators when paver stops.

.5 Use hand operated vibrator on odd shaped slabs inaccessible to frame mounted units. Do not operate vibrator in one location longer than 5 seconds. Ensure the hand vibrator is inserted and removed vertically in the concrete mix.

.6 Vibrators are not to be used to move the concrete mix.

.7 Ensure concrete adjacent to edge forms or previously constructed slabs is thoroughly vibrated.

9. FINISHING

.1 After consolidation by vibration, finish with equipment approved by Consultant.

.2 When striking off concrete surface, maintain uniform roll of concrete ahead of first screed for its full length when finishing machine is on first pass.

.3 Make two passes with transverse finishing machine. Excessive operation over a given area shall be avoided.

.4 Where joints are formed rather than sawn, form longitudinal and transverse joints after final pass of finishing machine.

.5 Hand finish areas inaccessible to finishing machines to same quality and surface characteristics as machine finished surfaces.

.6 Finish concrete surface with approved float at proper time. Operate from edge to edge with wiping motion while advancing, with each succeeding pass overlapping previous one.

.7 Check surface with approved 3.0m long straightedge. Correct irregularities exceeding 3 mm before concrete takes initial set.

.8 Finish edges of slabs with edging tool to form smooth squared surface. Do not patch with cement paste.

10. SURFACE TEXTURING

.1 Commence texturing immediately after float finishing.

.2 Use stiff bristled broom to produce nonslip concrete surface finish approved by Consultant, with fine granular texture free from disfigurations.

.3 Provide transverse surface texture by self-propelled machine specifically designed for purpose, automatically controlled from string line reference used by paver, to produce an average surface texture as per American Concrete Pavement Association publication - Constructing Smooth Concrete Pavement.

.4 Texturing to be straight, precise and not damaging to pavement edges.

.5 Whether texturing is done by machine methods or by hand, care shall be taken to avoid overlapping passes of the texturing broom such that a surface already

sufficiently textured is overworked and the sharpness of the scores or grooves is deformed or the grooves filled with laitance.

.6 The finished surface shall have a roughly grooved appearance. The quality of sharpness of the grooves shall be to the satisfaction of the Consultant.

.7 Average textured depth to be not less than 1 mm when measured by ASTM E965 – Standard Test Method for Measuring Surface Macrotexture Depth Using a Volumetric Technique.

11. CURING

.1 Curing compound:

.1 The curing compound shall not be applied during rainfall.

.2 The entire surface of the pavement shall be sprayed twice uniformly with white pigmented curing compound immediately after the finishing of the surface.

.3 Apply in two coats with accepted spray equipment to form complete and unbroken film on surface of concrete. Mechanically agitate compound before and during use. The spraying equipment shall be of the fully atomizing type equipped with a tank agitator.

.4 Hand spraying of odd widths or shapes and concrete surfaces exposed by the removal of forms will be permitted providing that a uniform coverage with curing compound is achieved.

.5 For hand application apply first coat immediately after texturing operations, second coat to be applied immediately after first coat in a perpendicular direction.

.6 For machine application curing compound to be applied in accordance with manufacturers' specifications.

.7 Spray slab edges immediately after removal of forms.

.8 Protect formed or sawed joints from evaporation during curing period.

.9 Respray areas where membrane is damaged from any cause, including sawcuting operations.

.10 Sawcuts shall be hand sprayed immediately after cutting and shall include covering the vertical faces resulting from the sawcutting.

.11 Upon removal of side forms, the sides of the exposed slabs shall be protected immediately to provide a curing treatment equal to that provided for the surface.

.2 Curing in Cold Weather

.1 The requirements of ACI 306 R-10 Cold Weather Concreting and CSA A23.1-14, Section 7.7.3.4.2 shall apply.

.2 The concrete shall be maintained at a temperature of at least 10 ºC for a period of 72 hours after placing and at a temperature above freezing for the remainder of the curing time.

.1 The Contractor shall be responsible for the quality and strength of the concrete placed during cold weather, and any concrete damaged by frost action shall be removed and replaced at the Contractor's expense.

.3 Curing in Hot Weather

.1 The requirements of ACI 305 R-10 Hot Weather Concreting and CSA A23.1-14, Section 7.7.3.4.1 shall apply.

12. PROTECTION

.1 Do not open concrete pavement to traffic or construction equipment until concrete reaches 80% of specified flexural strength and minimum of 7 days after placing.

.2 When placing concrete in lanes adjacent to existing concrete, operate placing equipment on rubber wheels or pads to prevent damage to existing surface.

13. TOLERANCES

.1 Finished concrete surface to be within +/- 6mm of design grade but not uniformly high or low.

.2 Finished concrete surface not to have irregularities exceeding 6 mm when checked with 3m straight edge placed in any direction.

.3 Horizontal deviations of slab edge from alignment of pavement not to exceed 10 mm.

.4 No variations from the true surface shall be permitted across any joint in the pavement; and

.5 Except across the crown of a camber and across valleys or ridges, the surface shall be such that when tested with a 3 m long supported test straight edge placed anywhere in any direction on the surface, there shall not be a gap greater than $\pm$ 3 mm between the bottom of the straight edge and the surface of the pavement; and

.6 Isolated high spots in the final pavement, not exceeding 2m^2 each, which depart by more than 6 mm from the design elevations or which do not comply with the straight edge test, shall be ground down if the total area to be ground does not exceed 10m^2 in any 1000 m^2 section of concrete pavement. When correction in the final pavement in excess of this allowance is necessary to bring it within these specified limits, the pavement shall be removed and replaced by the Contractor at his own expense; and

.7 Irrespective of the tolerances noted above, ponding of water within panels or between adjacent panels will not be accepted.

14. JOINTS

.1 General:

.1 To Section 03 30 20 – Sawcutting and Sealing of Airfield Joints.

.2 Construct joints plumb, straight and square to details indicated.

.3 Transverse joints to coincide with those in adjacent pavement unless indicated or directed otherwise.

.4 Install preformed joint filler at locations and to details indicated.

.5 Install isolation joints around structures and features that project through, into or against pavement.

.2 For saw cutting control joints in green concrete:

.1 Contractor to layout joints as indicated by the Contract Documents or as directed by the Engineer. Ensure joint alignment is straight across the entire paved area.

.2 Install end stakes to ensure straight joint alignment across paved area. Mark joint alignment with chalk line or other suitable guide to acceptance of the Engineer.

.3 Saw joints using accepted equipment and methods to produce joint dimensions indicated. Depth of sawn joints to be uniform across panel, including at the edge of panel.

.4 Ensure joints are sawn straight.

.5 Restrict speed of saw cutting to ensure proper joint alignment and to avoid damage to concrete.

.6 Supply sufficient workers and equipment, including standby equipment, to maintain satisfactory sawing schedule.

.7 Schedule sawing operations on 24 hour basis and consistent with concrete placing.

.8 Make initial saw cuts in progressive manner and as soon as concrete surface has hardened sufficiently to resist ravelling as cut is made and before shrinkage cracks occurs.

.9 If cracking occurs ahead of saw cut, stop sawing immediately. Move ahead several joints and cut one or more joints before returning to saw intermediate joints. Where cracking persists, make 1 m saw cut from one edge and

complete sawing from opposite edge. Adjustments to sawing schedule to be accepted by the Engineer.

.10 If uncontrolled cracking or other surface damage results from inadequate or improper sawing techniques, suspend further concrete operations until situation is corrected and immediately remove and replace damaged panels.

.11 Immediately on completion of sawing, flush joints with water to remove laitance.

.3 For saw cutting sealed joints in hardened concrete:

.1 Immediately on completion of sawing, flush joints with water to remove laitance.

.2 Sandblast joint to remove remaining residue.

.3 After sandblasting, clean and dry saw cut joints using lance with oil-free hot compressed air, applied at minimum pressure of 600 kPa.

.4 Follow manufacturer's specifications for any additional joint preparation requirements.

.5 Dispose of material removed from joints.

.6 Obtain the Engineer's acceptance of prepared sawcut joints before application of sealant.

.4 Sealing:

.1 Seal joints before allowing vehicular traffic on new pavement.

.2 Provide Consultant with copy of sealant manufacturer's instructions for application.

.3 Do not apply joint sealant in rainy weather or when ambient temperature is less than 10 degrees C. Do not apply joint sealant when the daily low temperature is expected to fall below 5 degrees C.

.4 Do not use sealant that has been frozen.

.5 Ensure joints are clean and dry immediately before applying sealant.

.6 Insert approved bond breaking material in joint prior to applying sealant, then fill joint from bottom up with sealant to avoid trapping air.

.7 Prepare sealant for application using equipment and methods approved by Consultant.

.8 Mix two-component sealant in accordance with manufacturer's recommendations.

.9 Fill joints with sealant immediately after cleaning. Maintain tip of cone or wand close to bottom of routed groove during filling.

.10 Apply sealant strictly in accordance with manufacturer's recommendations with special attention to temperature ranges for safe heating and for application of hot poured sealants and cleanliness of concrete to be bonded.

.11 On completion of first application of sealant, return and top up any underfilled areas.

.12 Pour sealant in joint so that cooled cured sealant fills crack from the bottom up to a level 6 mm below the pavement surface for Portland cement concrete.

.13 Replace sealant which fails to bond to concrete or fails to cure properly, as directed by Consultant.

15. PRODUCT ACCEPTANCE

.1 Product means concrete pavement after placement, finishing, sawcutting, and curing.

.1 Concrete strength test results (compressive and flexural) and the quality of the pavement (durability) shall be used as a basis for acceptance or rejection of the concrete.

.2 Removal and replacement of concrete panels shall be evaluated in accordance with the requirements of this specification.

.3 Strength Tests:

.1 One sample, consisting of 3 test cylinders shall be taken from every 40 m^3 of plastic concrete delivered and placed at the job site for determining the compressive strength. One sample, consisting of 3 beams, shall be taken from every 80m^3 of plastic concrete delivered to the job site for determining the flexural strength, and the results shall be submitted to the Engineer.

.2 The average strength of all sets of three consecutive strength tests of cylinders and beams, made and tested in accordance with CAN/CSA-A23.2, should not be less than the specified minimum design 28 day compressive/flexural strength. Individual 28 day strength tests should not be less than 80% of the specified minimum 28 day flexural design strength.

.3 There will be no appeal for the results of the concrete strength tests after verification by Quality Assurance testing.

.4 Acceptance of pavement for strength will be determined by the Engineer.

.4 A lot shall consist of approximately 33 m^3 of concrete. This is equivalent to approximately three new concrete panels with individual dimensions of 6,096 mm long x 6,096 mm wide x 300 mm thick.

.5 Concrete strength shall be evaluated for acceptance on a lot basis. The location of any failed test shall be deemed to be the longitudinal midpoint of the defective concrete panel where the unsatisfactory test results was taken. For example, the 1 panel poured immediately prior to the panel where the failed test was taken, the panel where the failed test was taken and the 1 panel poured immediately after the panel where the failed test was taken shall be considered defective and shall be removed and replaced. Where failed tests occur the Contractor shall remove and replace the entire lot(s) affected.

.6 Durability:

.1 A minimum of two eight-inch long cores may be cut from the lot as selected by the Engineer to test for the air-void characteristics. The testing shall be performed by a CCIL certified laboratory in Category II in accordance with ASTM C457 Standard Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete.

.2 Each core shall be tested for surface and interior air-void system. The concrete with the satisfactory air-void system for freeze-thaw durability will have a spacing factor L not exceeding 0.230 mm. No single test with the spacing factor more than 0.230mm will be accepted. The provision of CSA A23.1-14, Section 4.3.3.4.a shall not apply.

.3 The air content of the core surface and core interior, determined on hardened concrete, shall have minimum air content of 3%.

.4 At that time, the surface of the cores will be examined for symptoms of over-finishing such as trapped air below surface, excessive amount of cement paste and surface dusting or scaling.

.5 In cases of linear traverse tests (ASTM 457) used for verification of low plastic air in concrete, the testing laboratory shall be CCIL certified in accordance with CSA A283 Category II certified by CCIL or MTO to conduct the test. If the QC testing laboratory has no ability to perform the testing in their lab, then the testing costs will be paid by the Contractor, and the acceptance will be based solely on the QA results.

.7 Defective concrete as defined in Part 3 Section 16 is subject to rejection.

16. DEFECTIVE CONCRETE

.1 Concrete is defective when it fails to meet the requirements of the specifications or when any of the following conditions exist:

.1 The concrete is defective as described by these specifications.

.2 It contains: cracks, honeycombing, embedded debris, uncontrolled shrinkage cracking, or other surface defects.

.3 It is damaged by freezing.

.4 It is placed at too high temperature.

.5 The surface levels are outside the permitted tolerances

.6 The surface shows signs of overfinishing such as laitance, dusting, or spalling.

.7 It is damaged by incomplete curing.

.8 Spalling along panel joints.

.9 It is damaged due to construction operations.

.10 Average 28 day strength of any three consecutive strength tests is less than specified minimum 28 day strength.

.11 Any 28-day flexural strength test result is less than 80 % of the specified minimum 28 day strength.

.2 If concrete is determined to be defective the Contractor shall be deemed to be responsible. The Consultant shall define the areas of defective concrete and the Contractor shall replace or repair these areas at his own expense.

.3 Defective concrete shall be replaced or repaired in accordance with Section 3.18 of this specification.

.4 If concrete is determined to be defective due to overfinishing, a core shall be obtained from the defective area and its surface tested microscopically to meet the criteria outlined is Section 3.15.1.8.

17. REPAIR/RESTORATION/REMOVAL OF NEW CONCRETE PANELS

.1 Any new concrete panel that is defective shall be removed and replaced, as specified hereinafter, at no cost to the Owner.

.2 Removal of partial panels is not permitted.

.3 Removal and replacement shall be full depth and for the full width of the panel and the limit of removal shall be normal to the paving lane and to each original transverse joint.

.4 Repair of defective concrete work:

.1 Where defective concrete is identified by Consultant during plastic condition, repair using methods approved by Consultant.

.2 Grind off high surface variations where directed by Consultant.

.3 Repair strategy for surface damage due to overfinishing, freezing, inadequate curing, construction damage and joint spalling is subject to approval by the Consultant. With the exception of repairing spalls along joints only partial depth repairs shall be considered. No thin-layer repairs shall be accepted.

.4 Repairing spalls along joints:

.1 Where directed by the Consultant, spalls along joints of new panels shall be repaired by first making a vertical saw cut at least 25 mm outside the spalled area and to a depth of at least 50 mm.

.2 Saw cuts shall be straight lines forming rectangular areas.

.3 The concrete between the saw cut and the joint, or crack, shall be chipped out to remove all unsound concrete and at least 12 mm of visually sound concrete. The cavity thus formed shall be thoroughly cleaned with high pressure water jets or sand blasting supplemented with compressed air to remove all loose material and moisture.

.4 Material used for edge spall repairs shall be compatible with the concrete mix used for paving and approved by the Consultant.

.5 Epoxy resin mortars shall be applied using proportions and mixing and placing procedures as recommended by the manufacturer and approved by the Consultant.

.6 The epoxy resin materials shall be placed in the cavity in layers not greater than the thickness recommended by the manufacturer. The time interval between placement of additional layers shall be as recommended by the manufacturer.

.7 Where the spalled area abuts a joint, an insert not less than 10 mm wide shall be used to prevent bond and contact at the joint face. A reservoir for the joint sealant shall be sawed to the dimensions required for other joints. The reservoir shall be thoroughly cleaned and sealed with the sealer specified for the joints.

.8 If any spall penetrates half the depth of the panel or to the depth of reinforcement, the entire panel shall be removed and replaced as previously specified.

.5 Removal and Replacement of New Panels:

.1 Where it is necessary to remove full panels, unless there are keys or dowels present, all edges of the panel shall be cut full depth with concrete saw. All saw cuts shall be perpendicular to the panel surface.

.2 If keys, dowels, or tie bars are present along any edges, these edges shall be sawed full depth a minimum of 300 mm from the edge. These joints shall

then carefully be sawed on the joint line to within 25 mm of the depth of the dowel or key. The main panel shall be further divided by sawing full depth, at appropriate locations, and each piece lifted out and removed. Suitable equipment shall be used to provide a truly vertical lift, and approved safe lifting devices used for attachment to the panel slabs. The 300 mm wide strips along keyed or doweled edges shall be carefully broken up and removed using light, handheld jackhammers, 14 kg or less, or other approved similar equipment. Care shall be taken to prevent damage to the dowels, tie bars, or keys or to concrete to remain in place.

.3 The joint face below keys, dowels or tie-bars shall be suitably trimmed so that there is no abrupt offset in any direction greater then 12 mm and no gradual offset greater than 25 mm when tested in a horizontal direction with a 3.0 m straightedge.

.4 No mechanical in-place breakers shall be used for removal of panels with underlying cement stabilized base.

.5 If an underbreak between 38 and 100 mm, measured vertically from the bottom edge of the panel, occurs at any point along any edge, the area shall be repaired as directed before replacing the removed panel. Procedures directed will be similar to those specified for surface spalls except without sawcuts. If an underbreak over 100 mm occurs, the entire panel containing the underbreak shall be removed and replaced.

.6 Where there are no dowels, tie bars, or keys on an edge, or where they have been damaged, dowels of the size and spacing as specified for other joints in similar pavement shall be installed by epoxy grouting them into holes drilled into the existing concrete using procedures as specified. Original damaged dowels or tie bars shall be cut off flush with the joint face. Protruding portions of replacement dowels shall be lubricated. All four edges of the new panel shall thus contain dowels, original keys, or original tie bars.

.7 Placement of concrete shall be as specified for original construction.

.8 Prior to placement of new concrete, underlying stabilized base course material that is damaged shall be removed and replaced as directed by the Consultant.

.9 The surface of all four joint faces shall be cleaned of all loose material and contaminants and coated with a double application of membrane forming curing compound as bond breaker. Care shall be taken to prevent any curing compound from contacting dowels or tie bars.

.10 The resulting joints around the new panel shall be prepared and sealed as specified for original construction.

18. EXISTING CONCRETE PAVEMENT REMOVAL AND REPAIR

.1 This section applies to existing panels to be removed for the installation of other works or existing panels damaged by the Contractor's operations.

.2 All operations shall be carefully controlled to prevent damage to the concrete pavement and to the underlying material to remain in place.

.3 Removal of Existing Pavement Panels:

.1 When it is necessary to remove existing concrete pavement and leave adjacent concrete in place, unless there are dowels or keys present, the joint between the removal area and adjoining pavement to stay in place, including dowels, tie bars, or keys shall first be cut full depth with a standard diamond-type concrete saw.

.2 If it is known that keys or dowels are present at this joint, the saw cut shall be made full depth 300 mm from the joint.

.3 The edge shall then be carefully sawed on the joint line within 25 mm of the top of the dowel or key. Next, a full depth saw cut shall be made parallel to the joint at least 600 mm from the joint and at least 300 mm from the end of any dowels.

.4 All pavement between this last saw cut and the joint line shall be carefully broken up and removed using hand-held jackhammers, 14 kg or less, or other approved light-duty equipment which will not cause stress to propagate across the joint saw cut and cause distress in the pavement which is to remain in place.

.5 Where dowels or keys are present, care shall be taken to produce an even, vertical joint face below the dowels or keys. If the Contractor is unable to produce such a joint face, or if underbreak or other distress occurs, the Contractor shall saw the dowels or keys flush with the joint.

.6 The Contractor shall then install new dowels, of the size and spacing used for other similar joints, by epoxy resin bonding them in holes drilled in the joint face as specified in Section 3.5 of this specification.

.7 The joint face shall be sawed or otherwise trimmed so that there is no abrupt offset in any direction greater than 12 mm and no gradual offset greater than 25 mm when tested in a horizontal direction with a 3.0 m straightedge.

.8 If the presence of dowels or tie-bars cannot be determined the Contractor shall saw the full depth at the existing joint face through the existing dowel bars, tie bars, or keys.

.1 The Contractor shall remove the existing concrete in such a manner as not to disturb adjacent panels.

.2 The Contractor shall then install new dowels, of the size and spacing used for other similar joints, by epoxy resin bonding them in holes drilled in the joint face as specified in Section 3.5.

.3 The joint face shall be sawed or otherwise trimmed so that there is no abrupt offset in any direction greater than 12 mm and no gradual

offset greater than 25 mm when tested in a horizontal direction with a 3.0 m straightedge.

.4 All this shall be at no additional cost to the Owner.

.9 Edge Repair

.1 The edge of existing concrete pavement against which new pavement abuts shall be protected from damage at all times.

.2 Areas that are damaged during construction shall be repaired at no cost to the Owner.

.3 Previously damaged areas adjacent to the proposed new concrete shall be identified, mapped and recorded by the Contractor and agreed upon by the Construction Manager prior to start of construction.

.1 Spall Repair: Spalls shall be repaired where indicated and where directed. Repair materials and procedures shall be as previously specified in Section 3.18.4.4, Repairing Spalls Along Joints.

.2 Underbreak Repair:

.1 All underbreaks shall be repaired.

.2 First, all delaminated and loose material shall be carefully removed, and then the void shall be completely filled with paving concrete and thoroughly consolidated.

.3 Care shall be taken to produce an even joint face from top to bottom.

.4 Prior to placing concrete, the underlying material shall be thoroughly moistened.

.5 After placement, curing compound shall be applied to the exposed surface.

.3 Underlying Material:

.1 The underlying material adjacent to the edge of or under the existing pavement which is to remain in place shall be protected from damage or disturbance during removal operations and until placement of new concrete, and shall be shaped as shown on the drawings or as directed.

.2 Sufficient material shall be kept in place outside the joint line to prevent disturbance (or sloughing) of material under the pavement that is to remain in place.

.3 Any material under the portion of the concrete pavement to remain in place which is disturbed or loses its compaction shall be carefully removed and replaced with concrete as specified in the preceding section 3.19.9.3.2 on Underbreak Repair.

.4 The underlying material outside the joint line shall be thoroughly cleaned when new concrete is placed.

19. TRAFFIC ON FINISHED SURFACES

.1 Keep vehicular traffic off newly paved areas until paving has properly cured and joints have been sealed.

.2 Traffic allowed on finished concrete surfaces shall be restricted to the minimum required for the conveyance of mixed materials for the laying of the pavement immediately adjacent to the area being laid.

.3 The Contractor shall be responsible for maintaining the finished concrete in good condition.

.4 Protect concrete from damage from oil, fuel stains, and excessive tire marks. Repair and clean marks to provide uniform finished appearance.

.5 The Contractor shall ensure that the tires of all construction vehicles are free from rocks, stones, pebbles, dirt and debris that could cause damage to the new concrete.

.6 The Contractor shall make good any defects, damage or defacement which occurs during the Contract by the methods and to the standards described in this specification.

20. CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

.2 Upon completion and curing of the joint sealing compound, the Contractor shall remove all remaining concrete slurry and sandblasting sand from the pavement surface.

.3 The pavement surface shall be cleaned using high-pressure water, power brooms and vacuum trucks as required. The Consultant shall approve the cleaning method.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies the requirements for the supply and application of paint lines and pavement markings indicated by the Contract Documents or as directed by the Consultant.

1.2 RELATED WORK

.1 Section 32 01 11.01 - Pavement Cleaning and Markings Removal.

1.3 REFERENCES

.1 All references to this Specifications, Standards, or Methods shall be understood to refer to the latest adopted revision, including all amendments.

.2 CAN/CGSB-1.5, Low Flash Petroleum Spirits Thinner.

.3 CGSB1-GP-12c, Standard Paint Colours.

.4 CGSB1-GP-71, Method, of Testing Paints and Pigments.

.5 CGSB1-GP-74M, Paint, Traffic, Alkyd.

.6 Supplemental Specification – FOL Pavement Marking Reflective Tape

1.4 SAMPLES

.1 Submit certified test reports in accordance with Section 01 33 00 - Submittal Procedures.

1.5 MEASUREMENT FOR PAYMENT

.1 Temporary pavement marking reflective tape will be measured by lump sum including survey layout, supply, installation, maintenance, protection, removal of temporary tape markings once work Section is complete, disposal off-site and clean-up.

.2 Permanent pavement markings will be measured by lump sum including survey layout, supply, installation of two coats of paint, protection, glass beads in the yellow paint and clean-up.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Paint (Permanent):

.1 Low VOC waterborne traffic paint (VOC’s of 150 g/l or less).

.2 Use low temperature waterborne traffic paint between temperatures greater than 0°C and lower than 10°C.

.3 Use normal waterborne traffic paint when the temperature is greater than 10°C.

.4 Colour: to CGSB1-GP-12C – Yellow 505-308, Black 512-301, White 513-301, Red 509-301.

.5 Upon request, the Consultant will supply a qualified product list of paints applicable to work. Qualified paints may be used but the Consultant reserves right to perform further tests.

.2 Colour as indicated.

.3 Methods of Testing Paints and Pigments to CAN/CGSB1-GP-71.

.4 Glass beads:

.1 Overlay type: to CGSB1-GP-74M.

.5 Durable markings shall be Poly Carb Mark 55.4 or Lafrentz System 400 Cold Plastic.

.6 Temporary pavement marking reflective tape shall be as shown in the Supplementary Specifications or as approved by the Consultant.

PART 3 EXECUTION

3.1 EQUIPMENT REQUIREMENTS

.1 Paint applicator to be an approved pressure type mobile distributor capable of applying paint in single, double and dashed lines. Applicator to be capable of applying marking components uniformly, at rates specified, and to dimensions as indicated, and to have positive shut-off.

.2 All equipment for use in the work shall be acceptable to the Consultant and shall include a mechanical marking machine and such auxiliary hand painting equipment as may be necessary to satisfactorily complete the work.

.3 The mechanical marker shall be an approved atomizing spray-type marking machine suitable for application of traffic paint. It shall produce an even and uniform film thickness at the required coverage and shall be designed so as to apply markings of uniform cross sections and clear cut edges without running or spattering.

.4 Suitable adjustments shall be provided on the sprayer(s) of a single machine or by furnishing additional equipment for painting the width required.

.5 Distributor to be capable of applying reflective glass beads as an overlay on freshly applied paint.

3.2 CONDITION OF SURFACES

.1 Pavement surface shall be clean and dry during application of paint. Areas to be painted shall be clean, free from curing compound, ponded water, frost, ice, dust, oil, grease, rubber tire deposits and other foreign matter.

.2 Pavement cleaning to Section 32 01 11.01 Pavement Cleaning and Marking Removal.

3.3 APPLICATION

.1 The Consultant shall provide points outlining the start and end points and radii for each paint markings. The Contractor shall be responsible for setting the marks required to complete the work.

.2 The Contractor shall use stencils, supplied by the Airport, for painting letters and numbers. Supply of stencils to be coordinated through the Airport Maintenance Department.

.3 All paint lines and pavement markings require two separate coats of paint.

.4 Unless otherwise accepted by the Consultant, apply paint only when air temperature is above 10°C, wind speed will not cause over-spray and no rain is forecast within next 4 h.

.5 Apply paint at a rate of not less than 0.37 L/m^2 per single coat of paint.

.6 Apply glass beads at a rate of not less than 650g/L of paint.

.7 Glass beads shall be applied to all markings except for black backgrounds.

.8 Apply second coat of paint, after the first coat has dried or after a minimum of one hour.

.9 Apply paint to the locations and dimensions indicated in the Contract Documents or as directed by the Consultant.

.10 Do not thin paint unless accepted by the Consultant.

.11 Symbols and letters to conform to dimensions indicated.

.12 Paint lines to be of uniform colour and density with sharp edges.

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

3.4 TOLERANCE

.1 Paint markings to be within plus or minus 10mm of dimensions indicated.

.2 Remove incorrect markings in accordance with Section 32 01 11.01 - Pavement Cleaning and Marking Removal.

.3 There shall be no overlap between the second and first coat. Both coats of paint shall be at the same width and alignment.

3.5 PROTECTION OF COMPLETED WORK

.1 Protect pavement markings until dry.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This section specifies the requirements for the supply, installations and repair of manholes, catch basins, and related appurtenances to the lines, grades and dimensions shown in the Contract Documents or as directed by the Consultant.

1.2 RELATED SECTIONS

.1 Section 03 10 00 – Concrete Forming and Accessories.

.2 Section 03 20 00 – Concrete Reinforcing.

.3 Section 32 13 13 – Concrete Paving.

1.3 MEASUREMENT PROCEDURES

.1 Partial Depth Repair of Existing Concrete Manhole Top:

.1 Payment at the tendered lump sum unit price shall be full compensation for removal of the concrete top, protection of existing steel frame and grate, supply and installation of steel reinforcement, forming, cast-in-place concrete to 28 day compressive strength at 35 MPa, finishing to design elevations as noted on the drawings, and all other incidentals necessary to complete the works.

1.4 REFERENCES

.1 All references to this Specifications, Standards, or Methods shall be understood to refer to the latest adopted revision, including all amendments.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A48/A48M, Standard Specification for Gray Iron Castings.

.2 ASTM C117, Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.

.3 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM C139, Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.

.5 ASTM C478M, Standard Specification for Precast Reinforced Concrete Manhole Sections Metric.

.6 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.4 Canadian Standards Association (CSA International)

.1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/ Methods of Test and Standard Practices for Concrete.

.2 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.1 CSA-A3001, Cementitious Materials for Use in Concrete.

.2 CSA-A3002, Masonry and Mortar Cement.

.3 CAN/CSA-A165 Series-04, CSA Standards on Concrete Masonry Units (Consists of A165.1, A165.2 and A165.3).

.4 CAN/CSA-G30.18-M92(R2002), Billet Steel Bars for Concrete Reinforcement.

.5 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.5 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two copies WHMIS MSDS - Material Safety Data Sheets.

.3 At least four weeks prior to commencing work submit test data and certification that material incorporated into the work meets the requirements of this section.

.4 Submittals: submit following in accordance with Section 01 45 00 - Quality Control.

.1 Submit manufacturer's test data and certification at least 4 weeks prior to beginning Work. Include manufacturer's drawings, information and shop drawings where pertinent.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

1.6 QUALITY CONTROL

.1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section and on-site installation, with contractor's representative and the Consultant to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle materials in accordance with local and Airport requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

Part 2 Products

2.1 MATERIALS

.1 Cast-in-place concrete:

.1 In accordance with Section 32 13 13 – Concrete Paving.

.2 Cement: to CAN/CSA-A3001, Type GU (General use cement).

.3 Concrete mix design to produce 35 MPa minimum compressive strength at 28 days and containing 25 mm maximum size coarse aggregate, with water/cement ratio to CAN/CSA-A23.1, exposure and 80 mm slump at time and point of deposit.

.1 Air entrainment to CAN/CSA-A23.1, class F-1 exposure.

.4 Concrete reinforcement: in accordance with Section 03 20 00 - Concrete Reinforcing.

.2 Steel gratings, I-beams and fasteners: as indicated.

.3 Frames, gratings, covers to dimensions as indicated and following requirements:

.1 Metal gratings and covers to bear evenly on frames.

.1 Frame with grating or cover to constitute one unit.

.2 Assemble and mark unit components before shipment.

.2 Frames, grates and fastenings shall meet Transport Canada specifications and as shown on the contract drawings.

.3 Gray iron castings: to ASTM A48/A48M, strength Class 30B.

.4 Castings: sand blasted or cleaned and ground to eliminate surface imperfections.

.4 Concrete mixes and materials:

.1 Perform concrete work in accordance with Section 32 13 13 – Concrete Paving.

.2 Place reinforcing steel in accordance with Section 03 20 00 – Concrete Reinforcing.

.3 Place inserts in accordance with dimensions and details indicated.

.5 Inland Butterfly Valve:

.1 The Guard Drain Block System as per attached specification and template drawings by Inland Technologies.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 CONCRETE WORK

.1 Do concrete work in accordance with Section 32 13 13 – Concrete Paving.

.2 Place concrete reinforcement in accordance with Section 03 20 00 - Concrete Reinforcing.

.3 Place forming in accordance with Section 03 10 00 – Concrete Forming and Accessories.

.4 Position metal inserts in accordance with dimensions and details as indicated.

3.3 INSTALLATION

.1 Construct units in accordance with details indicated, plumb and true to alignment and grade.

3.4 REPAIRING TOP OF EXISTING MANHOLE

.1 Remove existing partial depth of concrete and dispose off-site.

.1 Remove concrete by hydro blasting (high pressure water) method while containing / vacuuming over-spray and removed concrete materials as approved by the Consultant.

.2 Clean and level underlying concrete substrate so surface is +- 3mm from horizontal with no underlying cracks.

.3 Drill and set reinforcing steel with epoxy or non-shrink grout as indicated.

.4 Install reinforcing steel bars as indicated.

.5 Construct concrete work in accordance with Section 32 13 13 – Concrete Paving.

.6 Re-use existing gratings, frames and I-beams (if applicable) or construct new as indicated.

.7 Install new 35 MPa concrete to match surrounding asphalt and concrete elevations, slope concrete surface into steel grate.

3.5 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 On completion of project, flush manholes and catch basins with water and remove resultant debris.

END OF SECTION

SPECIFICATION FOR FLEX-O-LINE PAVEMENT MARKING TAPE

FOL300/310 – WET REFLECTIVE

I. Scope

This specification describes a pavement striping tape which is designed to provide reflective delineation under both dry conditions and conditions of moderate rainfall.

II. Description

The pavement striping material shall consist of white or yellow weather and traffic resistant reflective film on a conformable backing precoated with a pressure-sensitive adhesive.

III. Requirements

A. **Color** – The striping material shall be of white or yellow color as specified for pavement markings.

B. **Reflection** – The white and yellow striping material shall be reflex-reflective, reflecting white or yellow respectively and shall be readily visible when viewed with automobile headlights at night and shall have the following minimum reflective values at 0.2 and 0.5 divergence measured n accordance with the photometric testing procedures of Federal Specification L-S-300A "Sheeting and Tape, Reflective; Nonexposed Lens Adhesive Backing". Para. 4.4.7 or as amended. Reflective values shall be expressed as candle-power per foot candle per stripe measured on a 2 ½ by 2 foot panel at 86° incidence (a typical stripe is 4" x 15" = 5 square feet).

Div. Angle	White	Yellow
0.2°	1.00	0.90
0.5°	0.90	0.80

White and yellow striping material immersed in distilled water removed and allowed to drain at an angle of 4° with the horizontal for 15 seconds shall have minimum reflective values expressed as candle-power per foot candle per stripe as follows:

Div. Angle	White	Yellow
0.2°	0.50	0.45
0.5°	0.45	0.40

C. **Adhesive** – The striping material shall have a precoated pressure-sensitive adhesive, which shall not require a liner or activation.

Material applied and tested in accordance with ASTM-D1000-68 shall show minimum adhesion values as follows:

Application Temp.	Test Temp.	Minimum Adhesion Value (Gms/inch in width)
50°F.	0°F.	500
75°F.	75°F.	500
115°F.	115°F.	1000

D. **Application Properties** – The material shall adhere to asphalt and concrete surfaces when applied according to manufacturer's recommendations at surface temperatures down to 50°F. and shall require no protective devices such as traffic cones or barricades after application.

E. **Conformability** – The striping material shall be thin, flexible, formable, and following application shall remain conformed to the texture of the pavement surfaces.

The average thickness of the material, as determined by five micrometer readings, will not be less than 25 mils nor more than 40 mils.

F. **Removability** – Striping tape shall be removable by following the manufacturer's recommendations so long as the material is substantially intact. Removal shall not require sandblast; solvent or grinding methods and shall not result in objectionable staining of the pavement surface.

G. **Durability & Wear Resistance** – The striping material applied in accordance with manufacturer's recommended procedures shall be weather resistant and show no appreciable fading, lifting or shrinkage during the useful life of the line. Samples of material applied to standard specimen plates and tested in accordance with Federal Test Method Standard No. 141. Method 6192 using a CS-17 wheel and 1000 gram load shall not wear through to the metallic surface after 5000 cycles.

H. **General** – The striping material as supplied shall be of good appearance, free from cracks and edges shall be true, straight and unbroken. The material shall be available in rolls and there shall be no more than one (1) splice per 50 yards of length.

The striping material shall be packaged in accordance with accepted commercial standards.

The striping material as supplied may be stored at temperatures up to 100°F. for periods up to one year after purchase.

FOL Tape, LLC

Appendix A – Plan of Construction Operations