



INVITATION TO TENDER

RUNWAY 13-31, TAXIWAY A AND APRON I REHABILITATION

QUESNEL REGIONAL AIRPORT QUESNEL, BC

DATE OF ISSUE: January 17, 2022

Closing Location:

Courier, or hand delivered to:

City of Quesnel
Mr. Jeff Norburn, Director of Community Services
410 Kinchant St.
Quesnel, BC, Canada V2J 7J5

Closing date and time:

One (1) complete original and one (1) USB copy of each Tender are requested by: **2:00:00 PM Pacific Standard Time (PST) February 17, 2022.**

Contact:

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

Alex Evans, P.Eng.

Email: Alex.Evans@tetrattech.com

INSTRUCTIONS TO TENDERERS

INVITATION

The City of Quesnel invites tenders for the **Runway 13-31, Taxiway A and Apron I Rehabilitation** project at the Quesnel Regional Airport. This is an open invitation to tender for qualified contractors. Tenders must be received by the City of Quesnel, at its address set out herein, by **2:00:00 PM PST Local Time, Thursday, February 17, 2022**.

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 and/or Contract Administrator" means Tetra Tech Canada Inc., 1000 - 10th FL, 885 Dunsmuir St., Vancouver, BC V6C 1N5, Alex.Evans@tetrattech.com;
- .5 "Tender Documents" means
 - .1 Instructions to Tenderers;
 - .2 Tender Form;
 - .3 Agreement;
 - .4 General Conditions;
 - .5 Supplementary Conditions;
 - .6 Specifications;
 - .7 Drawings;
 - .8 Addenda (if any) and;
 - .9 Airside Operational Plan
- .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 Quesnel Regional Airport, City of Quesnel, Attn: Jeff Norburn, Director of Community Services. 410 Kinchant St. Quesnel, BC, Canada V2J 7J5

- .13 "Tender" means a tender submitted to the Owner in accordance with the Instructions to Tenderers;
- .14 "Tenderer" means anyone who submits a Tender; and
- .15 "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.
- 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 **May 16, 2022** and completed by **July 30, 2022**.

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: **Alex Evans, P.Eng.**
email: **Alex.Evans@tetrattech.com**
- 3.3 **The Tenderer acknowledges that a pre-tender conference video meeting will be held on January 27, 2022 at 10:00 am Local Time (PST). Contact Alex Evans above for meeting invite.**

3.4 **Should the Tenderer want to physically inspect the Place of Work, please contact Tommy Grant at tgrant@quesnel.ca to arrange for a brief site tour. Please note that proof of Covid-19 Vaccination will be required as per Transport Canada standards. Questions regarding the project will not be answered during the site tour, as all inquiries must be directed to Alex Evans, P.Eng.**

3.5 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. An alternative tender will not be opened unless the selected tenderer has also provided an alternate tender.

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 Consultant is 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 Unit Prices; and
- .4 Appendix D – Contractor’s Qualifications
- .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.

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. Failure to provide bid security acceptable to the Owner will be sufficient grounds for disqualification.

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 shall 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.
- .1 The cost of the Tenders shall be priced as four separate base items (Price A, Price B, Price C, and Price D). 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 for Price A, B, C, D, or NONE, on any basis it considers desirable, including the overall cost of the Tenders in relation to the Owner's budget for the Work.
- 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 general conditions,
 - .2 A copy of the insurance policies as specified in the supplementary 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.

- .4 Prime Contractor designation is required within ten (10) working days of the contract award.

- 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 EXCLUSION OF P.C.C. PROCEDURES AND GUIDELINES

- 20.1 In the tendering, award and performance of the Contract, the Owner, does not adopt or agree to be bound by the "Procedures and Guidelines Recommended For Use on Publicly Funded Construction Projects", produced by the Public Construction Council of British Columbia, September 1989, or any other procedure or guidelines recommended, adopted or produced by any government, or by any construction association or body.

PART 21 GENERAL PROVISIONS

- 21.1 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.
- 21.2 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.

PART 22 TRANSPORT CANADA COVID-19 VACCINE REGULATIONS

- 22.1 Transport Canada requires that all workers working airside provide proof of Covid-19 vaccination. All workers working on airside must obtain an Airside Access Pass and display the pass whenever requested. The Owner will issue the individual Airside Access Pass to each worker upon completion of Contractor Orientation Form and verification of proof of Covid-19 vaccination.

END OF INSTRUCTIONS TO TENDERERS

Submitted To: The City of Quesnel

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 Canada 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:

A: _____

Dollars (A: \$ _____) 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.

OR;

B: _____

Dollars (B: \$ _____) 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.

OR;

C: _____

Dollars (C: \$ _____) 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.

OR;

D: _____

Dollars (D: \$ _____) 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, 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 prior to **July 30, 2022**.
- 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 _____, 2022.

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	TITLE	PAGES
00100	Invitation to Tender Title Page	1
00200	Instructions to Tenderers	9
00300	Tender Form (Including Appendices A-E)	29
00500	Form of Agreement	1
00710	General Conditions	1
00810	Supplementary General Conditions	11
-----	CCDC 18 Including Agreement	35

DIVISION 01 - GENERAL REQUIREMENTS

01 11 00	Summary of Work	4
01 14 00	Work Restrictions	2
01 15 00	Weigh Scales	2
01 21 00	Allowances	2
01 31 19	Project Meetings	3
01 32 16.07	Construction Progress Schedule - Bar (GANTT) Chart	4
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 56 00	Temporary Barriers and Enclosures	2

SECTION	TITLE	PAGES
01 61 00	Common Product Requirements	5
01 71 00	Examination and Preparation	4
01 74 11	Cleaning	3
01 78 00	Closeout Submittals	6
DIVISION 02 - EXISTING CONDITIONS		
02 41 13	Selective Site Demolition	8
02 41 13.14	Asphalt Paving Removal	3
DIVISION 03 - CONCRETE		
03 10 00	Concrete Forming and Accessories	5
03 20 00	Concrete Reinforcing	5
03 30 00	Cast-In-Place Concrete	15
03 30 20	Sawcutting and Sealing of Airfield Panel Joints	3
DIVISION 26 - ELECTRICAL		
26 05 00	Common Work Results for Electrical	14
26 05 28	Grounding – Secondary	2
26 05 34	Conduits, Conduit Fastenings	4
26 05 43.01	Installation of Cables in Trenches and in Ducts	4
DIVISION 31 - EARTHWORK		
31 05 10	Corrected Maximum Dry Density	1
31 05 16	Aggregate Materials	10
31 22 14	Airfield Grading	7
31 23 33.01	Excavating, Trenching, and Backfilling	13
DIVISION 32 - CIVIL		

SECTION	TITLE	PAGES
32 01 11.01	Pavement Cleaning and Marking Removal	2
32 01 18	Routing and Sealing Pavement Cracks	4
32 11 23	Granular Base Course	4
32 12 13.16	Asphalt Tack Coat	4
32 12 16	Asphalt Paving	20
32 12 16.03S	Hot-In-Place Recycle	3
32 17 23	Pavement Markings	4
32 31 13	Chain Link Fences and Gates	8
32 91 19.13	Topsoil Placement and Grading	5
32 92 19.16	Hydraulic Seeding	6
DIVISION 33 - UTILITIES		
33 05 13	Manholes and Catch Basin Structures	8
33 65 76	Direct Buried Underground Cable Ducts	3
DIVISION 34 - TRANSPORTATION		
34 43 10	Airfield Lighting – General	9
34 43 10.01	Illuminated Airport Guidance Signs	3
34 43 13.19	Elevated Edge Lighting for Airport Runways, Taxiways, Aprons	3
34 43 16.26	Airfield Omni-Directional Approach Lighting Equipment	3
34 43 16.34	Airfield Medium Intensity Approach Lighting Equipment	3
34 43 16.36	Airfield Precision Approach Path Indicator	2
34 43 26.23	Airfield Lighting Regulator Assembly	2
APPENDIX A	Plan of Construction Operations	26
APPENDIX B	Hot-In-Place Recycling (HIPR) Technical Memo	17

Drawings List - Bound Separately:

GENERAL

G-000 - COVER PAGE
G-101 - OVERALL PLAN OF CONSTRUCTION OPERATIONS
G-102 - TAXIWAY A AND APRON I PLAN OF CONSTRUCTION OPERATIONS

CIVIL

C-101 - OVERALL SITE PLAN AND SURVEY CONTROL
C-102 - RUNWAY 13-31 PLAN AND PROFILE STA.4+900 - STA.5+840
C-103 - RUNWAY 13-31 PLAN AND PROFILE STA.5+840 - STA.6+780
C-104 - TAXIWAY A AND APRON I SITE PLAN
C-105 - ASPHALT CORING, CRACK TREATMENTS AND PAVING JOINT RECORDS
C-201 - RUNWAY 13-31 TEMPORARY PAINT MARKING PLAN
C-202 - RUNWAY 13-31 PAINT MARKING AND SIGNAGE PLAN
C-203 - TAXIWAY A & APRON I PAINT MARKING AND SIGNAGE PLAN
C-301 - CIVIL DETAILS I
C-302 - CIVIL DETAILS II
C-401 - PAINT DETAILS I

ELECTRICAL

ESP1 - ELECTRICAL SITE PLAN
ELA1A - ELECTRICAL LAYOUT SHEET 1 OF 5 OPTION #A: ODALS 13
ELA1B - ELECTRICAL LAYOUT SHEET 1 OF 5 OPTION #B: MALS 13 OPTION #C: MALSF 13
OPTION #D: MALSR 13
ELA2A - ELECTRICAL LAYOUT SHEET 2 OF 5 OPTION #A: ODALS 13
ELA2B - ELECTRICAL LAYOUT SHEET 2 OF 5 OPTION #B: MALS 13 OPTION #C: MALSF 13
OPTION #D: MALSR 13
ELA3 - ELECTRICAL LAYOUT SHEET 3 OF 5
ELA4A - ELECTRICAL LAYOUT SHEET 4 OF 5 OPTION #A: ODALS 31
ELA4B - ELECTRICAL LAYOUT SHEET 4 OF 5 OPTION #B: MALS 31 OPTION #C: MALSF 31
OPTION #D: MALSR 31
ELA5A - ELECTRICAL LAYOUT SHEET 5 OF 5 OPTION #A: ODALS 31
ELA5B - ELECTRICAL LAYOUT SHEET 5 OF 5 OPTION #B: MALS 31 OPTION #C: MALSF 31
OPTION #D: MALSR 31
EDE1 - ELECTRICAL DETAILS SHEET 1 OF 6
EDE2 - ELECTRICAL DETAILS SHEET 2 OF 6
EDE3 - ELECTRICAL DETAILS SHEET 3 OF 6
EDE4 - ELECTRICAL DETAILS SHEET 4 OF 6
EDE5 - ELECTRICAL DETAILS SHEET 5 OF 6
EDE6 - ELECTRICAL DETAILS SHEET 6 OF 6

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.

Division or Section of Work	Name of Subcontractor
-----------------------------	-----------------------

Survey Company

Civil Contractor

Asphalt Milling Contractor

Electrical Contractor

Paving Contractor

Painting Contractor

APPENDIX "C" to Tender Form

Tender Submitted by: _____

Schedule of Contract Unit Prices

1.00	NMS REF.	General Construction Items	Unit	Quantity	Unit Price	Total
1.01	01 35 13.13 1.4.1	Mobilization / Demobilization / Permits / Facilities / Bonding / Insurance / Reflective Low Barricades & Red Lights / Access Control Guard / Quality Control / Project Sign / Night Lighting / Protect Existing Manholes / New Retroreflective Road Holding Position Sign	LS	1		
1.02	01 71 00 1.2.1	Construction & As-built Surveys, Locates, New Survey Monuments, and Operations & Maintenance Manuals	LS	1		
1.03	01 21 00 1.1.8.1	Allowance for Airside Security Escort	ALLOW	1	\$50,000	\$50,000
1.04	01 21 00 1.1.8.2	Rejuvenating Agent	ALLOW	1	\$75,000	\$75,000
1.05	01 21 00 1.1.8.3	Standby Time	ALLOW	1	\$75,000	\$75,000
1.06	01 21 00 1.1.8.4	Repair of Existing Collapsed Manhole	ALLOW	1	\$10,000	\$10,000
1.07	01 21 00 1.1.8.5	Tree Clearing	ALLOW	1	\$15,000	\$15,000
Sub-Total Section 1.0						
2.00	NMS REF.	Runway 13-31 Rehabilitation: HIPR and HMAC Overlay	Unit	Quantity	Unit Price	Total
2.01	02 41 13.14 1.3.2	PROVISIONAL WORK: Crack Treatments Before HIPR	LM	1,900		

2.02	02 41 13.14 1.3.1	Remove Existing Runway Asphalt by Cold Milling Full Depth and Stockpile Millings at Stockpile Location On-Site - Approximately 175mm Thick	M2	25,360		
2.03	02 41 13.14 1.3.1	Remove Existing Asphalt Blastpads by Cold Milling Full Depth and Stockpile Millings at Stockpile Location On-Site - Approximately 65mm Thick	M2	1,740		
2.04	32 12 16.03 1.3.1	HIPR - 55mm Depth 45m Runway Width	M2	74,570		
2.05	32 12 16.03 1.3.3	Admix (20%) 45m Runway Width	Tonne	1,940		
2.06	32 12 13.16 1.4.1	Asphalt Tack Coat	M2	77,000		
2.07	32 12 16 1.4.2	HMAC Base Course Mix for Asphalt Fill Location	M3	137		
2.08	32 12 16 1.4.1	HMAC Surface Course Mix - 60mm Compacted Thickness for 45m Runway Width	M2	74,570		
2.09	31 22 14 1.2.1	Supply and Install Compacted Common Fill 7.98m Width - Average 146mm Thick	M3	3,700		
2.10	32 91 19.13 1.3.1	Supply and Install Topsoil (Average 100mm Thick)	M2	29,350		
2.11	32 91 19.13 1.3.1	Supply and Install Topsoil (20-70mm Thick) to Tie to Existing Ground	M2	150		
2.12	32 92 19.16 1.3.1	Hydroseeding	M2	29,500		

2.13	33 05 13 1.3.1	Raise Existing Manhole Rim to Match New Grades	EA	3		
2.14	32 17 23 1.5.1	Temporary and New Permanent Pavement Markings	LS	1		
Sub-Total Section 2.0						
3.00	NMS REF.	Runway 31 PCC Rehabilitation and HMAC Overlay	Unit	Quantity	Unit Price	Total
3.01	02 41 13 1.3.1	Sawcut and Remove Existing Reinforced PCC Panels Full Depth and Dispose Off Site - Approximately 230mm Thick	M2	760		
3.02	03 30 00 1.3.1	Sawcut, Partial Depth Concrete Panel Repairs	M2	95		
3.03	32 12 13.16 1.4.1	Asphalt Tack Coat	M2	7,600		
3.04	32 12 16 1.4.1	HMAC Surface Course Mix - 71mm Compacted Thickness	M2	7,600		
3.05	32 01 18 1.2.1	Sawcut, Rout and Seal Above PCC Cracks	LM	3,300		
3.06	31 22 14 1.2.1	Supply and Install Compacted Common Fill 7.98m Width - Average 200mm Thick	M3	150		
Sub-Total Section 3.0						
4.00	NMS REF.	Mill/Pave Taxiway A	Unit	Quantity	Unit Price	Total
4.01	02 41 13.14 1.3.1	Cold Milling Variable Depth (10mm - 65mm) and Stockpile Millings at Stockpile Location On-Site	M2	360		
4.02	02 41 13.14 1.3.1	Cold Milling 10mm Depth and Stockpile Millings at Stockpile Location On-Site	M2	4,390		

4.03	02 41 13.14 1.3.2	PROVISIONAL WORK: Taxiway A Crack Treatments After Milling	LM	200			
4.04	32 12 13.16 1.4.1	Asphalt Tack	M2	4,900			
4.05	32 12 16 1.4.2	HMAC Base Course Mix for Variable Depth Paving Areas	M3	4			
4.06	32 12 16 1.4.1	HMAC Surface Course Mix - 65mm Compacted Thickness	M2	4,740			
4.07	32 91 19.13 1.3.1	Supply and Install Topsoil (20-55mm Thick) to Tie to Existing Ground	M2	670			
4.08	32 92 19.16 1.3.1	Hydroseeding	M2	670			
4.09	33 05 13 1.3.1	Raise Existing Manhole Rim to Match New Grades	EA	6			
4.10	32 17 23 1.5.1	Temporary and New Permanent Pavement Markings	LS	1			
		Sub-Total Section 4.0					
5.00	NMS REF.	Mill/Pave Apron I Asphalt	Unit	Quantity	Unit Price	Total	
5.01	02 41 13.14 1.3.1	Remove Existing Apron Asphalt by Cold Milling Full Depth and Stockpile Millings at Stockpile Location On- Site - Approximately 100mm Thick	M2	2,140			
5.02	32 11 23 1.3.3	Water and Compact Existing Granular Base	M2	2,140			
5.03	32 12 13.16 1.4.1	Asphalt Tack	M2	2,140			
5.04	32 12 16 1.4.1	HMAC Surface Course Mix - 100mm Compacted Thickness (Placed in 2-50mm Lifts)	M2	2,140			

		Sub-Total Section 5.0				
6.00	NMS REF.	Apron I PCC Rehabilitation	Unit	Quantity	Unit Price	Total
6.01	03 30 00 1.3.2	Sawcut, Partial Depth Concrete Panel Repairs	M2	40		
6.02	03 30 20 1.4.1	Remove Existing Joint Sealant, Sawcut and Seal PCC/PCC and PCC/HMAC Joints	LM	1,400		
6.03	32 17 23 1.5.1	New Permanent Pavement Marking	LS	1		
		Sub-Total Section 6.0				
7.00A	NMS REF.	Civil PROVISIONAL Items Option A: ODALS	Unit	Quantity	Unit Price	Total
7.01A	32 11 23 1.3.1	Supply and Install Granular Base for Blastpads - 70mm Thick	M3	90		
7.02A	32 12 16 1.4.1	HMAC Surface Course Mix - 65mm Compacted Thickness for Blastpads	M2	1,280		
		Sub-Total Section 7.0A				
7.00B	NMS REF.	Civil PROVISIONAL Items Option B: MALS	Unit	Quantity	Unit Price	Total
7.01B	32 91 19.13 1.3.1	Supply and Install Topsoil (100mm - 136mm Thick) for Removed Blastpad Areas	M2	1,280		
7.02B	32 92 19.16 1.3.1	Hydroseeding	M2	1,280		
7.03B	02 41 13 1.3.2	Remove Existing Chain Link Security Fence Surrounding Existing Runway 13 Groundside ODALS and Dispose Off Site	LS	1		

7.04B	32 31 13 1.3.1	Supply and Install New 1.22m High Chain Link Fence c/w Barbed Wire and 1.83m Wide Gate Around Each New MALS Groundside Light	LM	120		
Sub-Total Section 7.0B						
7.00C	NMS REF.	Civil PROVISIONAL Items Option C: MALS F	Unit	Quantity	Unit Price	Total
7.01C	32 91 19.13 1.3.1	Supply and Install Topsoil (100mm - 136mm Thick) for Removed Blastpad Areas	M2	1,280		
7.02C	32 92 19.16 1.3.1	Hydroseeding	M2	1,280		
7.03C	02 41 13 1.3.2	Remove Existing Chain Link Security Fence Surrounding Existing Runway 13 Groundside ODALS and Dispose Off Site	LS	1		
7.04C	32 31 13 1.3.1	Supply and Install New 1.22m High Chain Link Fence c/w Barbed Wire and 1.83m Wide Gate Around Each New MALS F Groundside Light	LM	120		
Sub-Total Section 7.0C						
7.00D	NMS REF.	Civil PROVISIONAL Items Option D: MALS R	Unit	Quantity	Unit Price	Total
7.01D	32 91 19.13 1.3.1	Supply and Install Topsoil (100mm - 136mm Thick) for Removed Blastpad Areas	M2	1,280		
7.02D	32 92 19.16 1.3.1	Hydroseeding	M2	1,280		

7.03D	02 41 13 1.3.2	Remove Existing Chain Link Security Fence Surrounding Existing Runway 13 Groundside ODALS and Dispose Off Site	LS	1		
7.04D	32 31 13 1.3.1	Supply and Install New 1.22m High Chain Link Fence c/w Barbed Wire and 1.83m Wide Gate Around Each New MALSR Groundside Light	LM	170		
Sub-Total Section 7.0D						
8.00	NMS REF.	Electrical General Items	Unit	Quantity	Unit Price	Total
8.01	26 05 00 1.6.2	Electrical Mobilization / Demobilization / General Conditions / Etc.	LS	1		
8.02	34 43 10 1.6.5	Locate, mark on site, and record location of all existing underground cables / utilities that could be disturbed during construction.	LS	1		
8.03	26 05 00 1.6.4	Site clean-up/restoration.	LS	1		
8.04	34 43 10 1.6.3	Conduct testing & commissioning.	LS	1		
8.05	26 05 00 1.6.3	Submit Record Drawings and O&M Manuals	LS	1		
8.06	26 05 00 1.6.5	Spare Parts (Allowance)	LS	1		
Sub-Total Section 8.0						
9.00	NMS REF.	Airfield Lighting Rehabilitation	Unit	Quantity	Unit Price	Total
9.01	34 43 13.19 1.2.1	Remove and Re-install existing elevated runway edge light on new stake c/w sawcut/trenching (as required), and	EA	50		

		extended secondary cable/conduit.				
9.02	34 43 13.19 1.2.1	Remove and Re-install existing threshold/end light on new stake c/w sawcut/trenching (as required), and extended secondary cable.	EA	16		
9.03	34 43 16.36 1.5.1	Relocate, reinstall, and reconnect Runway 13 PAPI System	LS	1		
9.04	34 43 16.36 1.5.1	Relocate, reinstall, and reconnect Runway 31 PAPI System	LS	1		
9.05	34 43 10 1.6.2	Supply, install, and connect new pullpit lid (no hub).	EA	51		
9.06	26 05 43.01 1.3.1	Supply, install, and connect 1-1/C, #8, 5kV ASLC in existing or new duct.	LM	10,800		
9.07	34 43 10.01 1.3.1	Supply, install, and connect new illuminated airfield sign.	EA	6		
9.08	34 43 13.19 1.2.2	Supply, install, and connect new elevated taxiway edge light on stake c/w new secondary conduit/cabling and series isolating transformer. (Runway/Taxiway Intersection or Turning Bay)	EA	13		
9.09	34 43 13.19 1.2.2	Supply, install, and connect new elevated taxiway edge light on stake c/w new secondary conduit/cabling and series isolating transformer. (Apron)	EA	6		
9.10	34 43 10 1.6.7	Supply, install, and connect new Illuminated Windsock.	LS	3		

9.11	34 43 10 1.6.6	Provisions for maintaining airfield lighting systems operational during construction.	LS	1			
9.12	34 43 10 1.6.4	Electrical removals	LS	1			
9.13	34 43 10 1.6.8	Supply, install, and connect new Aircraft Receptacle Kiosk c/w cabling. (ALLOWANCE)	CASH ALLOW	1	\$50,000.00	\$50,000	
9.14	34 43 13.19 1.2.3	Replace existing runway edge light lens with white/yellow lens.	EA	35			
9.15	34 43 10 1.6.1	Supply, install, and connect new pullpit.	EA	34			
		Sub-Total Section 9.0					
10.00A	NMS REF.	PROVISIONAL Runway Approach Lighting System Rehabilitation Option A: ODALS	Unit	Quantity	Unit Price	Total	
		Runway 13 ODALS (Option A)					
10.01A	33 65 76 1.4.1	Trenching c/w 2-50mm RPVC Ducts (1 Power, 1 Comm), c/w ground counterpoise for ODALS Approaches Only	LM	525			
10.02A	26 05 43.01 1.3.1	Supply, install, and connect 1-1/C, #8, 5kV ASLC in existing or new duct.	LM	3,000			
10.03A	26 05 43.01 1.3.1	Supply, install, and connect 2C#14 Sync Cable for ODALS in new duct.	LM	525			
10.04A	34 43 16.26 1.4.1	Supply, install, and connect new Runway 13 ODALS System	LS	1			
10.05A	34 43 10 1.6.1	Supply, install, and connect new pullpit.	EA	14			
		Runway 31 ODALS (Option A)					

10.06A	33 65 76 1.4.1	Tenching c/w 2-50mm RPVC Ducts (1 Power, 1 Comm), c/w ground counterpoise for ODALS Approaches Only	LM	525			
10.07A	26 05 43.01 1.3.1	Supply, install, and connect 1-1/C, #8, 5kV ASLC in existing or new duct.	LM	3,200			
10.08A	26 05 43.01 1.3.1	Supply, install, and connect 2C#14 Sync Cable for ODALS in new duct.	LM	525			
10.09A	34 43 16.26 1.4.1	Supply, install, and connect new Runway 31 ODALS System	LS	1			
10.10A	34 43 10 1.6.1	Supply, install, and connect new pullpit.	EA	14			
		Sub-Total Section 10.0A					
10.00B	NMS REF.	PROVISIONAL Runway Approach Lighting System Rehabilitation Option B: MALS	Unit	Quantity	Unit Price	Total	
		Runway 13 MALS (Option B)					
10.01B	34 43 16.34 1.2.1	Supply, install, and connect new Runway 13 MALS System	LS	1			
10.02B	33 65 76 1.4.1	Tenching c/w 1-50mm RPVC Ducts (1 Power), c/w ground counterpoise	LM	450			
10.03B	26 05 43.01 1.3.1	Supply, install, and connect 1-1/C, #8, 5kV ASLC in existing or new duct.	LM	2,940			
10.04B	34 43 10 1.6.1	Supply, install, and connect new pullpit.	EA	21			
		Runway 31 MALS (Option B)					
10.05B	34 43 16.34 1.2.1	Supply, install, and connect new Runway 31 MALS System	LS	1			

10.06B	33 65 76 1.4.1	Tenching c/w 1-50mm RPVC Ducts (1 Power), c/w ground counterpoise	LM	450		
10.07B	26 05 43.01 1.3.1	Supply, install, and connect 1-1/C, #8, 5kV ASLC in existing or new duct.	LM	3,140		
10.08B	34 43 10 1.6.1	Supply, install, and connect new pullpit.	EA	21		
Sub-Total Section 10.0B						
10.00C	NMS REF.	PROVISIONAL Runway Approach Lighting System Rehabilitation Option C: MALSF	Unit	Quantity	Unit Price	Total
Runway 13 MALSF (Option C)						
10.01C	34 43 16.34 1.2.1	Supply, install, and connect new Runway 13 MALS Steady Burn System	LS	1		
10.02C	33 65 76 1.4.1	Tenching c/w 1-50mm RPVC Ducts (1 Power), c/w ground counterpoise	LM	320		
10.03C	33 65 76 1.4.1	Tenching c/w 2-50mm RPVC Ducts (1 Power, 1 Comm), c/w ground counterpoise for MALSF	LM	130		
10.04C	26 05 43.01 1.3.1	Supply, install, and connect 1-1/C, #8, 5kV ASLC in existing or new duct.	LM	5,880		
10.05C	26 05 43.01 1.3.1	Supply, install, and connect 2C#14 Sync Cable for Strobes in new duct.	LM	130		
10.06C	34 43 16.34 1.2.1	Supply, install, and connect Runway 13 strobes (3) for MALSF approach lighting.	LS	1		
10.07C	34 43 26.23 1.7.1	Supply, install, and connect new CCR in FEC	EA	1		

10.08C	34 43 10 1.6.1	Supply, install, and connect new pullpit.	EA	24		
		Runway 31 MALSF (Option C)				
10.09C	34 43 16.34 1.2.1	Supply, install, and connect new Runway 31 MALS Steady Burn System	LS	1		
10.10C	33 65 76 1.4.1	Tenching c/w 1-50mm RPVC Ducts (1 Power), c/w ground counterpoise	LM	320		
10.11C	33 65 76 1.4.1	Tenching c/w 2-50mm RPVC Ducts (1 Power, 1 Comm), c/w ground counterpoise for MALSF	LM	130		
10.12C	26 05 43.01 1.3.1	Supply, install, and connect 1-1/C, #8, 5kV ASLC in existing or new duct.	LM	6,280		
10.13C	26 05 43.01 1.3.1	Supply, install, and connect 2C#14 Sync Cable for Strobes in new duct.	LM	130		
10.14C	34 43 16.34 1.2.1	Supply, install, and connect Runway 31 strobes (3) for MALSF approach lighting.	LS	1		
10.15C	34 43 26.23 1.7.1	Supply, install, and connect new CCR in FEC	EA	1		
10.16C	34 43 10 1.6.1	Supply, install, and connect new pullpit.	EA	24		
		Sub-Total Section 10.0C				
10.00D	NMS REF.	PROVISIONAL Runway Approach Lighting System Rehabilitation Option D: MALS R	Unit	Quantity	Unit Price	Total
		Runway 13 MALS R (Option D)				
10.01D	34 43 16.34 1.2.1	Supply, install, and connect new Runway 13 MALS Steady Burn System	LS	1		

10.02D	33 65 76 1.4.1	Tenching c/w 1-50mm RPVC Ducts (1 Power), c/w ground counterpoise	LM	500		
10.03D	33 65 76 1.4.1	Tenching c/w 2-50mm RPVC Ducts (1 Power, 1 Comm), c/w ground counterpoise for MALSF	LM	260		
10.04D	26 05 43.01 1.3.1	Supply, install, and connect 1-1/C, #8, 5kV ASLC in existing or new duct.	LM	7,480		
10.05D	26 05 43.01 1.3.1	Supply, install, and connect 2C#14 Sync Cable for Strobes in new duct.	LM	260		
10.06D	34 43 16.34 1.2.1	Supply, install, and connect Runway 13 RAIL Strobes (5) for MALS approach lighting.	LS	1		
10.07D	34 43 26.23 1.7.1	Supply, install, and connect new CCR in FEC	EA	1		
10.08D	34 43 10 1.6.1	Supply, install, and connect new pullpit.	EA	31		
		Runway 31 MALS (Option D)				
10.09D	34 43 16.34 1.2.1	Supply, install, and connect new Runway 31 MALS Steady Burn System	LS	1		
10.10D	33 65 76 1.4.1	Tenching c/w 1-50mm RPVC Ducts (1 Power), c/w ground counterpoise	LM	500		
10.11D	33 65 76 1.4.1	Tenching c/w 2-50mm RPVC Ducts (1 Power, 1 Comm), c/w ground counterpoise for MALSF	LM	260		
10.12D	26 05 43.01 1.3.1	Supply, install, and connect 1-1/C, #8, 5kV ASLC in existing or new duct.	LM	7,880		

10.13D	26 05 43.01 1.3.1	Supply, install, and connect 2C#14 Sync Cable for Strobes in new duct.	LM	260		
10.14D	34 43 16.34 1.2.1	Supply, install, and connect Runway 31 RAIL Strobes (5) for MALSR approach lighting.	LS	1		
10.15D	34 43 26.23 1.7.1	Supply, install, and connect new CCR in FEC	EA	1		
10.16D	34 43 10 1.6.1	Supply, install, and connect new pullpit.	EA	31		
Sub-Total Section 10.0D						
11.00	NMS REF.	PROVISIONAL Electrical Items	Unit	Quantity	Unit Price	Total
11.01	34 43 10.01 1.3.1	Supply, install, and connect new illuminated airfield sign. (Taxiway B)	EA	2		
11.02	34 43 10 1.6.9	Supply, install, and connect new RGL Unit.	EA	2		
11.03	34 43 10 1.6.1	Supply, install, and connect new pullpit.	EA	4		
11.04	34 43 13.19 1.2.4	Supply and install retro-reflective taxiway edge marker.	EA	8		
Sub-Total Section 11.0						

Option A Total (Sections 1 – 6, 7A, 8, 9, 10A, 11)	\$
GST (5%)	\$
Option A Total Estimated Contract Price with GST	\$
Option B Total (Sections 1 – 6, 7B, 8, 9, 10B, 11)	\$
GST (5%)	\$
Option B Total Estimated Contract Price with GST	\$
Option C Total (Sections 1 – 6, 7C, 8, 9, 10C, 11)	\$
GST (5%)	\$
Option C Total Estimated Contract Price with GST	\$
Option D Total (Sections 1 – 6, 7D, 8, 9, 10D, 11)	\$
GST (5%)	\$
Option D Total Estimated Contract Price with GST	\$
Bidders Signature:	
Bidders Address:	
Bidders Telephone:	

APPENDIX "D" to Tender Form

**Tender
Submitted by:** _____

GENERAL 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.

<u>Construction Project</u>	<u>Year</u>	<u>Cost</u>	<u>Consulting Engineer</u>
--	--------------------	--------------------	---------------------------------------

Name of Site Superintendent: _____

Experience: _____

Dates: _____

Project Name: _____

Responsibility: _____

References: _____

Dates: _____

Project Name: _____

Responsibility: _____

References: _____

Dates: _____

Project Name: _____

Responsibility: _____

References: _____

ELECTRICAL CONTRACTOR'S QUALIFICATIONS

The Electrical Contractor (or Subcontractor) and its Electrical Site Superintendent performing the electrical component of the Work shall have a minimum 3 projects within last 5 years working on airport electrical system projects (construction, minimum electrical project values of \$100,000 each) and with the following airport lighting equipment / systems: constant current regulators, series circuit installation, navigational aids, elevated edge lighting, approach lighting.

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

**Name of
Electrical Site
Superintendent:** _____

Experience: _____

Dates: _____

Project Name: _____

Responsibility: _____

References: _____

Dates: _____

Project Name: _____

Responsibility: _____

References: _____

Dates: _____

Project Name: _____

Responsibility: _____

References: _____

APPENDIX "E" to Tender Form

Tender
Submitted by: _____

EQUIPMENT AND PERSONNEL STATEMENT

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

2. Equipment

Equipment Make and Model

Hourly Charge Out Rate*

Hourly Standby Rate**

* To be used for force account work.
All rates to be all-inclusive.

** To be used for standby time if other than total crew as tendered in the List of Unit Prices.

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 not 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 GENERAL 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 **July 30, 2022**, 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 Quesnel Regional Airport, Quesnel, British Columbia.
29. "Plan of Construction Operations" means the Owner's operational plan for the **Runway 13-31, Taxiway A and Apron I Rehabilitation at Quesnel Regional Airport, Quesnel, 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. "Consultant" and "Contract Administrator" shall have the same meaning and shall refer to Tetra Tech representative Alex Evans or designate.

GC 1.1 CONTRACT DOCUMENTS

Delete GC 1.1.7 and replace with the following:

SGC 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 General Conditions,
 - The General Conditions,
 - Addenda,
 - The Specifications,
 - Plan of Construction Operations,
 - The IFC Drawings,
 - Instructions to Tenderers,
 - Tender Form.
- .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:

SGC 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:

SGC 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:

SGC 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:

SGC 3.5.1.1 Prepare and submit to the Consultant within ten (10) working 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 Airside Operational Plan.

GC 3.9 LABOUR AND PRODUCTS

Delete GC 3.9.1 and replace with the following:

SGC 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:

SGC 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:

SGC 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, except where explicitly stated. 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 5.5 APPLICATIONS FOR PROGRESS PAYMENT

Add the following as GC 5.5.7:

SGC 5.5.7 The Contractor is to provide digital AutoCAD survey and Points files with each progress payment claim showing the surveyed claimed quantities. The Consultant can withhold payment for claimed quantities if the Contractor does not provide AutoCAD survey files for the claimed quantities. Digital files provided must meet the acceptance of the Consultant.

GC 5.6 PROGRESS PAYMENTS

Delete GC 5.6.1 and replace with the following:

SGC 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:

SGC 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:

SGC 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:

SGC 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:

SGC 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:

SGC 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:

SGC 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:

SGC 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:

SGC 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:

SGC 6.5.8 Time is of the essence of the Contract.

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:

SGC 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:

SGC 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:

SGC 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:

SGC 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:

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

A. "All Risks" Contractor's Equipment Insurance for full replacement cost/actual cash value 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 aircraft (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 \$2,000,000.00 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 Final Certificate for Payment.

Delete GC 11.1.2 and replace with the following:

SGC 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 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. The policy shall be in a form acceptable to the Consultant.

Delete GC 11.1.3 and replace with the following:

SGC 11.1.3 The Contractor shall provide, maintain and pay for the following insurance coverages:

A. Airport Contractor Liability Insurance (Occurrence Basis)

The Contractor will provide *Airport Contractor Liability Insurance* which shall be in the name of the Contractor, and as additional insureds the Owner (**namely the City of Quesnel**), Consultant (**namely Tetra Tech Canada Inc.**), the Contractor, Sub-contractors, sub-consultants, architects, engineers, project managers, construction managers and design consultants, their directors, officers and employees employed on the Project insured and any other entity the Owner may reasonably require from time to time with limits of not less than TEN MILLION (\$10,000,000.00) DOLLARS inclusive per occurrence for bodily injury, death and damage to property, *including policy extensions commonly referred to as products liability, completed operations, blanket contractual, contractor's protective, personal injury, occurrence property damage, explosion, collapse and underground damage. This policy will also include liability for vehicles operating within the airport security fence ("airside") to include vendors, suppliers, material dealers and others while operating vehicles "airside" for the sole purpose of support or transportation of material, equipment or parts. This policy will provide that the insurer will pay expenses, including legal costs, in connection with any claims which may be required to be contested by an insured and will include a cross liability clause, a breach of conditions clause and a 30 days' notice of cancellation clause. This policy will be maintained continuously from commencement of the work until total*

performance of the work. Property damage deductible of TEN THOUSAND (\$10,000) DOLLARS unless there is damage to an aircraft involved where the deductible will be TWENTY-FIVE THOUSAND (\$25,000.00) DOLLARS. The party found to be at fault will be responsible for the deductible.

B. All Risk - Builder's Risk Insurance

The Contractor will provide coverage to meet the Project requirements. Coverage will not be less than 100% of the full replacement cost, less such deductible amounts as are applicable (the deductible will be not more than \$25,000.00, except in the case of Flood where a \$50,000 deductible shall apply, or Earthquake where the deductible shall be 3% of the total insured value). The party found to be at fault will be responsible for the applicable deductible. The insurance shall be in the name of the Contractor and shall include as unnamed insureds the Owner, Consultant, the Contractor, Sub-contractors, sub-consultants, architects, engineers, project managers, construction managers and design consultants, their directors, officers and employees and all individuals or firms providing services or materials to or for the unnamed insured.

Add the following as GC 11.1.6:

SGC 11.1.6 It is the responsibility of the party relying on the insurance coverages 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 coverages, explicit or implied, or any discrepancy whatsoever between the insurance coverages 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:

SGC 11.2.1 The Contractor shall, within the time specified in the Contract Documents (and, in any case, prior to commencement of the Work) purchase and provide the Performance Bond and the Labour and Material Payment Bond and any other contract security as stipulated in the Contract Documents.

Delete GC 11.2.2 and replace with the following:

SGC 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 shall be named as obligee pursuant to such bonds.

Add the following as GC 11.2.3:

SGC 11.2.3 Following is the contract security required for the Contract:

- .1 A Performance Bond in the amount of fifty percent (50%) of the Total Estimated Contract Price; and
- .2 A Labour and Materials Payment Bond in the amount of fifty percent (50%) of the Total Estimated Contract Price.
- .3 The Performance Bond must include provisions for a one-year Maintenance Guarantee.

GC 12.1 INDEMNIFICATION

Delete GC 12.1.1 and replace with the following:

SGC 12.1.1 The Contractor shall indemnify and hold harmless, 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:

SGC 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

SGC 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

SGC 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

civil works contract

Project: Runway 13-31, Taxiway A and Apron I Rehabilitation
Quesnel Regional Airport
City of Quesnel

Apply a CCDC 18 copyright seal here. The application of the seal demonstrates the intention of the party proposing the use of this document that it be an accurate and unamended form of CCDC 18 – 2001 except to the extent that any alterations, additions or modifications are set forth in supplementary conditions.



Canadian Construction Documents Committee

TABLE OF CONTENTS

AGREEMENT BETWEEN OWNER AND CONTRACTOR

- A-1 THE WORK
- A-2 AGREEMENTS AND AMENDMENTS
- A-3 CONTRACT DOCUMENTS
- A-4 CONTRACT PRICE
- A-5 PAYMENT
- A-6 RECEIPT OF AND ADDRESSES FOR NOTICES
- A-7 LANGUAGE OF THE CONTRACT
- A-8 SUCCESSION

DEFINITIONS

- 1. Change Directive
- 2. Change Order
- 3. Construction Equipment
- 4. Consultant
- 5. Contract
- 6. Contract Documents
- 7. Contract Price
- 8. Contract Time
- 9. Contractor
- 10. Drawings
- 11. Owner
- 12. Place of the Work
- 13. Product
- 14. Project
- 15. Provide
- 16. Schedule of Prices
- 17. Shop Drawings
- 18. Specifications
- 19. Subcontractor
- 20. Substantial Performance of the Work
- 21. Supplemental Instruction
- 22. Supplier
- 23. Temporary Work
- 24. Unit Price
- 25. Value Added Taxes
- 26. Work
- 27. Working Day

GENERAL CONDITIONS OF THE CIVIL WORKS CONTRACT

PART 1 GENERAL PROVISIONS

- GC 1.1 CONTRACT DOCUMENTS
- GC 1.2 LAW OF THE CONTRACT
- GC 1.3 RIGHTS AND REMEDIES
- GC 1.4 ASSIGNMENT

PART 2 ADMINISTRATION OF THE CONTRACT

- GC 2.1 AUTHORITY OF THE CONSULTANT
- GC 2.2 ROLE OF THE CONSULTANT
- GC 2.3 REVIEW AND INSPECTION OF THE WORK
- GC 2.4 DEFECTIVE WORK

PART 3 EXECUTION OF THE WORK

- GC 3.1 CONTROL OF THE WORK
- GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS
- GC 3.3 TEMPORARY WORK
- GC 3.4 DOCUMENT REVIEW
- GC 3.5 CONSTRUCTION SCHEDULE
- GC 3.6 SUPERVISION
- GC 3.7 LAYOUT OF THE WORK
- GC 3.8 SUBCONTRACTORS AND SUPPLIERS
- GC 3.9 LABOUR AND PRODUCTS
- GC 3.10 DOCUMENTS AT THE SITE
- GC 3.11 SHOP DRAWINGS
- GC 3.12 USE OF THE WORK
- GC 3.13 CUTTING AND REMEDIAL WORK
- GC 3.14 CLEANUP

PART 4 ALLOWANCES

- GC 4.1 CASH ALLOWANCES
- GC 4.2 CONTINGENCY ALLOWANCE

PART 5 PAYMENT

- GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER
- GC 5.2 BASIS OF PAYMENT FOR UNIT PRICE WORK
- GC 5.3 BASIS OF PAYMENT FOR LUMP SUM WORK
- GC 5.4 BASIS OF PAYMENT FOR COST PLUS WORK
- GC 5.5 APPLICATIONS FOR PROGRESS PAYMENT
- GC 5.6 PROGRESS PAYMENT
- GC 5.7 SUBSTANTIAL PERFORMANCE OF THE WORK
- GC 5.8 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF THE WORK
- GC 5.9 PROGRESSIVE RELEASE OF HOLDBACK
- GC 5.10 FINAL PAYMENT
- GC 5.11 WITHHOLDING OF PAYMENT
- GC 5.12 NON-CONFORMING WORK

PART 6 CHANGES

- GC 6.1 CHANGES
- GC 6.2 CHANGE ORDER
- GC 6.3 CHANGE DIRECTIVE
- GC 6.4 CONCEALED OR UNKNOWN CONDITIONS
- GC 6.5 DELAYS
- GC 6.6 CLAIMS
- GC 6.7 QUANTITY VARIATIONS

PART 7 DEFAULT NOTICE

- GC 7.1 OWNER'S RIGHT TO PERFORM THE WORK, STOP THE WORK, OR TERMINATE THE CONTRACT
- GC 7.2 CONTRACTOR'S RIGHT TO STOP THE WORK OR TERMINATE THE CONTRACT

PART 8 DISPUTE RESOLUTION

- GC 8.1 AUTHORITY OF THE CONSULTANT
- GC 8.2 NEGOTIATION, MEDIATION, AND ARBITRATION
- GC 8.3 RETENTION OF RIGHTS

PART 9 PROTECTION OF PERSONS AND PROPERTY

- GC 9.1 PROTECTION OF WORK AND PROPERTY
- GC 9.2 DAMAGES AND MUTUAL RESPONSIBILITY
- GC 9.3 TOXIC AND HAZARDOUS SUBSTANCES
- GC 9.4 ARTIFACTS AND FOSSILS
- GC 9.5 CONSTRUCTION SAFETY

PART 10 GOVERNING REGULATIONS

- GC 10.1 TAXES AND DUTIES
- GC 10.2 LAWS, NOTICES, PERMITS, AND FEES
- GC 10.3 PATENT FEES
- GC 10.4 WORKERS' COMPENSATION

PART 11 INSURANCE AND CONTRACT SECURITY

- GC 11.1 INSURANCE
- GC 11.2 CONTRACT SECURITY

PART 12 INDEMNIFICATION - WAIVER - WARRANTY

- GC 12.1 INDEMNIFICATION
- GC 12.2 WAIVER OF CLAIMS
- GC 12.3 WARRANTY

CCDC 18 is the product of a consensus-building process aimed at balancing the interests of all parties on the construction project. It reflects recommended industry practices. CCDC 18 can have important consequences. The CCDC and its constituent member organizations do not accept any responsibility or liability for loss or damage which may be suffered as a result of the use or interpretation of CCDC 18.

AGREEMENT BETWEEN OWNER AND CONTRACTOR

This Agreement made on the _____ day of _____ in the year 2022 .

by and between

City of Quesnel

hereinafter called the "Owner"

and

hereinafter called the "Contractor"

The *Owner* and the *Contractor* agree as follows:

ARTICLE A-1 THE WORK

The *Contractor* shall:

1.1 perform the *Work* required by the *Contract Documents* for Runway 13-31, Taxiway A and Apron I Rehabilitation

_____ *insert above the title of the Work*

located at Quesnel Regional Airport, Quesnel, BC

_____ *insert above the Place of the Work*

for which the Agreement has been signed by the parties, and for which Tetra Tech Canada Inc.

_____ *insert above the name of the Consultant*

is acting as and is hereinafter called the "*Consultant*" and

1.2 do and fulfill everything indicated by the *Contract Documents*, and

1.3 commence the *Work* by the 16 day of May in the year 2022 and, subject to adjustment in *Contract Time* as provided for in the *Contract Documents*, attain *Substantial Performance of the Work*, by the 30 day of

July in the year 2022

ARTICLE A-2 AGREEMENTS AND AMENDMENTS

- 2.1 The *Contract* supersedes all prior negotiations, representations, or agreements, either written or oral, relating in any manner to the *Work*, including the bidding documents that are not expressly listed in Article A-3 of the Agreement - CONTRACT DOCUMENTS.
- 2.2 The *Contract* may be amended only as provided in the *Contract Documents*.

ARTICLE A-3 CONTRACT DOCUMENTS

- 3.1 The following are the *Contract Documents* referred to in Article A-1 of the Agreement - THE WORK:
- Agreement Between *Owner* and *Contractor*
 - Definitions
 - The General Conditions of the Contract
 - * See Section 00300 Appendix A for List of Tender Documents

- * *(Insert here, attaching additional pages if required, a list identifying all other Contract Documents e.g.:*
- *Supplementary Conditions;*
 - *Schedule of Prices;*
 - *Specifications, giving a list of contents with section numbers and titles, number of pages, and date;*
 - *Drawings, giving drawing number, title, date, revision date or mark;*
 - *Addenda, giving title, number, date;*
 - *Information documents, or parts thereof, to be incorporated in the Contract Documents identifying them by title, date, name of preparer and, if not included in their entirety, the page or sheet numbers to be included).*

ARTICLE A-4 CONTRACT PRICE

4.1 * *Unit Prices* form the basis for payment of the *Contract Price*. Quantities in the *Schedule of Prices* are estimated. The estimated *Contract Price*, which is the total extended amount indicated in the *Schedule of Prices*, is:

OR

* ~~A lump sum stipulated price forms the basis for payment of the *Contract Price*. The *Contract Price* is:~~

* *(Manually strike out inapplicable paragraph)*

_____/100 dollars \$ _____

4.2 All amounts are in Canadian funds and exclude Value Added Taxes.

4.3 These amounts shall be subject to adjustments as provided in the *Contract Documents*.

ARTICLE A-5 PAYMENT

5.1 Subject to the provisions of the *Contract Documents*, and in accordance with legislation and statutory regulations respecting holdback percentages and, where such legislation or regulations do not exist or apply, subject to a holdback of _____ ten _____ percent (10 %), the *Owner* shall in Canadian funds:

- .1 make progress payments to the *Contractor* on account of the *Contract Price* when due in the amount certified by the *Consultant* together with such *Value Added Taxes* as may be applicable to such payment, and
- .2 upon *Substantial Performance of the Work*, pay to the *Contractor* the unpaid balance of the holdback amount when due together with such *Value Added Taxes* as may be applicable to such payment, and
- .3 upon the issuance of the final certificate for payment, pay to the *Contractor* the unpaid balance of the *Contract Price* when due together with such *Value Added Taxes* as may be applicable to such payment.

5.2 In the event of loss or damage occurring where payment becomes due under the property and boiler insurance policies, payments shall be made to the *Contractor* in accordance with the provisions of GC 11.1 - INSURANCE.

5.3 Interest

- .1 Should either party fail to make payments as they become due under the terms of the *Contract* or in an award by arbitration or court, interest at two percent (2%) per annum above the prime rate on such unpaid amounts shall also become due and payable until payment. Such interest shall be compounded and adjusted on a monthly basis. The prime rate shall be the rate of interest quoted by _____ Royal Bank _____ for prime business loans. *(Insert name of chartered lending institution whose prime rate is to be used)*
- .2 Interest shall apply at the rate and in the manner prescribed by paragraph 5.3.1 of this Article on the settlement amount of any claim in dispute that is resolved either pursuant to Part 8 of the General Conditions - DISPUTE RESOLUTION or otherwise, from the date the amount would have been due and payable under the *Contract*, had it not been in dispute, until it is paid.

ARTICLE A-6 RECEIPT OF AND ADDRESSES FOR NOTICES

6.1 Notices in writing between the parties or between them and the *Consultant* shall be considered to have been received by the addressee on the date of delivery if delivered to the individual, or to a member of the firm, or to an officer of the corporation for whom they are intended by hand or by registered post; or if sent by regular post, to have been delivered within 5 *Working Days* of the date of mailing when addressed as follows:

The *Owner* at City of Quesnel

410 Kinchant St.
street and number and postal box number if applicable

Quesnel, BC V2J 7J5
post office or district, province or territory, postal code

The *Contractor* at _____

street and number and postal box number if applicable

post office or district, province or territory, postal code

The *Consultant* at Tetra Tech Canada Inc.

1000 - 10th FL, 885 Dunsmuir St.
street and number and postal box number if applicable

Vancouver, BC V6C 1N5
post office or district, province or territory, postal code

ARTICLE A-7 LANGUAGE OF THE CONTRACT

7.1 When the *Contract Documents* are prepared in both the English and French languages, it is agreed that in the event of any apparent discrepancy between the English and French versions, the English / ~~French~~ * language shall prevail.
* (Complete this statement by striking out inapplicable term)

7.2 This Agreement is drawn in English at the request of the parties hereto. La présente convention est rédigée en anglais à la demande des parties.

ARTICLE A-8 SUCCESSION

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

In witness whereof the parties hereto have executed this Agreement by the hands of their duly authorized representatives.

SIGNED AND DELIVERED

in the presence of:

Owner

City of Quesnel

name of Owner

signature

name and title of person signing

signature

name and title of person signing

WITNESS

signature

name and title of person signing

Contractor

name of Contractor

signature

name and title of person signing

WITNESS

signature

name and title of person signing

- N.B. Where legal jurisdiction, local practice, or Owner or Contractor requirement calls for:
- (a) proof of authority to execute this document, attach such proof of authority in the form of a certified copy of a resolution naming the representative(s) authorized to sign the Agreement for and on behalf of the corporation or partnership; or
 - (b) the affixing of a corporate seal, this Agreement should be properly sealed.

DEFINITIONS

The following definitions shall apply to all *Contract Documents*.

1. **Change Directive**
A *Change Directive* is a written instruction prepared by the *Consultant* and signed by the *Owner* directing the *Contractor* to proceed with a change in the *Work* within the general scope of the *Contract Documents* prior to the *Owner* and the *Contractor* agreeing upon an adjustment in *Contract Price* and *Contract Time* .
2. **Change Order**
A *Change Order* is a written amendment to the *Contract* prepared by the *Consultant* and signed by the *Owner* and the *Contractor* stating their agreement upon:
 - a change in the *Work*;
 - the method of adjustment or the amount of the adjustment in the *Contract Price*, if any; and
 - the extent of the adjustment in the *Contract Time*, if any.
3. **Construction Equipment**
Construction Equipment means all machinery and equipment, either operated or not operated, that is required for preparing, fabricating, conveying, erecting, or otherwise performing the *Work* but is not incorporated into the *Work*.
4. **Consultant**
The *Consultant* is the person or entity identified as such in the Agreement. The *Consultant* is the Engineer or other entity licensed to practise in the province or territory of the *Place of the Work*. The term *Consultant* means the *Consultant* or the *Consultant's* authorized representative.
5. **Contract**
The *Contract* is the undertaking by the parties to perform their respective duties, responsibilities, and obligations as prescribed in the *Contract Documents* and represents the entire agreement between the parties.
6. **Contract Documents**
The *Contract Documents* consist of those documents listed in Article A-3 of the Agreement - CONTRACT DOCUMENTS and amendments agreed upon between the parties.
7. **Contract Price**
When *Unit Prices* form the basis of payment, the *Contract Price* is the sum of the product of each *Unit Price* stated in the *Schedule of Prices* multiplied by the appropriate actual quantity of each item that is incorporated in or made necessary by the *Work*, plus lump sums, if any, and allowances, if any, stated in the *Schedule of Prices*. When a lump sum stipulated price forms the basis of payment, the *Contract Price* is the amount stipulated in Article A-4 of the Agreement - CONTRACT PRICE.
8. **Contract Time**
The *Contract Time* is the time stipulated in paragraph 1.3 of Article A-1 of the Agreement - THE WORK from commencement of the *Work* to *Substantial Performance of the Work*.
9. **Contractor**
The *Contractor* is the person or entity identified as such in the Agreement. The term *Contractor* means the *Contractor* or the *Contractor's* authorized representative as designated to the *Owner* in writing.
10. **Drawings**
The *Drawings* are the graphic and pictorial portions of the *Contract Documents*, wherever located and whenever issued, showing the design, location, and dimensions of the *Work*, generally including plans, elevations, sections, details, schedules, and diagrams.
11. **Owner**
The *Owner* is the person or entity identified as such in the Agreement. The term *Owner* means the *Owner* or the *Owner's* authorized agent or representative as designated to the *Contractor* in writing, but does not include the *Consultant*.
12. **Place of the Work**
The *Place of the Work* is the designated site or location of the *Work* identified in the *Contract Documents*.

13. **Product**
Product or *Products* means material, machinery, equipment, and fixtures forming the *Work*, but does not include *Construction Equipment*.
14. **Project**
The *Project* means the total construction contemplated of which the *Work* may be the whole or a part.
15. **Provide**
Provide means to supply and install.
16. **Schedule of Prices**
The *Schedule of Prices* is the schedule listed in Article A-3 - CONTRACT DOCUMENTS identifying items of work, estimated quantities, units of measure, and *Unit Prices*.
17. **Shop Drawings**
Shop Drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures, *Product* data, and other data which the *Contractor* provides to illustrate details of portions of the *Work*.
18. **Specifications**
The *Specifications* are that portion of the *Contract Documents*, wherever located and whenever issued, consisting of the written requirements and standards for *Products*, systems, workmanship, and the services necessary for the performance of the *Work*.
19. **Subcontractor**
A *Subcontractor* is a person or entity having a direct contract with the *Contractor* to perform a part or parts of the *Work*, or to supply *Products* worked to a special design for the *Work*.
20. **Substantial Performance of the Work**
Substantial Performance of the Work is as defined in the lien legislation applicable to the *Place of the Work*. If such legislation is not in force or does not contain such definition, or if the *Work* is governed by the Civil Code of Quebec, *Substantial Performance of the Work* shall have been reached when the *Work* is ready for use or is being used for the purpose intended and is so certified by the *Consultant*.
21. **Supplemental Instruction**
A *Supplemental Instruction* is an instruction, not involving adjustment in the *Contract Price* or *Contract Time*, in the form of *Specifications*, *Drawings*, schedules, samples, models, or written instructions, consistent with the intent of the *Contract Documents*. It is to be issued by the *Consultant* to supplement the *Contract Documents* as required for the performance of the *Work*.
22. **Supplier**
A *Supplier* is a person or entity having a direct contract with the *Contractor* to supply *Products* not worked to a special design for the *Work*.
23. **Temporary Work**
Temporary Work means temporary supports, structures, facilities, services, and other temporary things, excluding *Construction Equipment*, required for the execution of the *Work* but not incorporated into the *Work*.
24. **Unit Price**
A *Unit Price* is the amount payable for a single unit of work as stated in the *Schedule of Prices*.
25. **Value Added Taxes**
Value Added Taxes means such sum as shall be levied upon the *Contract Price* by the Federal or any Provincial or Territorial Government and is computed as a percentage of the *Contract Price* and includes the Goods and Services Tax, the Quebec Sales Tax, the Harmonized Sales Tax, and any similar tax, the collection and payment of which is by the *Contractor* as imposed by the tax legislation.
26. **Work**
The *Work* means the total construction and related services required by the *Contract Documents*.
27. **Working Day**
Working Day means a day other than a Saturday, Sunday, statutory holiday or statutory vacation day that is observed by the construction industry in the area of the *Place of the Work*.

GENERAL CONDITIONS OF THE CIVIL WORKS CONTRACT

PART 1 GENERAL PROVISIONS

GC 1.1 CONTRACT DOCUMENTS

- 1.1.1 The intent of the *Contract Documents* is to include the labour, *Products*, and services necessary for the performance of the *Work* by the *Contractor* in accordance with these documents. It is not intended, however, that the *Contractor* shall supply products or perform work not consistent with, not covered by, or not properly inferable from the *Contract Documents*.
- 1.1.2 Except for the provisions of article 12.3.6, nothing contained in the *Contract Documents* shall create any contractual relationship between:
- .1 the *Owner* and a *Subcontractor*, a *Supplier*, or their agent, employee, or other person performing any of the *Work*.
 - .2 the *Consultant* and the *Contractor*, a *Subcontractor*, a *Supplier*, or their agent, employee, or other person performing any of the *Work*.
- 1.1.3 The *Contract Documents* are complementary, and what is required by any one shall be as binding as if required by all.
- 1.1.4 Words and abbreviations which have well known technical or trade meanings are used in the *Contract Documents* in accordance with such recognized meanings.
- 1.1.5 References in the *Contract Documents* to the singular shall be considered to include the plural as the context requires.
- 1.1.6 Neither the organization of the *Specifications* nor the arrangement of *Drawings* shall control the *Contractor* in dividing the work among *Subcontractors* and *Suppliers*.
- 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*,
 - material and finishing schedules,
 - the *Drawings*.
 - .2 *Drawings* of larger scale shall govern over those of smaller scale of the same date.
 - .3 dimensions shown on *Drawings* shall govern over dimensions scaled from *Drawings*.
 - .4 later dated documents shall govern over earlier documents of the same type.
- 1.1.8 The *Owner* shall provide the *Contractor*, without charge, sufficient copies of the *Contract Documents* to perform the *Work*.
- 1.1.9 *Specifications*, *Drawings*, models, and copies thereof furnished by the *Consultant* are and shall remain the *Consultant's* property, with the exception of the signed *Contract* sets, which shall belong to each party to the *Contract*. All *Specifications*, *Drawings*, and models furnished by the *Consultant* are to be used only with respect to the *Work* and are not to be used on other work. These *Specifications*, *Drawings*, and models are not to be copied or altered in any manner without the written authorization of the *Consultant*.
- 1.1.10 Models furnished by the *Contractor* at the *Owner's* expense are the property of the *Owner*.

GC 1.2 LAW OF THE CONTRACT

- 1.2.1 The law of the *Place of the Work* shall govern the interpretation of the *Contract*.

GC 1.3 RIGHTS AND REMEDIES

- 1.3.1 Except as expressly provided in the *Contract Documents*, the duties and obligations imposed by the *Contract Documents* and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights, and remedies otherwise imposed or available by law.
- 1.3.2 No action or failure to act by the *Owner*, *Consultant*, or *Contractor* shall constitute a waiver of any right or duty afforded any of them under the *Contract*, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

GC 1.4 ASSIGNMENT

- 1.4.1 Neither party to the *Contract* shall assign the *Contract* or a portion thereof without the written consent of the other, which consent shall not be unreasonably withheld.

PART 2 ADMINISTRATION OF THE CONTRACT

GC 2.1 AUTHORITY OF THE CONSULTANT

- 2.1.1 The *Consultant* will have authority to act on behalf of the *Owner* only to the extent provided in the *Contract Documents*, unless otherwise modified by written agreement as provided in paragraph 2.1.2.
- 2.1.2 The duties, responsibilities, and limitations of authority of the *Consultant* as set forth in the *Contract Documents* shall be modified or extended only with the written consent of the *Owner*, the *Contractor*, and the *Consultant*.
- 2.1.3 If the *Consultant's* employment is terminated, the *Owner* shall immediately appoint or reappoint a *Consultant* against whom the *Contractor* makes no reasonable objection and whose status under the *Contract Documents* shall be that of the former *Consultant*.

GC 2.2 ROLE OF THE CONSULTANT

- 2.2.1 The *Consultant* will provide administration of the *Contract* as described in the *Contract Documents* during construction until issuance of the final certificate for payment, and subject to GC 2.1 - AUTHORITY OF THE CONSULTANT and with the *Owner's* concurrence, from time to time until the completion of any correction of defects as provided in paragraph 12.3.3 of GC 12.3 - WARRANTY.
- 2.2.2 The *Consultant* may provide at the *Place of the Work*, one or more project representatives to assist in carrying out the *Consultant's* responsibilities. The duties, responsibilities, and limitations of authority of such project representatives shall be as set forth in writing to the *Contractor*.
- 2.2.3 The *Consultant* will review the *Work* at intervals appropriate to the progress of construction to:
 - .1 become familiar with the progress and quality of the *Work*,
 - .2 determine if the *Work* is proceeding in general conformity with the *Contract Documents*, and
 - .3 verify quantities of *Work* performed under a *Schedule of Prices*.
- 2.2.4 Based on the *Consultant's* observations and evaluation of the *Contractor's* applications for payment, the *Consultant* will determine the amounts owing to the *Contractor* under the *Contract* and will issue certificates for payment as provided in Article A-5 of the Agreement - PAYMENT, GC 5.6 - PROGRESS PAYMENT, and GC 5.10 - FINAL PAYMENT.
- 2.2.5 The *Consultant* will not be responsible for and will not have control, charge, or supervision of construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs required in connection with the *Work* in accordance with the applicable construction safety legislation, other regulations, or general construction practice. The *Consultant* will not be responsible for the *Contractor's* failure to carry out the *Work* in accordance with the *Contract Documents*. The *Consultant* will not have control over, charge of, or be responsible for the acts or omissions of the *Contractor*, *Subcontractors*, *Suppliers*, or their agents, employees, or any other persons performing portions of the *Work*.

- 2.2.6 The *Consultant* will be, in the first instance, the interpreter of the requirements of the *Contract Documents* and shall make findings as to the performance thereunder by both parties to the *Contract*, except with respect to GC 5.1 - FINANCING INFORMATION REQUIRED OF THE OWNER. Interpretations and findings of the *Consultant* shall be consistent with the intent of the *Contract Documents*. When making such interpretations and findings the *Consultant* will not show partiality to either the *Owner* or the *Contractor*.
- 2.2.7 Matters in question relating to the performance of the Work or the interpretation of the *Contract Documents*, except for GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER, shall be referred initially to the *Consultant* by notice in writing given to the *Consultant* and to the other party for the *Consultant's* interpretation and finding which will be given by notice in writing to the parties within a reasonable time. With respect to claims, the *Consultant* will make findings as set out in GC 6.6 - CLAIMS, paragraph 6.6.5.
- 2.2.8 The *Consultant* will have authority to reject work which in the *Consultant's* opinion does not conform to the requirements of the *Contract Documents*. Whenever the *Consultant* considers it necessary or advisable, the *Consultant* will have authority to require inspection or testing of work, whether or not such work is fabricated, installed, or completed. However, neither the authority of the *Consultant* to act nor any decision either to exercise or not to exercise such authority shall give rise to any duty or responsibility of the *Consultant* to the *Contractor*, *Subcontractors*, *Suppliers*, or their agents, employees, or other persons performing any of the *Work*.
- 2.2.9 During the progress of the *Work* the *Consultant* will furnish *Supplemental Instructions* to the *Contractor* with reasonable promptness or in accordance with a schedule for such instructions agreed to by the *Consultant* and the *Contractor*.
- 2.2.10 The *Consultant* will review and take appropriate action upon such *Contractor's* submittals as *Shop Drawings*, *Product data*, and samples, as provided in the *Contract Documents*.
- 2.2.11 The *Consultant* will prepare *Change Orders* and *Change Directives* as provided in GC 6.2 - CHANGE ORDER and GC 6.3 - CHANGE DIRECTIVE.
- 2.2.12 The *Consultant* will conduct reviews of the *Work* to determine the date of *Substantial Performance of the Work* as provided in GC 5.7 - SUBSTANTIAL PERFORMANCE OF THE WORK.
- 2.2.13 All certificates issued by the *Consultant* will be to the best of the *Consultant's* knowledge, information, and belief. By issuing any certificate, the *Consultant* does not guarantee the *Work* is correct or complete.
- 2.2.14 The *Consultant* will receive and review written warranties and related documents required by the *Contract* and provided by the *Contractor* and will forward such warranties and documents to the *Owner* for the *Owner's* acceptance.

GC 2.3 REVIEW AND INSPECTION OF THE WORK

- 2.3.1 The *Owner* and the *Consultant* shall have access to the *Work* at all times. The *Contractor* shall provide sufficient, safe, and proper facilities at all times for the review of the *Work* by the *Consultant* and the inspection of the *Work* by authorized agencies. If parts of the *Work* are in preparation at locations other than the *Place of the Work*, the *Owner* and the *Consultant* shall be given access to such work whenever it is in progress.
- 2.3.2 If work is designated for tests, inspections, or approvals in the *Contract Documents*, or by the *Consultant's* instructions, or the laws or ordinances of the *Place of the Work*, the *Contractor* shall give the *Consultant* reasonable notice of when the work will be ready for review and inspection. The *Contractor* shall arrange for and shall give the *Consultant* reasonable notice of the date and time of inspections by other authorities.
- 2.3.3 The *Contractor* shall furnish promptly to the *Consultant* two copies of certificates and inspection reports relating to the *Work*.
- 2.3.4 If the *Contractor* covers, or permits to be covered, work that has been designated for special tests, inspections, or approvals before such special tests, inspections, or approvals are made, given or completed, the *Contractor* shall, if so directed, uncover such work, have the inspections or tests satisfactorily completed, and make good covering work at the *Contractor's* expense.

- 2.3.5 The *Consultant* may order any portion or portions of the *Work* to be examined to confirm that such work is in accordance with the requirements of the *Contract Documents*. If the work is not in accordance with the requirements of the *Contract Documents*, the *Contractor* shall correct the work and pay the cost of examination and correction. If the work is in accordance with the requirements of the *Contract Documents*, the *Owner* shall pay the cost of examination and restoration.
- 2.3.6 The *Contractor* shall pay the cost of making any test or inspection, including the cost of samples required for such test or inspection, if such test or inspection is designated in the *Contract Documents* to be performed by the *Contractor* or is designated by the laws or ordinances of the *Place of the Work*.
- 2.3.7 The *Contractor* shall pay the cost of samples required for any test or inspection to be performed by the *Consultant* or the *Owner* if such test or inspection is designated in the *Contract Documents*.

GC 2.4 DEFECTIVE WORK

- 2.4.1 The *Contractor* shall promptly remove from the *Place of the Work* and replace or re-execute defective work that has been rejected by the *Consultant* as failing to conform to the *Contract Documents* whether or not the defective work has been incorporated in the *Work* and whether or not the defect is the result of poor workmanship, use of defective products, or damage through carelessness or other act or omission of the *Contractor*.
- 2.4.2 The *Contractor* shall make good promptly other contractors' work destroyed or damaged by such removals or replacements at the *Contractor's* expense.
- 2.4.3 If in the opinion of the *Consultant* it is not expedient to correct defective work or work not performed as provided in the *Contract Documents*, the *Owner* may deduct from the amount otherwise due to the *Contractor* the difference in value between the work as performed and that called for by the *Contract Documents*. If the *Owner* and the *Contractor* do not agree on the difference in value, they shall refer the matter to the *Consultant* for a determination.

PART 3 EXECUTION OF THE WORK

GC 3.1 CONTROL OF THE WORK

- 3.1.1 The *Contractor* shall have total control of the *Work* and shall effectively direct and supervise the *Work* so as to ensure conformity with the *Contract Documents*.
- 3.1.2 The *Contractor* shall be solely responsible for construction means, methods, techniques, sequences, and procedures and for co-ordinating the various parts of the *Work* under the *Contract*.

GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

- 3.2.1 The *Owner* reserves the right to award separate contracts in connection with other parts of the *Project* to other contractors and to perform work with own forces.
- 3.2.2 When separate contracts are awarded for other parts of the *Project*, or when work is performed by the *Owner's* own forces, the *Owner* shall:
- .1 provide for the co-ordination of the activities and work of other contractors and *Owner's* own forces with the *Work* of the *Contract*;
 - .2 assume overall responsibility for compliance with the applicable health and construction safety legislation at the *Place of the Work*;
 - .3 enter into separate contracts with other contractors under conditions of contract which are compatible with the conditions of the *Contract*;
 - .4 ensure that insurance coverage is provided to the same requirements as are called for in GC 11.1 - INSURANCE and co-ordinate such insurance with the insurance coverage of the *Contractor* as it affects the *Work*; and
 - .5 take all reasonable precautions to avoid labour disputes or other disputes on the *Project* arising from the work of other contractors or the *Owner's* own forces.

- 3.2.3 When separate contracts are awarded for other parts of the *Project*, or when work is performed by the *Owner's* own forces, the *Contractor* shall:
- .1 afford the *Owner* and other contractors reasonable opportunity to introduce and store products and use the *Owner's* or other contractor's construction equipment to execute their work;
 - .2 cooperate with other contractors and the *Owner* in reviewing their construction schedules; and
 - .3 where part of the *Work* is affected by or depends upon for its proper execution the work of other contractors or *Owner's* own forces, promptly report to the *Consultant* in writing and prior to proceeding with that part of the *Work*, any apparent deficiencies in such work
- 3.2.4 Where the *Contract Documents* identify the work to be performed by other contractors or the *Owner's* own forces, the *Contractor* shall coordinate and schedule the *Work* with the work of other contractors and the *Owner's* own forces and interface as specified in the *Contract Documents*.
- 3.2.5 Where a change in the *Work* is required as a result of the co-ordination and interface of the work of other contractors or *Owner's* own forces with the *Work*, the changes shall be authorized and valued as provided in GC 6.1 - CHANGES, GC 6.2 - CHANGE ORDER, and GC 6.3 - CHANGE DIRECTIVE.
- 3.2.6 Disputes, and other matters in question between the *Contractor* and other contractors shall be dealt with as provided in Part 8 of the General Conditions - DISPUTE RESOLUTION provided the other contractors have reciprocal obligations. The *Contractor* shall be deemed to have consented to arbitration of any dispute with any other contractor whose contract with the *Owner* contains a similar agreement to arbitrate.

GC 3.3 TEMPORARY WORK

- 3.3.1 The *Contractor* shall have the sole responsibility for the design, erection, operation, maintenance, and removal of *Temporary Work*.
- 3.3.2 The *Contractor* shall engage and pay for registered professional engineering personnel skilled in the appropriate disciplines to perform those functions referred to in paragraph 3.3.1 where required by law or by the *Contract Documents* and in all cases where such *Temporary Work* is of such a nature that professional engineering skill is required to produce safe and satisfactory results.
- 3.3.3 Notwithstanding the provisions of GC 3.1 - CONTROL OF THE WORK, paragraph 3.3.1, and paragraph 3.3.2 or provisions to the contrary elsewhere in the *Contract Documents* where such *Contract Documents* include designs for *Temporary Work* or specify a method of construction in whole or in part, such designs or methods of construction shall be considered to be part of the design of the *Work* and the *Contractor* shall not be held responsible for that part of the design or the specified method of construction. The *Contractor* shall, however, be responsible for the execution of such design or specified method of construction in the same manner as for the execution of the *Work*.

GC 3.4 DOCUMENT REVIEW

- 3.4.1 The *Contractor* shall review the *Contract Documents* and shall report promptly to the *Consultant* any error, inconsistency, or omission the *Contractor* may discover. Such review by the *Contractor* shall be to the best of the *Contractor's* knowledge, information, and belief and in making such review the *Contractor* does not assume any responsibility to the *Owner* or the *Consultant* for the accuracy of the review. The *Contractor* shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the *Contract Documents*, which the *Contractor* did not discover. If the *Contractor* does discover any error, inconsistency, or omission in the *Contract Documents*, the *Contractor* shall not proceed with the work affected until the *Contractor* has received corrected or missing information from the *Consultant*.

GC 3.5 CONSTRUCTION SCHEDULE

- 3.5.1 The *Contractor* shall:
- .1 prepare and submit to the *Owner* and the *Consultant* prior to the first application for payment, a construction schedule that indicates the timing of the major activities of the *Work* and provides sufficient detail of the critical events and their inter-relationship to demonstrate the *Work* will be performed in conformity with the *Contract Time*;
 - .2 monitor the progress of the *Work* relative to the construction schedule and update the schedule on a monthly basis or as stipulated by the *Contract Documents*; and
 - .3 advise the *Consultant* of any revisions required to the schedule as the result of extensions of the *Contract Time* as provided in Part 6 of the General Conditions - CHANGES IN THE WORK.

GC 3.6 SUPERVISION

- 3.6.1 The *Contractor* shall provide all necessary supervision and appoint a competent representative who shall be in attendance at the *Place of the Work* while the *Work* is being performed. The appointed representative shall not be changed except for valid reason.
- 3.6.2 The appointed representative shall represent the *Contractor* at the *Place of the Work* and notices and instructions given to the appointed representative by the *Consultant* shall be held to have been received by the *Contractor*.

GC 3.7 LAYOUT OF THE WORK

- 3.7.1 The *Owner* shall, in consultation with the *Contractor*, establish reference points for construction which are necessary for the *Contractor* to proceed with the *Work*.
- 3.7.2 The *Contractor* shall be responsible for laying out the *Work*, shall preserve and protect the established reference points, and shall not change or relocate the established reference points without the approval of the *Consultant*.
- 3.7.3 The *Contractor* shall advise the *Consultant* whenever any established reference point is lost, destroyed, damaged, or requires relocation as a result of the *Contractor's* operations. The cost to reestablish any reference point that is lost, destroyed, damaged, or requires relocation as a result of the *Contractor's* operations, shall be at the *Contractor's* expense.

GC 3.8 SUBCONTRACTORS AND SUPPLIERS

- 3.8.1 The *Contractor* shall preserve and protect the rights of the parties under the *Contract* with respect to work to be performed under subcontract, and shall:
- .1 enter into contracts or written agreements with *Subcontractors* and *Suppliers* to require them to perform their work as provided in the *Contract Documents*;
 - .2 incorporate the terms and conditions of the *Contract Documents* into all contracts or written agreements with *Subcontractors* and *Suppliers*; and
 - .3 be as fully responsible to the *Owner* for acts and omissions of *Subcontractors*, *Suppliers*, and of persons directly or indirectly employed by them as for acts and omissions of persons directly employed by the *Contractor*.
- 3.8.2 The *Contractor* shall indicate in writing, at the request of the *Owner*, those *Subcontractors* or *Suppliers* whose bids have been received by the *Contractor* which the *Contractor* would be prepared to accept for the performance of a portion of the *Work*. Should the *Owner* not object before signing the *Contract*, the *Contractor* shall employ those *Subcontractors* or *Suppliers* so identified by the *Contractor* in writing for the performance of that portion of the *Work* to which their bid applies.
- 3.8.3 The *Owner* may, for reasonable cause, at any time before the *Owner* has signed the *Contract*, object to the use of a proposed *Subcontractor* or *Supplier* and require the *Contractor* to employ one of the other subcontract bidders.
- 3.8.4 If the *Owner* requires the *Contractor* to change a proposed *Subcontractor* or *Supplier*, the *Contract Price* and *Contract Time* shall be adjusted by the differences occasioned by such required change.

- 3.8.5 The *Contractor* shall not be required to employ as a *Subcontractor* or *Supplier*, a person or firm to which the *Contractor* may reasonably object.
- 3.8.6 The *Owner*, through the *Consultant*, may provide to a *Subcontractor* or *Supplier* information as to the percentage of the *Subcontractor's* or *Supplier's* work which has been certified for payment.

GC 3.9 LABOUR AND PRODUCTS

- 3.9.1 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*.
- 3.9.2 *Products* provided shall be new. *Products* which are not specified shall be of a quality consistent with those specified and their use acceptable to the *Consultant*.
- 3.9.3 The *Contractor* shall maintain good order and discipline among the *Contractor's* employees engaged on the *Work* and shall not employ on the *Work* anyone not skilled in the tasks assigned.

GC 3.10 DOCUMENTS AT THE SITE

- 3.10.1 The *Contractor* shall keep one copy of current *Contract Documents*, submittals, reports, and records of meetings at the *Place of the Work*, in good order and available to the *Owner* and the *Consultant*.

GC 3.11 SHOP DRAWINGS

- 3.11.1 The *Contractor* shall provide *Shop Drawings* as required in the *Contract Documents*.
- 3.11.2 The *Contractor* shall review all *Shop Drawings* prior to submission to the *Consultant*. The *Contractor* represents by this review that:
- .1 the *Contractor* has determined and verified all field measurements, field construction conditions, materials, *Product* requirements, catalogue numbers, and similar data or will do so; and
 - .2 the *Contractor* has checked and co-ordinated each *Shop Drawing* with the requirements of the *Contract Documents*.
- 3.11.3 The *Contractor* shall confirm the review of each shop drawing by stamp, date, and signature of the person responsible for the review. At the time of submission the *Contractor* shall notify the *Consultant* in writing of any deviations in the *Shop Drawings* from the requirements of the *Contract Documents*.
- 3.11.4 The *Contractor* shall submit *Shop Drawings* to the *Consultant* to review in orderly sequence and sufficiently in advance so as to cause no delay in the *Work* or in the work of other contractors. Upon request of the *Contractor* or the *Consultant*, they jointly shall prepare a schedule of the dates for submission and return of *Shop Drawings*. *Shop Drawings* which require approval of any legally constituted authority having jurisdiction shall be submitted to such authority by the *Contractor* for approval.
- 3.11.5 The *Contractor* shall submit *Shop Drawings* in the form specified or as the *Consultant* may direct. The *Consultant* will review and return *Shop Drawings* in accordance with the schedule agreed upon, or otherwise with reasonable promptness so as to cause no delay. The *Consultant's* review is for conformity to the design concept and for general arrangement only. The *Consultant's* review shall not relieve the *Contractor* of responsibility for errors or omissions in the *Shop Drawings* or for meeting all requirements of the *Contract Documents* unless the *Consultant* expressly notes the acceptance of a deviation on the *Shop Drawings*.
- 3.11.6 Upon the *Consultant's* request, the *Contractor* shall revise and resubmit *Shop Drawings* which the *Consultant* rejects as inconsistent with the *Contract Documents* unless otherwise directed by the *Consultant*. The *Contractor* shall notify the *Consultant* in writing of any revisions to the resubmission other than those requested by the *Consultant*.

GC 3.12 USE OF THE WORK

- 3.12.1 The *Contractor* shall confine *Construction Equipment*, *Temporary Work*, storage of *Products*, waste products and debris, and operations of employees to limits indicated by laws, ordinances, permits, or the *Contract Documents* and shall not unreasonably encumber the *Place of Work* with *Products*.
- 3.12.2 The *Contractor* shall not load or permit to be loaded any part of the *Work* with a weight or force that will endanger the safety of the *Work*.

GC 3.13 CUTTING AND REMEDIAL WORK

- 3.13.1 The *Contractor* shall do the cutting and remedial work required to make the several parts of the *Work* come together properly.
- 3.13.2 The *Contractor* shall co-ordinate the *Work* to ensure that this requirement is kept to a minimum.
- 3.13.3 Should the *Owner*, the *Consultant*, other contractors or anyone employed by them be responsible for ill-timed work necessitating cutting or remedial work to be performed, the cost of such cutting or remedial work shall be valued as provided in GC 6.1 - CHANGES, GC 6.2 - CHANGE ORDER, and GC 6.3 - CHANGE DIRECTIVE.
- 3.13.4 Cutting and remedial work shall be performed by specialists familiar with the *Products* affected and shall be performed in a manner to neither damage nor endanger the *Work*.

GC 3.14 CLEANUP

- 3.14.1 The *Contractor* shall maintain the *Work* in a safe and tidy condition and free from the accumulation of waste products and debris, other than that caused by the *Owner*, other contractors or their employees.
- 3.14.2 Before applying for *Substantial Performance of the Work* as provided in GC 5.7 - SUBSTANTIAL PERFORMANCE OF THE WORK, the *Contractor* shall remove waste products and debris, other than that resulting from the work of the *Owner*, other contractors or their employees, and shall leave the *Work* clean and suitable for use or occupancy by the *Owner*. The *Contractor* shall remove products, tools, *Construction Equipment* and *Temporary Work* not required for the performance of the remaining work.
- 3.14.3 Prior to application for the final certificate for payment, the *Contractor* shall remove any remaining products, tools, *Construction Equipment*, *Temporary Work*, and waste products and debris, other than those resulting from the work of the *Owner*, other contractors or their employees.

PART 4 ALLOWANCES

GC 4.1 CASH ALLOWANCES

- 4.1.1 The *Contract Price* includes the cash allowances, if any, stated in the *Contract Documents*. The scope of work or costs included in such cash allowances shall be as described in the *Contract Documents*.
- 4.1.2 The *Contract Price*, and not the cash allowances, includes the *Contractor's* overhead and profit in connection with such cash allowances.
- 4.1.3 Expenditures under cash allowances shall be authorized by the *Owner* through the *Consultant*.
- 4.1.4 Where costs under any cash allowance exceed the amount of the allowance, the *Contractor* shall be compensated for the excess incurred and substantiated plus an amount for overhead and profit on the excess as set out in the *Contract Documents*. Where costs under any cash allowance are less than the amount of the allowance, the *Owner* shall be credited for the unexpended portion of the cash allowance, but not for the *Contractor's* overhead and profit on such amount. Multiple cash allowances shall not be combined for the purpose of calculating the foregoing.
- 4.1.5 The *Contract Price* shall be adjusted by *Change Order* to provide for any difference between the actual cost and each cash allowance.

- 4.1.6 The value of the work performed under a cash allowance is eligible to be included in progress payments.
- 4.1.7 The *Contractor* and the *Consultant* shall jointly prepare a schedule that shows when the *Consultant* and *Owner* must authorize ordering of items called for under cash allowances to avoid delaying the progress of the *Work*.

GC 4.2 CONTINGENCY ALLOWANCE

- 4.2.1 The *Contract Price* includes the contingency allowance, if any, stated in the *Contract Documents*.
- 4.2.2 Expenditures under the contingency allowance shall be authorized and valued as provided in GC 6.1 - CHANGES, GC 6.2 - CHANGE ORDER, and GC 6.3 - CHANGE DIRECTIVE.
- 4.2.3 The *Contract Price* shall be adjusted by *Change Order* to provide for any difference between the expenditures authorized under paragraph 4.2.2 and the contingency allowance.

PART 5 PAYMENT

GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

- 5.1.1 The *Owner* shall, at the request of the *Contractor*, before signing the *Contract*, and promptly from time to time thereafter, furnish to the *Contractor* reasonable evidence that financial arrangements have been made to fulfill the *Owner's* obligations under the *Contract*.
- 5.1.2 The *Owner* shall notify the *Contractor* in writing of any material change in the *Owner's* financial arrangements during performance of the *Contract*.

GC 5.2 BASIS OF PAYMENT FOR UNIT PRICE WORK

- 5.2.1 Payment for *Unit Price* work shall be based on the *Unit Prices* in the *Contract*.
- 5.2.2 The *Contractor* shall measure the *Work* and the *Consultant* will verify such measurements to determine payment to the *Contractor* in accordance with the measurement provisions of the *Contract Documents*.

GC 5.3 BASIS OF PAYMENT FOR LUMP SUM WORK

- 5.3.1 Payment for lump sum work shall be based on the stipulated price(s) in the *Contract*.

GC 5.4 BASIS OF PAYMENT FOR COST PLUS WORK

- 5.4.1 Payment for cost plus work shall be based on the cost of such work, as provided in paragraph 5.4.2, plus a fee calculated as a percentage of the cost of such work, for the *Contractor's* overhead and profit. The percentage amount shall be as provided in the *Contract Documents* but shall not be applied to the cost of *Construction Equipment* when such cost is based on rates which already include the *Contractor's* overhead and profit.
- 5.4.2 The cost of cost plus work shall be at rates prevailing in the locality of the *Place of the Work* and shall include the following cost elements as applicable to such work:
- .1 wages and benefits paid for labour in the direct employ of the *Contractor* under applicable collective bargaining agreements, or under a salary or wage schedule agreed upon by the *Owner* and *Contractor*;
 - .2 salaries, wages, and benefits of the *Contractor's* personnel, when stationed at the field office, in whatever capacity employed; or personnel at shops or on the road, engaged in expediting the production or transportation of materials or equipment;
 - .3 contributions, assessments, or taxes incurred for such items as employment insurance, provincial or territorial health insurance, workers' compensation, and Canada or Quebec Pension Plan, insofar as such cost is based on wages, salaries, or other remuneration paid to employees of the *Contractor* and included in the cost of the *Work* as provided in paragraphs 5.4.2.1 and 5.4.2.2;
 - .4 travel and subsistence expenses of the *Contractor's* personnel described in paragraphs 5.4.2.1 and 5.4.2.2;
 - .5 the cost of all *Products* including cost of transportation thereof;

- .6 the cost of materials, supplies, *Construction Equipment*, *Temporary Work*, and hand tools not owned by the workers, including transportation, and maintenance thereof, which are consumed in the performance of the *Work*; and cost less salvage value on such items used but not consumed, which remain the property of the *Contractor*;
 - .7 the cost of all tools and *Construction Equipment*, exclusive of hand tools used in the performance of the *Work*, whether rented from or provided by the *Contractor* or others, including installation, minor repairs and replacements, dismantling, removal, transportation and delivery cost thereof;
 - .8 deposits lost;
 - .9 the amounts of all subcontracts;
 - .10 the cost of quality assurance such as independent inspection and testing services;
 - .11 charges levied by authorities having jurisdiction at the *Place of the Work*;
 - .12 royalties, patent license fees, and damages for infringement of patents and cost of defending suits therefor subject always to the *Contractor's* obligations to indemnify the *Owner* as provided in paragraph 10.3.1 of GC 10.3 - PATENT FEES;
 - .13 any adjustment in premiums for all bonds and insurance which the *Contractor* is required, by the *Contract Documents*, to purchase and maintain;
 - .14 any adjustment in taxes and duties for which the *Contractor* is liable;
 - .15 charges for long distance telephone and facsimile communications, courier services, expressage, and petty items incurred in relation to the performance of the *Work*;
 - .16 the cost of removal and disposal of waste products and debris; and
 - .17 cost incurred due to emergencies affecting the safety of persons or property.
- 5.4.3 The *Contractor* shall obtain the *Owner's* approval prior to subcontracting or entering into other agreements for cost plus work.
- 5.4.4 The *Consultant* may refuse to certify payment for all or part of the cost of any item under any cost element, where the item in question was unsuitable, unnecessary or the cost was otherwise improperly incurred in the performance of the *Work*.
- 5.4.5 The *Contractor* shall keep full and detailed accounts and records necessary for the documentation of the cost of cost plus work and shall provide the *Consultant* with copies thereof when requested.
- 5.4.6 The *Owner* shall be afforded reasonable access to all of the *Contractor's* books, records, correspondence, instructions, drawings, receipts, vouchers, and memoranda related to the cost of cost plus work, and for this purpose the *Contractor* shall preserve such records for a period of one year from the date of *Substantial Performance of the Work*.

GC 5.5 APPLICATIONS FOR PROGRESS PAYMENT

- 5.5.1 Applications for payment on account as provided in Article A-5 of the Agreement - PAYMENT may be made monthly as the *Work* progresses.
- 5.5.2 Applications for payment shall be dated the last day of the agreed monthly payment period and the amount claimed shall be for the value, proportionate to the amount of the *Contract*, of work performed and *Products* delivered to the *Place of the Work* at that date.
- 5.5.3 Where the basis of payment of the *Contract Price* is *Unit Prices*, applications for payment shall include quantity measurements and any other data requested by the *Consultant* to assist the *Consultant* in evaluating the application and verifying quantity measurements.
- 5.5.4 Where the basis of payment of the *Contract Price* is a lump sum stipulated price:
- .1 the *Contractor* shall submit to the *Consultant*, at least 10 *Working Days* before the first application for payment, a schedule of values for the parts of the *Work*, aggregating the total amount of the *Contract Price*, so as to facilitate evaluation of applications for payment;
 - .2 the schedule of values shall be made out in such form and supported by such evidence as the *Consultant* may reasonably direct and when accepted by the *Consultant*, shall be used as the basis for applications for payment, unless it is found to be in error; and
 - .3 the *Contractor* shall include a statement based on the schedule of values with each application for payment.

- 5.5.5 Where the basis of payment for a portion of the *Work* is cost plus, applications for payment shall be based on the cost of the work performed plus the amount of the fee earned, in accordance with GC 5.4 - BASIS OF PAYMENT FOR COST PLUS WORK.
- 5.5.6 Applications for payment for *Products* delivered to the *Place of the Work* but not yet incorporated into the *Work* shall be supported by such evidence as the *Consultant* may reasonably require to establish the value and delivery of the *Products*.

GC 5.6 PROGRESS PAYMENT

- 5.6.1 The *Consultant* will issue to the *Owner*, no later than 5 *Working Days* after the receipt of an application for payment from the *Contractor* submitted in accordance with GC 5.2 - APPLICATIONS FOR PROGRESS PAYMENT, a certificate for payment in the amount applied for or in such other amount as the *Consultant* determines to be properly due. If the *Consultant* amends the application, the *Consultant* will promptly notify the *Contractor* in writing giving reasons for the amendment.
- 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 5 *Working Days* after the date of a certificate for payment issued by the *Consultant*.
- 5.6.3 Where the basis of payment of the *Contract Price* is *Unit Prices*, quantities for progress payments shall be considered approximate until final verification of quantities by the *Consultant*. A certificate for progress payment shall not be construed as the *Consultant's* final verification of quantities. Final verification of quantities will be made after all work of an item is completed.

GC 5.7 SUBSTANTIAL PERFORMANCE OF THE WORK

- 5.7.1 When the *Contractor* considers that the *Work* is substantially performed, or if permitted by the lien legislation applicable to the *Place of the Work* a designated portion thereof which the *Owner* agrees to accept separately is substantially performed, the *Contractor* shall prepare and submit to the *Consultant* a comprehensive list of items to be completed or corrected and apply for a review by the *Consultant* to establish *Substantial Performance of the Work* or substantial performance of the designated portion of the *Work*. Failure to include an item on the list does not alter the responsibility of the *Contractor* to complete the *Contract*.
- 5.7.2 No later than 15 *Working Days* after the receipt of the *Contractor's* list and application, the *Consultant* will review the *Work* to verify the validity of the application and notify the *Contractor* whether the *Work* or the designated portion of the *Work* is substantially performed.
- 5.7.3 The *Consultant* will state the date of *Substantial Performance of the Work* or designated portion of the *Work* in a certificate.
- 5.7.4 Immediately following the issuance of the certificate of *Substantial Performance of the Work*, the *Contractor*, in consultation with the *Consultant*, shall establish a reasonable date for finishing the *Work*.

GC 5.8 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF THE WORK

- 5.8.1 After the issuance of the certificate of *Substantial Performance of the Work*, the *Contractor* shall:
- .1 submit an application for payment of the holdback amount,
 - .2 submit a sworn or affirmed statement that all accounts for labour, subcontracts, *Products*, *Construction Equipment*, and other indebtedness which may have been incurred by the *Contractor* in the *Substantial Performance of the Work* and for which the *Owner* might in any way be held responsible have been paid in full, except for amounts properly retained as a holdback or as an identified amount in dispute.
- 5.8.2 After the receipt of an application for payment from the *Contractor* and the sworn or affirmed statement as provided in paragraph 5.8.1, the *Consultant* will issue a certificate for payment of the holdback amount.

- 5.8.3 Where the holdback amount required by the applicable lien legislation has not been placed in a separate holdback account, the *Owner* shall, 5 *Working Days* prior to the expiry of the holdback period stipulated in the lien legislation applicable to the *Place of the Work*, place the holdback amount in a bank account in the joint names of the *Owner* and the *Contractor*.
- 5.8.4 In the common law jurisdictions, the holdback amount authorized by the certificate for payment of the holdback amount is due and payable on the day following the expiration of the holdback period stipulated in the lien legislation applicable to the *Place of the Work*. Where lien legislation does not exist or apply, the holdback amount shall be due and payable in accordance with other legislation, industry practice, or provisions which may be agreed to between the parties. The *Owner* may retain out of the holdback amount any sums required by law to satisfy any liens against the *Work* or, if permitted by the lien legislation applicable to the *Place of the Work*, other third party monetary claims against the *Contractor* which are enforceable against the *Owner*.
- 5.8.5 In the Province of Quebec, the holdback amount authorized by the certificate for payment of the holdback amount is due and payable no later than 30 days after the issuance of the certificate. The *Owner* may retain out of the holdback amount any sums required to satisfy any legal hypothecs that have been taken, or could be taken, against the *Work* or other third party monetary claims against the *Contractor* which are enforceable against the *Owner*.

GC 5.9 PROGRESSIVE RELEASE OF HOLDBACK

- 5.9.1 In the common law jurisdictions, where legislation permits and where, upon application by the *Contractor*, the *Consultant* has certified that the work of a *Subcontractor* or *Supplier* has been performed prior to *Substantial Performance of the Work*, the *Owner* shall pay the *Contractor* the holdback amount retained for such subcontract work, or the *Products* supplied by such *Supplier*, on the first *Working Day* following the expiration of the holdback period for such work stipulated in the lien legislation applicable to the *Place of the Work*.
- 5.9.2 In the Province of Quebec, where, upon application by the *Contractor*, the *Consultant* has certified that the work of a *Subcontractor* or *Supplier* has been performed prior to *Substantial Performance of the Work*, the *Owner* shall pay the *Contractor* the holdback amount retained for such subcontract work, or the *Products* supplied by such *Supplier*, no later than 30 days after such certification by the *Consultant*. The *Owner* may retain out of the holdback amount any sums required to satisfy any legal hypothecs that have been taken, or could be taken, against the *Work* or other third party monetary claims against the *Contractor* which are enforceable against the *Owner*.
- 5.9.3 Notwithstanding the provisions of the preceding paragraph, and notwithstanding the wording of such certificates, the *Contractor* shall ensure that such subcontract work or *Products* is protected pending the issuance of a final certificate for payment and be responsible for the correction of defects or work not performed regardless of whether or not such was apparent when such certificates were issued.

GC 5.10 FINAL PAYMENT

- 5.10.1 When the *Contractor* considers that the *Work* is completed, the *Contractor* shall submit an application for final payment.
- 5.10.2 The *Consultant* will, no later than 15 *Working Days* after the receipt of an application from the *Contractor* for final payment, review the *Work* to verify the validity of the application and notify the *Contractor* that the application is valid or give reasons why it is not valid.
- 5.10.3 When the *Consultant* finds the *Contractor's* application for final payment valid, the *Consultant* will promptly issue a final certificate for payment.
- 5.10.4 Subject to the provision of paragraph 10.4.1 of GC 10.4 - WORKERS' COMPENSATION, and any lien legislation applicable to the *Place of the Work*, the *Owner* shall, no later than 5 *Working Days* after the issuance of a final certificate for payment, pay the *Contractor* as provided in Article A-5 of the Agreement - PAYMENT.

GC 5.11 WITHHOLDING OF PAYMENT

- 5.11.1 If because of climatic or other conditions reasonably beyond the control of the *Contractor*, there are items of work that cannot be performed, payment in full for that portion of the *Work* which has been performed as certified by the *Consultant* shall not be withheld or delayed by the *Owner* on account thereof, but the *Owner* may withhold, until the remaining portion of the *Work* is finished, only such an amount that the *Consultant* determines is sufficient and reasonable to cover the cost of performing such remaining work.

GC 5.12 NON-CONFORMING WORK

- 5.12.1 No payment by the *Owner* under the *Contract* nor partial or entire use or occupancy of the *Work* by the *Owner* shall constitute an acceptance of any portion of the *Work* or *Products* which are not in accordance with the requirements of the *Contract Documents*.

PART 6 CHANGES

GC 6.1 CHANGES

- 6.1.1 The *Owner*, through the *Consultant*, without invalidating the *Contract*, may make:
- .1 changes in the *Work* consisting of additions, deletions, or other revisions to the *Work* by *Change Order* or *Change Directive*, and
 - .2 changes to the *Contract Time* for the *Work*, or any part thereof, by *Change Order*.
- 6.1.2 The *Contractor* shall not perform a change in the *Work* without a *Change Order* or a *Change Directive*.

GC 6.2 CHANGE ORDER

- 6.2.1 When a change in the *Work* or the *Contract Time* is proposed or required, the *Consultant* will provide notice in writing to the *Contractor* describing the proposed change. The *Contractor* shall present, in a form acceptable to the *Consultant*, a method of adjustment or an amount of adjustment of the *Contract Price*, if any, and the adjustment in the *Contract Time*, if any, for the proposed change.
- 6.2.2 The method of adjustment of the *Contract Price* presented by the *Contractor* may be:
- .1 *Unit Prices* listed in the *Schedule of Prices* that are applicable to the change in the *Work* or, if *Unit Prices* listed in the *Schedule of Prices* are not directly applicable, by unit prices deduced or extrapolated from such *Unit Prices*,
 - .2 a lump sum or unit price quotation, or
 - .3 the cost plus method as provided in GC 5.4 - BASIS OF PAYMENT FOR COST PLUS WORK.
- 6.2.3 When the *Owner* and *Contractor* agree to the adjustments in the *Contract Price* and *Contract Time* or to the method to be used to determine the adjustments, such agreement shall be effective immediately and shall be recorded in a *Change Order*, signed by *Owner* and *Contractor*. The value of the work performed as the result of a *Change Order* shall be included in applications for progress payment.

GC 6.3 CHANGE DIRECTIVE

- 6.3.1 If the *Owner* requires the *Contractor* to proceed with a change in the *Work* prior to the *Owner* and the *Contractor* agreeing upon the adjustment in *Contract Price* and *Contract Time*, the *Owner*, through the *Consultant*, shall issue a *Change Directive*.
- 6.3.2 A *Change Directive* shall only be used by the *Owner* to direct a change in the *Work* that is within the general scope of the *Contract Documents*.
- 6.3.3 Upon receipt of a *Change Directive*, the *Contractor* shall proceed promptly with the change in the *Work*.

- 6.3.4 The adjustment in the *Contract Price* for a change in the *Work* carried out by way of a *Change Directive* shall be on the basis of the *Contractor's* actual expenditures and savings attributable to the change. If a change in the *Work* results in expenditures only, the change in the *Work* shall be valued as cost plus work in accordance with GC 5.4 - BASIS OF PAYMENT FOR COST PLUS WORK.
- 6.3.5 If a change in the *Work* results in savings only, the amount of the credit shall be the actual cost savings to the *Contractor*, without deduction for overhead or profit.
- 6.3.6 If a change in the *Work* results in both expenditures and savings, the change in the *Work* shall be valued as specified in GC 6.3.4 and GC 6.3.5, except that overhead and profit on the cost plus work shall be payable only on the net increase, if any, with respect to that change in the *Work*.
- 6.3.7 Pending determination of the final amount of a *Change Directive*, the undisputed value of the work performed as the result of a *Change Directive* is eligible to be included in progress payments.
- 6.3.8 If the *Owner* and *Contractor* do not agree on the proposed adjustment in the *Contract Time* or the method of determining it, the adjustment shall be referred to the *Consultant* for determination.
- 6.3.9 If at any time after the start of the work directed by a *Change Directive*, the *Owner* and the *Contractor* reach agreement on the adjustment to the *Contract Price* and to the *Contract Time*, this agreement shall be recorded in a *Change Order* signed by *Owner* and *Contractor*.

GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

- 6.4.1 If the *Owner* or the *Contractor* discover conditions at the *Place of the Work* which are:
 - .1 subsurface or otherwise concealed physical conditions which existed before the commencement of the *Work* which differ materially from those indicated in the *Contract Documents*; or
 - .2 physical conditions, other than conditions due to weather, that are of a nature which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the *Contract Documents*;
 then the observing party shall notify the other party in writing before conditions are disturbed and in no event later than 5 *Working Days* after first observance of the conditions.
- 6.4.2 The *Consultant* will promptly investigate such conditions and make a finding. If the finding is that the conditions differ materially and this would cause an increase or decrease in the *Contractor's* cost or time to perform the *Work*, the *Consultant*, with the *Owner's* approval, will issue appropriate instructions for a change in the *Work* as provided in GC 6.2 - CHANGE ORDER or GC 6.3 - CHANGE DIRECTIVE.
- 6.4.3 If the *Consultant* finds that the conditions at the *Place of the Work* are not materially different or that no change in the *Contract Price* or the *Contract Time* is justified, the *Consultant* will report the reasons for this finding to the *Owner* and the *Contractor* in writing.
- 6.4.4 The *Contractor* shall not be entitled to an adjustment in the *Contract Price* or the *Contract Time* if such conditions were reasonably apparent prior to the time of bid closing.

GC 6.5 DELAYS

- 6.5.1 If the *Contractor* is delayed in the performance of the *Work* by an action or omission of the *Owner*, *Consultant*, or anyone employed or engaged by them directly or indirectly, contrary to the provisions of the *Contract Documents*, then the *Contract Time* shall be extended for such reasonable time as the *Consultant* may recommend in consultation with the *Contractor*. The *Contractor* shall be reimbursed by the *Owner* for reasonable costs incurred by the *Contractor* as the result of such delay.
- 6.5.2 If the *Contractor* is delayed in the performance of the *Work* by a stop work order issued by a court or other public authority and providing that such order was not issued as the result of an act or fault of the *Contractor* or any person employed or engaged by the *Contractor* directly or indirectly, then the *Contract Time* shall be extended for such reasonable time as the *Consultant* may recommend in consultation with the *Contractor*. The *Contractor* shall be reimbursed by the *Owner* for reasonable costs incurred by the *Contractor* as the result of such delay.

- 6.5.3 If the *Contractor* is delayed in the performance of the *Work* by
- .1 labour disputes, strikes, lock-outs (including lock-outs decreed or recommended for its members by a recognized contractors' association, of which the *Contractor* is a member or to which the *Contractor* is otherwise bound),
 - .2 fire, unusual delay by common carriers or unavoidable casualties,
 - .3 abnormally adverse weather conditions, or
 - .4 any other cause beyond the *Contractor's* control, other than one resulting from a default of or breach of *Contract* by the *Contractor*,
- then the *Contract Time* shall be extended for such reasonable time as the *Consultant* may recommend in consultation with the *Contractor*. The extension of time shall not be less than the time lost as the result of the event causing the delay, unless the *Contractor* agrees to a shorter extension. The *Contractor* shall not be entitled to payment for costs incurred by such delays unless such delays result from actions by the *Owner*.
- 6.5.4 No extension shall be made for delay unless notice in writing of the cause of delay is given to the *Consultant* not later than 10 *Working Days* after the commencement of delay, providing however, that in the case of a continuing cause of delay only one notice shall be necessary.
- 6.5.5 If no schedule is made under paragraph 2.2.9 of GC 2.2 - ROLE OF THE CONSULTANT, then no request for extension shall be made because of failure of the *Consultant* to furnish instructions until 10 *Working Days* after demand for such instructions has been made and not then, unless the request is reasonable.

GC 6.6 CLAIMS

- 6.6.1 If the *Contractor* intends to make a claim for additional payment, or if the *Owner* intends to make a claim for a credit to the *Contract Price* or for damages of any kind, the party that intends to make the claim shall give notice in writing of intent to claim to the other party and to the *Consultant* as soon as practicable, but no later than 10 *Working Days* after commencement of the event or series of events giving rise to the claim. Failure to provide such notification shall invalidate the claim.
- 6.6.2 Upon commencement of the event or series of events giving rise to the claim, the party intending to make a claim shall:
- .1 take all reasonable measures to mitigate any loss or damage which may be incurred as a result of such event or series of events, and
 - .2 keep such records as may be necessary to support the claim.
- 6.6.3 Within 30 *Working Days* after commencement of the event or series of events giving rise to the claim, or such other reasonable time as may be agreed by the *Consultant*, the party making the claim shall submit to the *Consultant* a detailed account of the amount claimed and the grounds upon which the claim is based.
- 6.6.4 Where the event or series of events giving rise to the claim has a continuing effect, the detailed account submitted under paragraph 6.6.3 shall be considered to be an interim account and the party making the claim shall, at such intervals as the *Consultant* may reasonably require, submit further interim accounts giving the accumulated amount of the claim and any further grounds upon which it is based. The party making the claim shall submit a final account with 30 *Working Days* after the end of the effects resulting from the event or series of events.
- 6.6.5 The *Consultant's* findings, with respect to a claim made by either party, will be given by notice in writing to the other party within 30 *Working Days* after receipt thereof by the *Consultant*, or such other time period as may be agreed by the parties. If such finding is not acceptable to both parties, the claim shall be settled in accordance with Part 8 of the General Conditions - DISPUTE RESOLUTION.

GC 6.7 QUANTITY VARIATIONS

- 6.7.1 The *Owner* or the *Contractor* may request an adjustment to a *Unit Price* contained in a *Schedule of Prices* included in the *Contract* provided that the actual quantity of the item in the *Schedule of Prices* exceeds or falls short of the estimated quantity by more than 15%.
- 6.7.2 Where the actual quantity exceeds the estimated quantity by more than 15%, a *Unit Price* adjusted pursuant to paragraph 6.7.1 shall apply only to the quantity that exceeds 115% of the estimated quantity.

- 6.7.3 Where the actual quantity falls short of the estimated quantity by more than 15%, a *Unit Price* adjusted pursuant to paragraph 6.7.1 shall not exceed the *Unit Price* that would cause the extended amount to equal the original extended amount derived from the original *Unit Price* and estimated quantity.
- 6.7.4 If either party requests adjustment of a *Unit Price*, both parties shall make all reasonable efforts to agree on a revised *Unit Price*. The agreed revised *Unit Price* shall be recorded in a Change Order.
- 6.7.5 If agreement on a revised *Unit Price* is not reached, the matter shall be subject to final determination in accordance with Part 8 - DISPUTE RESOLUTION. Pending determination of the revised *Unit Price*, payment for the *Work* performed shall be included in progress payments based on the unrevised *Unit Price*.

PART 7 DEFAULT NOTICE

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

- 7.1.1 If the *Contractor* is adjudged bankrupt, or makes a general assignment for the benefit of creditors because of the *Contractor's* insolvency, or if a receiver is appointed because of the *Contractor's* insolvency, the *Owner* may, without prejudice to any other right or remedy the *Owner* may have, by giving the *Contractor* or receiver or trustee in bankruptcy notice in writing, terminate the *Contract*.
- 7.1.2 If the *Contractor* neglects to prosecute the *Work* properly or otherwise fails to comply with the requirements of the *Contract* to a substantial degree and if the *Consultant* has given a written statement to the *Owner* and *Contractor* that sufficient cause exists to justify such action, the *Owner* may, without prejudice to any other right or remedy the *Owner* may have, notify the *Contractor* in writing that the *Contractor* is in default of the *Contractor's* contractual obligations and instruct the *Contractor* to correct the default in the 5 *Working Days* immediately following the receipt of such notice.
- 7.1.3 If the default cannot be corrected in the 5 *Working Days* specified, the *Contractor* shall be in compliance with the *Owner's* instructions if the *Contractor*:
- .1 commences the correction of the default within the specified time, and
 - .2 provides the *Owner* with an acceptable schedule for such correction, and
 - .3 corrects the default in accordance with such schedule.
- 7.1.4 If the *Contractor* fails to correct the default in the time specified or subsequently agreed upon, without prejudice to any other right or remedy the *Owner* may have, the *Owner* may:
- .1 correct such default and deduct the cost thereof from any payment then or thereafter due the *Contractor* provided the *Consultant* has certified such cost to the *Owner* and the *Contractor*, or
 - .2 terminate the *Contractor's* right to continue with the *Work* in whole or in part or terminate the *Contract*.
- 7.1.5 If the *Owner* terminates the *Contractor's* right to continue with the *Work* as provided in paragraphs 7.1.1 and 7.1.4, the *Owner* shall be entitled to:
- .1 take possession of the *Work* and *Products* delivered to the *Place of the Work*, subject to the rights of third parties, and finish the *Work* by whatever method the *Owner* may consider expedient, but without undue delay or expense, and
 - .2 withhold further payment to the *Contractor* until a final certificate for payment is issued, and
 - .3 charge the *Contractor* the amount by which the full cost of finishing the *Work* as certified by the *Consultant*, including compensation to the *Consultant* for the *Consultant's* additional services and a reasonable allowance as determined by the *Consultant* to cover the cost of corrections to work performed by the *Contractor* that may be required under GC 12.3 - WARRANTY, exceeds the unpaid balance of the *Contract Price*; however, if such cost of finishing the *Work* is less than the unpaid balance of the *Contract Price*, the *Owner* shall pay the *Contractor* the difference, and
 - .4 on expiry of the warranty period, charge the *Contractor* the amount by which the cost of corrections to the *Contractor's* work under GC 12.3 - WARRANTY exceeds the allowance provided for such corrections, or if the cost of such corrections is less than the allowance, pay the *Contractor* the difference.
- 7.1.6 The *Contractor's* obligation under the *Contract* as to quality, correction, and warranty of the work performed by the *Contractor* up to the time of termination shall continue in force after such termination.

GC 7.2 CONTRACTOR'S RIGHT TO STOP THE WORK OR TERMINATE THE CONTRACT

- 7.2.1 If the *Owner* is adjudged bankrupt, or makes a general assignment for the benefit of creditors because of the *Owner's* insolvency, or if a receiver is appointed because of the *Owner's* insolvency, the *Contractor* may, without prejudice to any other right or remedy the *Contractor* may have, by giving the *Owner* or receiver or trustee in bankruptcy notice in writing, terminate the *Contract*.
- 7.2.2 If the *Work* is stopped or otherwise delayed for a period of 20 *Working Days* or more under an order of a court or other public authority and providing that such order was not issued as the result of an act or fault of the *Contractor* or of anyone directly or indirectly employed or engaged by the *Contractor*, the *Contractor* may, without prejudice to any other right or remedy the *Contractor* may have, by giving the *Owner* notice in writing, terminate the *Contract*.
- 7.2.3 The *Contractor* may notify the *Owner* in writing, with a copy to the *Consultant*, that the *Owner* is in default of the *Owner's* contractual obligations if:
- .1 the *Owner* fails to furnish, when so requested by the *Contractor*, reasonable evidence that financial arrangements have been made to fulfill the *Owner's* obligations under the *Contract*, or
 - .2 the *Consultant* fails to issue a certificate as provided in GC 5.3 PROGRESS PAYMENT, or
 - .3 the *Owner* fails to pay the *Contractor* when due the amounts certified by the *Consultant* or awarded by arbitration or court, or
 - .4 the *Owner* violates the requirements of the *Contract* to a substantial degree and the *Consultant*, except for GC 5.1 - FINANCING INFORMATION REQUIRED OF THE OWNER, confirms by written statement to the *Contractor* that sufficient cause exists.
- 7.2.4 The *Contractor's* notice in writing to the *Owner* provided under paragraph 7.2.3 shall advise that if the default is not corrected within 5 *Working Days* following the receipt of the notice in writing, the *Contractor* may, without prejudice to any other right or remedy the *Contractor* may have, stop the *Work* or terminate the *Contract*.
- 7.2.5 If the *Contractor* terminates the *Contract* under the conditions set out above, the *Contractor* shall be entitled to be paid for all work performed including reasonable profit, for loss sustained upon *Products* and *Construction Equipment*, and such other damages as the *Contractor* may have sustained as a result of the termination of the *Contract*.

PART 8 DISPUTE RESOLUTION

GC 8.1 AUTHORITY OF THE CONSULTANT

- 8.1.1 Differences between the parties to the *Contract* as to the interpretation, application or administration of the *Contract* or any failure to agree where agreement between the parties is called for, herein collectively called disputes, which are not resolved in the first instance by findings of the *Consultant* as provided in GC 2.2 - ROLE OF THE CONSULTANT, shall be settled in accordance with the requirements of Part 8 of the General Conditions - DISPUTE RESOLUTION.
- 8.1.2 If a dispute arises under the *Contract* in respect of a matter in which the *Consultant* has no authority under the *Contract* to make a finding, the procedures set out in paragraph 8.1.3 and paragraphs 8.2.3 to 8.2.8 of GC 8.2 - NEGOTIATION, MEDIATION, AND ARBITRATION, and in GC 8.3 - RETENTION OF RIGHTS apply to that dispute with the necessary changes to detail as may be required.
- 8.1.3 If a dispute is not resolved promptly, the *Consultant* will give such instructions as in the *Consultant's* opinion are necessary for the proper performance of the *Work* and to prevent delays pending settlement of the dispute. The parties shall act immediately according to such instructions, it being understood that by so doing neither party will jeopardize any claim the party may have. If it is subsequently determined that such instructions were in error or at variance with the *Contract Documents*, the *Owner* shall pay the *Contractor* costs incurred by the *Contractor* in carrying out such instructions which the *Contractor* was required to do beyond what the *Contract Documents* correctly understood and interpreted would have required, including costs resulting from interruption of the *Work*.

GC 8.2 NEGOTIATION, MEDIATION, AND ARBITRATION

- 8.2.1 In accordance with the latest edition of the Rules for Mediation of Construction Disputes as provided in CCDC 40, the parties shall appoint a Project Mediator
- .1 within 20 *Working Days* after the *Contract* was awarded, or
 - .2 if the parties neglected to make an appointment within the 20 *Working Day* period, within 10 *Working Days* after either party by notice in writing requests that the Project Mediator be appointed.
- 8.2.2 A party shall be conclusively deemed to have accepted a finding of the *Consultant* under GC 2.2 - ROLE OF THE CONSULTANT and to have expressly waived and released the other party from any claims in respect of the particular matter dealt with in that finding unless, within 15 *Working Days* after receipt of that finding, the party sends a notice in writing of dispute to the other party and to the *Consultant*, which contains the particulars of the matter in dispute and the relevant provisions of the *Contract Documents*. The responding party shall send a notice in writing of reply to the dispute within 10 *Working Days* after receipt of the notice of dispute setting out particulars of this response and any relevant provisions of the *Contract Documents*.
- 8.2.3 The parties shall make all reasonable efforts to resolve their dispute by amicable negotiations and agree to provide, without prejudice, frank, candid and timely disclosure of relevant facts, information, and documents to facilitate these negotiations.
- 8.2.4 After a period of 10 *Working Days* following receipt of a responding party's notice in writing of reply under paragraph 8.2.2, the parties shall request the Project Mediator to assist the parties to reach agreement on any unresolved dispute. The mediated negotiations shall be conducted in accordance with the latest edition of the Rules for Mediation of Construction Disputes as provided in CCDC 40.
- 8.2.5 If the dispute has not been resolved within 10 *Working Days* after the Project Mediator was requested under paragraph 8.2.4 or within such further period agreed by the parties, the Project Mediator shall terminate the mediated negotiations by giving notice in writing to both parties.
- 8.2.6 By giving a notice in writing to the other party, not later than 10 *Working Days* after the date of termination of the mediated negotiations under paragraph 8.2.5, either party may refer the dispute to be finally resolved by arbitration under the latest edition of the Rules for Arbitration of Construction Disputes as provided in CCDC 40. The arbitration shall be conducted in the jurisdiction of the *Place of the Work*.
- 8.2.7 On expiration of the 10 *Working Days*, the arbitration agreement under paragraph 8.2.6 is not binding on the parties and, if a notice is not given under paragraph 8.2.6 within the required time, the parties may refer the unresolved dispute to the courts or to any other form of dispute resolution, including arbitration, which they have agreed to use.
- 8.2.8 If neither party requires by notice in writing given within 10 *Working Days* of the date of notice requesting arbitration in paragraph 8.2.6 that a dispute be arbitrated immediately, all disputes referred to arbitration as provided in paragraph 8.2.6 shall be
- .1 held in abeyance until
 - (1) *Substantial Performance of the Work*,
 - (2) the *Contract* has been terminated, or
 - (3) the *Contractor* has abandoned the *Work*,whichever is earlier, and
 - .2 consolidated into a single arbitration under the rules governing the arbitration under paragraph 8.2.6.

GC 8.3 RETENTION OF RIGHTS

- 8.3.1 It is agreed that no act by either party shall be construed as a renunciation or waiver of any rights or recourses, provided the party has given the notices required under Part 8 of the General Conditions - DISPUTE RESOLUTION and has carried out the instructions as provided in paragraph 8.1.3.

- 8.3.2 Nothing in Part 8 of the General Conditions - DISPUTE RESOLUTION shall be construed in any way to limit a party from asserting any statutory right to a lien under applicable lien legislation of the jurisdiction of the *Place of the Work* and the assertion of such right by initiating judicial proceedings is not to be construed as a waiver of any right that party may have under paragraph 8.2.6 to proceed by way of arbitration to adjudicate the merits of the claim upon which such a lien is based.

PART 9 PROTECTION OF PERSONS AND PROPERTY

GC 9.1 PROTECTION OF WORK AND PROPERTY

- 9.1.1 The *Contractor* shall protect the *Work* and the *Owner's* property and property adjacent to the *Place of the Work* from damage which may arise as the result of the *Contractor's* operations under the *Contract*, and shall be responsible for such damage, except damage which occurs as the result of:
- .1 errors in the *Contract Documents*;
 - .2 acts or omissions by the *Owner*, the *Consultant*, other contractors, their agents and employees.
- 9.1.2 Before commencing any work, the *Contractor* shall determine the location of all known underground utilities and structures indicated in the *Contract Documents* or that are reasonably apparent in an inspection of the *Place of the Work*.
- 9.1.3 Should the *Contractor* in the performance of the *Contract* damage the *Work*, the *Owner's* property, or property adjacent to the *Place of the Work*, the *Contractor* shall be responsible for the making good such damage at the *Contractor's* expense.
- 9.1.4 Should damage occur to the *Work* or *Owner's* property for which the *Contractor* is not responsible, as provided in paragraph 9.1.1, the *Contractor* shall make good such damage to the *Work* and, if the *Owner* so directs, to the *Owner's* property. The *Contract Price* and *Contract Time* shall be adjusted as provided in GC 6.1 - CHANGES, GC 6.2 - CHANGE ORDER, and GC 6.3 - CHANGE DIRECTIVE.

GC 9.2 DAMAGES AND MUTUAL RESPONSIBILITY

- 9.2.1 If either party to the *Contract* should suffer damage in any manner because of any wrongful act or neglect of the other party or of anyone for whom the other party is responsible in law, then that party shall be reimbursed by the other party for such damage. The reimbursing party shall be subrogated to the rights of the other party in respect of such wrongful act or neglect if it be that of a third party.
- 9.2.2 If the *Contractor* has caused damage to the work of another contractor on the *Project*, the *Contractor* shall upon due notice in writing settle with the other contractor by negotiation or arbitration. If the other contractor makes a claim against the *Owner* on account of damage alleged to have been so sustained, the *Owner* shall notify the *Contractor* in writing and may require the *Contractor* to defend the action at the *Contractor's* expense. The *Contractor* shall satisfy a final order or judgment against the *Owner* and pay the costs incurred by the *Owner* arising from such action.
- 9.2.3 If the *Contractor* becomes liable to pay or satisfy a final order, judgment, or award against the *Owner*, then the *Contractor*, upon undertaking to indemnify the *Owner* against any and all liability for costs, shall have the right to appeal in the name of the *Owner* such final order or judgment to any and all courts of competent jurisdiction.

GC 9.3 TOXIC AND HAZARDOUS SUBSTANCES

- 9.3.1 For the purposes of applicable environmental legislation, the *Owner* shall be deemed to have control and management of the *Place of the Work* with respect to existing conditions.
- 9.3.2 Prior to the *Contractor* commencing the *Work*, the *Owner* shall:
- .1 take all reasonable steps to determine whether any toxic or hazardous substances are present at the *Place of the Work*, and
 - .2 provide the *Consultant* and the *Contractor* with a written list of any such substances that are known to exist and their locations.

- 9.3.3 The *Owner* shall take all reasonable steps to ensure that no person suffers injury, sickness, or death and that no property is damaged or destroyed as a result of exposure to, or the presence of, toxic or hazardous substances which were at the *Place of the Work* prior to the *Contractor* commencing the *Work*.
- 9.3.4 Unless the *Contract* expressly provides otherwise, the *Owner* shall be responsible for taking all necessary steps, in accordance with legal requirements, to dispose of, store or otherwise render harmless toxic or hazardous substances which were present at the *Place of the Work* prior to the *Contractor* commencing the *Work*.
- 9.3.5 If the *Contractor*
- .1 encounters toxic or hazardous substances at the *Place of the Work*, or
 - .2 has reasonable grounds to believe that toxic or hazardous substances are present at the *Place of the Work*, which were not disclosed by the *Owner*, as required under paragraph 9.3.2, or which were disclosed but have not been dealt with as required under paragraph 9.3.4, the *Contractor* shall
 - .3 take all reasonable steps, including stopping the *Work*, to ensure that no person suffers injury, sickness, or death and that no property is damaged or destroyed as a result of exposure to or the presence of the substances, and
 - .4 immediately report the circumstances to the *Consultant* and the *Owner* in writing.
- 9.3.6 If the *Contractor* is delayed in performing the *Work* or incurs additional costs as a result of taking steps required under paragraph 9.3.5.3, the *Contract Time* shall be extended for such reasonable time as the *Consultant* may recommend in consultation with the *Contractor* and the *Contractor* shall be reimbursed for reasonable costs incurred as a result of the delay and as a result of taking those steps.
- 9.3.7 Notwithstanding paragraphs 2.2.6 and 2.2.7 of GC 2.2 - ROLE OF THE CONSULTANT, or paragraph 8.1.1 of GC 8.1 - AUTHORITY OF THE CONSULTANT, the *Consultant* may select and rely upon the advice of an independent expert in a dispute under paragraph 9.3.6 and, in that case, the expert shall be deemed to have been jointly retained by the *Owner* and the *Contractor* and shall be jointly paid by them.
- 9.3.8 The *Owner* shall indemnify and hold harmless the *Contractor*, the *Consultant*, their agents and employees, from and against claims, demands, losses, costs, damages, actions, suits, or proceedings arising out of or resulting from exposure to, or the presence of, toxic or hazardous substances which were at the *Place of the Work* prior to the *Contractor* commencing the *Work*. This obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity set out in GC 12.1 - INDEMNIFICATION or which otherwise exist respecting a person or party described in this paragraph.
- 9.3.9 GC 9.3 - TOXIC AND HAZARDOUS SUBSTANCES shall govern over the provisions of paragraph 1.3.1 of GC 1.3 RIGHTS AND REMEDIES or GC 9.2 - DAMAGES AND MUTUAL RESPONSIBILITY.

GC 9.4 ARTIFACTS AND FOSSILS

- 9.4.1 Fossils, coins, articles of value or antiquity, structures, and other remains or things of scientific or historic interest discovered at the *Place or Work* shall, as between the *Owner* and the *Contractor*, be deemed to be the absolute property of the *Owner*.
- 9.4.2 The *Contractor* shall take all reasonable precautions to prevent removal or damage to discoveries as identified in paragraph 9.4.1, and shall notify the *Consultant* immediately upon discovery of such items.
- 9.4.3 The *Consultant* will investigate the impact on the *Work* of the discoveries identified in paragraph 9.4.1. If conditions are found that would cause an increase or decrease in the *Contractor's* cost or time to perform the *Work*, the *Consultant*, with the *Owner's* approval, shall issue appropriate instructions for a change in the *Work* as provided in GC 6.2 - CHANGE ORDER or GC 6.3 - CHANGE DIRECTIVE.

GC 9.5 CONSTRUCTION SAFETY

- 9.5.1 Subject to paragraph 3.2.2.2 of GC 3.2 - CONSTRUCTION BY OWNER OR OTHER CONTRACTORS, the *Contractor* shall be solely responsible for construction safety at the *Place or the Work* and for compliance with the rules, regulations, and practices required by the applicable construction health and safety legislation and shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the *Work*.

PART 10 GOVERNING REGULATIONS

GC 10.1 TAXES AND DUTIES

- 10.1.1 The *Contract Price* shall include all taxes and customs duties in effect at the time of the bid closing except for *Value Added Taxes* payable by the *Owner* to the *Contractor* as stipulated in Article A-4 of the Agreement - CONTRACT PRICE.
- 10.1.2 Any increase or decrease in costs to the *Contractor* due to changes in such included taxes and duties after the time of bid closing shall increase or decrease the *Contract Price* accordingly.

GC 10.2 LAWS, NOTICES, PERMITS, AND FEES

- 10.2.1 The laws of the *Place of the Work* shall govern the *Work*.
- 10.2.2 Except for the permits and fees, including those required under paragraph 10.2.3, which the *Contract Documents* specify as the responsibility of the *Contractor*, the *Owner* shall obtain and pay for all necessary approvals, permits, permanent easements, and rights of servitude.
- 10.2.3 The *Contractor* shall obtain and pay for permits, licenses, inspections and certificates necessary for performance of the *Work* and customarily obtained after signing of the *Contract*.
- 10.2.4 The *Contractor* shall give the required notices and comply with the laws, ordinances, rules, regulations, or codes which are or become in force during the performance of the *Work* and which relate to the *Work*, to the preservation of the public health, and to construction safety.
- 10.2.5 The *Contractor* shall not be responsible for verifying that the *Contract Documents* are in compliance with the applicable laws, ordinances, rules, regulations, or codes relating to the *Work*. If the *Contract Documents* are in variance therewith, or if, subsequent to the time of bid closing, changes are made to the applicable laws, ordinances, rules, regulations, or codes which require modification to the *Contract Documents*, the *Contractor* shall notify the *Consultant* in writing requesting direction immediately upon such variance or change becoming known. The *Consultant* will make the changes required to the *Contract Documents* as provided in GC 6.1 - CHANGES, GC 6.2 - CHANGE ORDER, and GC 6.3 - CHANGE DIRECTIVE.
- 10.2.6 If the *Contractor* fails to notify the *Consultant* in writing; and fails to obtain direction as required in paragraph 10.2.5; and performs work knowing it to be contrary to any laws, ordinances, rules, regulations, or codes; the *Contractor* shall be responsible for and shall correct the violations thereof; and shall bear the costs, expenses, and damages attributable to the failure to comply with the provisions of such laws, ordinances, rules, regulations, or codes.
- 10.2.7 If, subsequent to the time of bid closing, changes are made to applicable laws, ordinances, rules, regulations, or codes of authorities having jurisdiction which affect the cost of the *Work*, either party may submit a claim in accordance with the requirements of GC 6.6 - CLAIMS.

GC 10.3 PATENT FEES

- 10.3.1 The *Contractor* shall pay the royalties and patent licence fees required for the performance of the *Contract*. The *Contractor* shall hold the *Owner* harmless from and against claims, demands, losses, costs, damages, actions, suits, or proceedings arising out of the *Contractor's* performance of the *Contract* which are attributable to an infringement or an alleged infringement of a patent of invention by the *Contractor* or anyone for whose acts the *Contractor* may be liable.
- 10.3.2 The *Owner* shall hold the *Contractor* harmless against claims, demands, losses, costs, damages, actions, suits, or proceedings arising out of the *Contractor's* performance of the *Contract* which are attributable to an infringement or an alleged infringement of a patent of invention in executing anything for the purpose of the *Contract*, the model, plan, or design of which was supplied to the *Contractor* as part of the *Contract Documents*.

GC 10.4 WORKERS' COMPENSATION

- 10.4.1 Prior to commencing the *Work*, *Substantial Performance of the Work*, and the issuance of the final certificate for payment, the *Contractor* shall provide evidence of compliance with workers' compensation legislation at the *Place of the Work*, including payments due thereunder.
- 10.4.2 At any time during the term of the *Contract*, when requested by the *Owner*, the *Contractor* shall provide such evidence of compliance by the *Contractor* and *Subcontractors*.

PART 11 INSURANCE AND CONTRACT SECURITY

GC 11.1 INSURANCE

- 11.1.1 Without restricting the generality of GC 12.1 - INDEMNIFICATION, the *Contractor* shall provide, maintain, and pay for the insurance coverages specified in GC 11.1 - INSURANCE. Unless otherwise stipulated, the duration of each insurance policy shall be from the date of commencement of the *Work* until the date of the final certificate for payment. Prior to commencement of the *Work* and upon the placement, renewal, amendment, or extension of all or any part of the insurance, the *Contractor* shall promptly provide the *Owner* with confirmation of coverage and, if required, a certified true copy of the policies certified by an authorized representative of the insurer together with copies of any amending endorsements.
- .1 General Liability Insurance:
General liability insurance shall be in the joint names of the *Contractor*, the *Owner*, and the *Consultant*, with limits of not less than \$2,000,000 per occurrence and with a property damage deductible not exceeding \$2,500. The insurance coverage shall not be less than the insurance required by IBC Form 2100, or its equivalent replacement, provided that IBC Form 2100 shall contain the latest edition of the relevant CCDC endorsement form. To achieve the desired limit, umbrella, or excess liability insurance may be used. All liability coverage shall be maintained for completed operations hazards from the date of *Substantial Performance of the Work*, as set out in the certificate of *Substantial Performance of the Work*, on an ongoing basis for a period of 6 years following *Substantial Performance of the Work*. Where the *Contractor* maintains a single, blanket policy, the addition of the *Owner* and the *Consultant* is limited to liability arising out of the *Work* and all operations necessary or incidental thereto. The policy shall be endorsed to provide the *Owner* with not less than 30 days notice in writing in advance of any cancellation, and of change or amendment restricting coverage.
 - .2 Automobile Liability Insurance:
Automobile liability insurance in respect of licensed vehicles shall have limits of not less than \$2,000,000 inclusive per occurrence for bodily injury, death, and damage to property, covering all licensed vehicles owned or leased by the *Contractor*, and endorsed to provide the *Owner* with not less than 15 days notice in writing in advance of any cancellation, change or amendment restricting coverage. Where the policy has been issued pursuant to a government-operated automobile insurance system, the *Contractor* shall provide the *Owner* with confirmation of automobile insurance coverage for all automobiles registered in the name of the *Contractor*.
 - .3 Aircraft and Watercraft Liability Insurance:
Aircraft and watercraft liability insurance with respect to owned or non-owned aircraft and watercraft if used directly or indirectly in the performance of the *Work*, including use of additional premises, shall be subject to limits of not less than \$2,000,000 inclusive per occurrence for bodily injury, death, and damage to property including loss of use thereof and limits of not less than \$2,000,000 for aircraft passenger hazard. Such insurance shall be in a form acceptable to the *Owner*. The policies shall be endorsed to provide the *Owner* with not less than 15 days notice in writing in advance of cancellation, change, or amendment restricting coverage.

.4 Property and Boiler and Machinery Insurance:

- (1) "All risks" property insurance shall be in the joint names of the *Contractor*, the *Owner*, the *Consultant*, and all *Subcontractors*, insuring not less than the sum of the amount of the *Contract Price* and the full value, as stated in the Supplementary Conditions, of *Products* that are specified to be provided by the *Owner* for incorporation into the *Work*, with a deductible not exceeding \$2,500. The insurance coverage shall not be less than the insurance required by IBC Form 4042 or its equivalent replacement, provided that IBC Form 4042 shall contain the latest edition of the relevant CCDC endorsement form. The coverage shall be maintained continuously until 5 *Working Days* after the date of the final certificate for payment.
- (2) Boiler and machinery insurance shall be in the joint names of the *Contractor*, the *Owner*, and the *Consultant* for not less than the replacement value of the boilers, pressure vessels, and other insurable objects forming part of the *Work*. The insurance provided shall not be less than the insurance provided by the "Comprehensive Boiler and Machinery Form" and shall be maintained continuously from commencement of use or operation of the property insured and until 5 *Working Days* after the date of the final certificate for payment.
- (3) The policies shall allow for partial or total use or occupancy of the *Work*. If because of such use or occupancy the *Contractor* is unable to provide coverage, the *Contractor* shall notify the *Owner* in writing. Prior to such use or occupancy the *Owner* shall provide, maintain, and pay for all risk property and boiler insurance insuring the full value of the *Work*, as in sub-paragraphs (1) and (2), including coverage for such use or occupancy and shall provide the *Contractor* with proof of such insurance. The *Contractor* shall refund to the *Owner* the unearned premiums applicable to the *Contractor's* policies upon termination of coverage.
- (4) The policies shall provide that, in the case of a loss or damage, payment shall be made to the *Owner* and the *Contractor* as their respective interests may appear. The *Contractor* shall act on behalf of the *Owner* for the purpose of adjusting the amount of such loss or damage payment with the insurers. When the extent of the loss or damage is determined, the *Contractor* shall proceed to restore the *Work*. Loss or damage shall not affect the rights and obligations of either party under the *Contract* except that the *Contractor* shall be entitled to such reasonable extension of *Contract Time* relative to the extent of the loss or damage as the *Consultant* may recommend in consultation with the *Contractor*.
- (5) The *Contractor* shall be entitled to receive from the *Owner*, in addition to the amount due under the *Contract*, the amount at which the *Owner's* interest in restoration of the *Work* has been appraised, such amount to be paid as the restoration of the *Work* proceeds and as provided in GC 5.5 - APPLICATIONS FOR PROGRESS PAYMENT and GC 5.6 - PROGRESS PAYMENT. In addition the *Contractor* shall be entitled to receive from the payments made by the insurer the amount of the *Contractor's* interest in the restoration of the *Work*.
- (6) In the case of loss or damage to the *Work* arising from the work of another contractor, or *Owner's* own forces, the *Owner*, in accordance with the *Owner's* obligations under paragraph 3.2.2.4 of GC 3.2 - CONSTRUCTION BY OWNER OR OTHER CONTRACTORS, shall pay the *Contractor* the cost of restoring the *Work* as the restoration of the *Work* proceeds and as provided in GC 5.5 - APPLICATIONS FOR PROGRESS PAYMENT and GC 5.6 - PROGRESS PAYMENT.

.5 Contractors' Equipment Insurance:

"All risks" contractors' equipment insurance covering *Construction Equipment* used by the *Contractor* for the performance of the *Work*, including boiler insurance on temporary boilers and pressure vessels, shall be in a form acceptable to the *Owner* and shall not allow subrogation claims by the insurer against the *Owner*. The policies shall be endorsed to provide the *Owner* with not less than 15 days notice in writing in advance of cancellation, change, or amendment restricting coverage. Subject to satisfactory proof of financial capability by the *Contractor* for self-insurance, the *Owner* agrees to waive the equipment insurance requirement.

11.1.2 The *Contractor* shall be responsible for deductible amounts under the policies except where such amounts may be excluded from the *Contractor's* responsibility by the terms of GC 9.1 - PROTECTION OF WORK AND PROPERTY and GC 9.2 - DAMAGES AND MUTUAL RESPONSIBILITY.

11.1.3 Where the full insurable value of the *Work* is substantially less than the *Contract Price*, the *Owner* may reduce the amount of insurance required or waive the course of construction insurance requirement.

- 11.1.4 If the *Contractor* fails to provide or maintain insurance as required by the *Contract Documents*, then the *Owner* shall have the right to provide and maintain such insurance and give evidence to the *Contractor* and the *Consultant*. The *Contractor* shall pay the cost thereof to the *Owner* on demand or the *Owner* may deduct the amount which is due or may become due to the *Contractor*.
- 11.1.5 All required insurance policies shall be with insurers licensed to underwrite insurance in the jurisdiction of the *Place of the Work*.

GC 11.2 CONTRACT SECURITY

- 11.2.1 The *Contractor* shall, prior to commencement of the *Work* or within the specified time, provide to the *Owner* any contract security specified in the *Contract Documents*.
- 11.2.2 If the *Contract Documents* require surety bonds to be provided, such bonds shall be issued by a duly licensed surety company authorized to transact the business of suretyship in the province or territory of the *Place of the Work* and shall be maintained in good standing until the fulfillment of the *Contract*. The form of such bonds shall be in accordance with the latest edition of the CCDC approved bond forms.

PART 12 INDEMNIFICATION — WAIVER — WARRANTY

GC 12.1 INDEMNIFICATION

- 12.1.1 The *Contractor* shall indemnify and hold harmless the *Owner* and the *Consultant*, their agents and employees from and against claims, demands, losses, costs, damages, actions, suits, or proceedings (hereinafter 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 anyone for whose acts the *Contractor* may be liable, and
 - .3 made in writing within a period of 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.
- 12.1.2 The obligation of the *Contractor* to indemnify hereunder shall be limited to \$2,000,000 per occurrence from the commencement of the *Work* until *Substantial Performance of the Work* and thereafter to an aggregate limit of \$2,000,000.
- 12.1.3 The *Owner* shall indemnify and hold harmless the *Contractor*, the *Contractor's* agents and employees from and against claims, demands, losses, costs, damages, actions, suits, or proceedings arising out of the *Contractor's* performance of the *Contract* which are attributable to a lack of or defect in title or an alleged lack of or defect in title to the *Place of the Work*.
- 12.1.4 GC 12.1 - INDEMNIFICATION shall govern over the provisions of paragraph 1.3.1 of GC 1.3 - RIGHTS AND REMEDIES or GC 9.2 - DAMAGES AND MUTUAL RESPONSIBILITY.

GC 12.2 WAIVER OF CLAIMS

- 12.2.1 Waiver of Claims by *Owner*
- As of the date of the final certificate for payment, the *Owner* expressly waives and releases the *Contractor* from all claims against the *Contractor* including without limitation those that might arise from the negligence or breach of contract by the *Contractor* except one or more of the following:
- .1 those made in writing prior to the date of the final certificate for payment and still unsettled;
 - .2 those arising from the provisions of GC 12.1 - INDEMNIFICATION or GC 12.3 - WARRANTY;
 - .3 those arising from the provisions of paragraph 9.3.5 of GC 9.3 - TOXIC AND HAZARDOUS SUBSTANCES AND MATERIALS and arising from the *Contractor* bringing or introducing any toxic or hazardous substances and materials to the *Place of the Work* after the *Contractor* commences the *Work*.

In the Common Law provinces GC 12.2.1.4 shall read as follows:

- .4 those made in writing within a period of 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* and arising from any liability of the *Contractor* for damages resulting from the *Contractor's* performance of the *Contract* with respect to substantial defects or deficiencies in the *Work* for which the *Contractor* is proven responsible. As used herein "substantial defects or deficiencies" means those defects or deficiencies in the *Work* which affect the *Work* to such an extent or in such a manner that a significant part or the whole of the *Work* is unfit for the purpose intended by the *Contract Documents*.

In the Province of Quebec GC 12.2.1.4 shall read as follows:

- .4 those arising under the provisions of Article 2118 of the Civil Code of Quebec.

12.2.2 Waiver of Claims by *Contractor*

As of the date of the final certificate for payment, the *Contractor* expressly waives and releases the *Owner* from all claims against the *Owner* including without limitation those that might arise from the negligence or breach of contract by the *Owner* except:

- .1 those made in writing prior to the *Contractor's* application for final payment and still unsettled; and
- .2 those arising from the provisions of GC 9.3 - TOXIC AND HAZARDOUS SUBSTANCES or GC 10.3 - PATENT FEES.

12.2.3 GC 12.2 - WAIVER OF CLAIMS shall govern over the provisions of paragraph 1.3.1 of GC 1.3 - RIGHTS AND REMEDIES, GC 6.6 - CLAIMS, and GC 9.2 - DAMAGES AND MUTUAL RESPONSIBILITY.

GC 12.3 WARRANTY

- 12.3.1 Except for extended warranties as described in paragraph 12.3.6, the warranty period under the *Contract* is one year from the date of *Substantial Performance of the Work*.
- 12.3.2 The *Contractor* shall be responsible for the proper performance of the *Work* to the extent that the design and *Contract Documents* permit such performance.
- 12.3.3 Subject to paragraph 12.3.2, the *Contractor* shall correct promptly, at the *Contractor's* expense, defects or deficiencies in the *Work* which appear prior to and during the warranty periods specified in the *Contract Documents*.
- 12.3.4 The *Owner*, through the *Consultant*, shall promptly give the *Contractor* notice in writing of observed defects and deficiencies which occur during the one-year warranty period.
- 12.3.5 The *Contractor* shall correct or pay for damage resulting from corrections made under the requirements of paragraph 12.3.3.
- 12.3.6 Any extended warranties required beyond the one-year warranty period, as described in paragraph 12.3.1, shall be as specified in the *Contract Documents*. Extended warranties shall be issued by the warrantor to the benefit of the *Owner*. The *Contractor's* responsibility with respect to extended warranties shall be limited to obtaining any such extended warranties from the warrantor. The obligations under such extended warranties are solely the responsibility of the warrantor.



Canadian Construction Documents Committee

CCDC Copyright 2001

Must not be copied in whole or in part without the written permission of the CCDC.

The Canadian Construction Documents Committee is a joint committee composed of owners and representatives appointed by:

The Association of Consulting Engineers of Canada
The Canadian Construction Association
Construction Specifications Canada
The Royal Architectural Institute of Canada

Committee policy and procedures are directed and approved by the constituent organizations.

This document has been endorsed by each of the above organizations.

Enquiries should be directed to:

The Secretary
Canadian Construction Documents Committee
400 - 75 Albert Street
Ottawa, Ontario K1P 5E7
Tel: (613) 236-9455
Fax: (613) 236-9526
www.ccdc.org

SECTION	TITLE	PAGES
DIVISION 01 - GENERAL REQUIREMENTS		
01 11 00	Summary of Work	4
01 14 00	Work Restrictions	2
01 15 00	Weigh Scales	2
01 21 00	Allowances	2
01 31 19	Project Meetings	3
01 32 16.07	Construction Progress Schedule - Bar (GANTT) Chart	4
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 56 00	Temporary Barriers and Enclosures	2
01 61 00	Common Product Requirements	5
01 71 00	Examination and Preparation	4
01 74 11	Cleaning	3
01 78 00	Closeout Submittals	6
DIVISION 02 - EXISTING CONDITIONS		
02 41 13	Selective Site Demolition	8
02 41 13.14	Asphalt Paving Removal	3
DIVISION 03 - CONCRETE		
03 10 00	Concrete Forming and Accessories	5
03 20 00	Concrete Reinforcing	5
03 30 00	Cast-In-Place Concrete	15
03 30 20	Sawcutting and Sealing of Airfield Panel Joints	3

DIVISION 26 - ELECTRICAL

26 05 00	Common Work Results for Electrical	14
26 05 28	Grounding – Secondary	2
26 05 34	Conduits, Conduit Fastenings	4
26 05 43.01	Installation of Cables in Trenches and in Ducts	4

DIVISION 31 - EARTHWORK

31 05 10	Corrected Maximum Dry Density	1
31 05 16	Aggregate Materials	10
31 22 14	Airfield Grading	7
31 23 33.01	Excavating, Trenching, and Backfilling	13

DIVISION 32 - CIVIL

32 01 11.01	Pavement Cleaning and Marking Removal	2
32 01 18	Routing and Sealing Pavement Cracks	4
32 11 23	Granular Base Course	4
32 12 13.16	Asphalt Tack Coat	4
32 12 16	Asphalt Paving	20
32 12 16.03S	Hot-In-Place Recycle	3
32 17 23	Pavement Markings	4
32 31 13	Chain Link Fences and Gates	8
32 91 19.13	Topsoil Placement and Grading	5
32 92 19.16	Hydraulic Seeding	6

DIVISION 33 - UTILITIES

33 05 13	Manholes and Catch Basin Structures	8
33 65 76	Direct Buried Underground Cable Ducts	3

DIVISION 34 - TRANSPORTATION

34 43 10	Airfield Lighting – General	9
----------	-----------------------------	---

34 43 10.01	Illuminated Airport Guidance Signs	3
34 43 13.19	Elevated Edge Lighting for Airport Runways, Taxiways, Aprons	3
34 43 16.26	Airfield Omni-Directional Approach Lighting Equipment	3
34 43 16.34	Airfield Medium Intensity Approach Lighting Equipment	3
34 43 16.36	Airfield Precision Approach Path Indicator	2
34 43 26.23	Airfield Lighting Regulator Assembly	2
APPENDIX A	Plan of Construction Operations	26
APPENDIX B	Hot-In-Place Recycling (HIPR) Technical Memo	17

END OF SECTION

PART 1 - GENERAL

1. RELATED SECTIONS

- .1 Section 01 35 13.13 – Special Procedures: Airport in Use
- .2 Appendix A – Plan of Construction Operations

2. WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises the rehabilitation of Runway 13-31, Taxiway A, and Apron I asphalt and concrete structures as well as an airfield electrical rehabilitation. Work to be undertaken includes, but is not limited to the following:
 - 1. Coordination with the Quesnel Regional Airport and Airport Security to schedule training / certification of Contractor's personnel to acquire an Airside Vehicle Operator's Permit (AVOP), airside access, closures, and general airside movements.
 - 2. Remove specified Runway 13-31 existing asphalt areas by cold milling full depth to decrease the width of Runway 13-31 and stockpile millings at specified stockpile location on-site;
 - 3. Remove specified Runway 13-31 existing Portland Cement Concrete (PCC) areas full depth to decrease the width of Runway 13-31 and dispose off site;
 - 4. Remove existing Runway 13-31 asphalt blastpads by cold milling full depth and stockpile millings at specified stockpile location on-site;
 - 5. Use Hot-In-Pace-Recycling (HIPR) to specified depth for Runway 13-31, supply and install new hot mix asphalt concrete (HMAC) overlay to specified thickness;
 - 6. Partial depth PCC repairs for select Runway 31 PCC panels and supply and install new HMAC overlay to specified thickness;
 - 7. Remove specified Taxiway A and Apron I existing asphalt to specified depth by cold milling and stockpile millings at specified stockpile location on-site, supply and install new HMAC to specified thickness;
 - 8. Partial depth PCC repairs for select Apron I PCC panels;
 - 9. Supply and install common fill, topsoil, and hydroseeding for Runway 13-31 asphalt and PCC removal areas;
 - 10. Repair of one damaged manhole;
 - 11. Raise manhole grates to match new asphalt elevations;

12. Supply and install new runway approach lighting system (PROVISIONAL WORK), new windsocks, and new airfield signage;
13. Relocate existing PAPI's and runway edge lighting;
14. Paint temporary and permanent pavement markings;
15. PROVISIONAL WORK - Crack treatments before HIPR and/or after milling;
16. PROVISIONAL WORK – supply and install new granular base and asphalt repaving of runway blastpads or topsoil and hydroseeding of removed blastpad asphalt;
17. PROVISIONAL WORK - removal of existing Runway 13 groundside approach lighting fencing and supply and install of new 1.22m high fencing;
18. Supply and install temporary barriers with red obstruction lights as specified and remove when work is completed. Temporary barriers with red obstruction lights to remain with the Owner on project completion;
19. Tree clearing;
20. Survey layout and quantities;
21. Quality control testing.

3. CONTRACT METHOD

- .1 Construct Work under Unit Price Contract.
- .2 PROVISIONAL WORK items are at the discretion of the Owner. Contractor to allow for any additional costs related to General Construction Items for PROVISIONAL WORK scope in each PROVISIONAL WORK Contract line item. No additional payment will be made to the Contractor for claims for additional payment related to inclusion or omission of any PROVISIONAL WORK items.

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. CONTRACTOR FURNISHED ITEMS

- .1 Temporary plastic low profile barricades fillable with water to provide resistance to movement by jet blast and/or wind.
- .2 Steady burning red lights (solar powered).

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 Consultant 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 of 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.

END OF SECTION

PART 1 - GENERAL

1. RELATED SECTIONS

- .1 Section 01 32 16.07 – Construction Progress Schedules – Bar (GANTT) Chart
- .2 Section 01 35 13.13 – Special Procedures: Airport in Use
- .3 Appendix A – Plan of Construction Operations

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.

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.
- .6 Contractor to abide by all City of Quesnel bylaws.

4. EXISTING SERVICES

- .1 Notify, the Owner and utility companies of intended interruption of services and obtain required permission.
 - .1 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.
 - .2 Provide for personnel, pedestrian, and vehicular traffic.
 - .3 Construct barriers in accordance with the Plan of Construction Operations (PCO) Drawings.

5. SPECIAL REQUIREMENTS

- .1 Submit schedule in accordance with Section 01 32 16.07 – Construction Progress Schedules - Bar (GANTT) Chart.
 - .1 Ensure that Contractor personnel employed on site become familiar with and obey regulations including the PCO, safety, fire, traffic, and security regulations.
 - .2 Keep within limits of work and avenues of ingress and egress.
 - .3 Ingress and egress of Contractor vehicles at site is limited to those indicated by the Plan of Construction Operations and may only be allowed under security escort.

6. AIRSIDE VEHICLE SECURITY ESCORT

- .1 Personnel employed on this project must be escorted for all (and access into and out of) work in airside areas. Personnel must be escorted in all areas after normal working hours.
 - .1 The Contractor will provide an Airside Escort with vehicle for all times the Contractor's personnel are airside.
 - .2 It is the Contractor's responsibility to ensure the Airside Escort personnel are trained and certified by the Quesnel Regional Airport. The Contractor must coordinate and schedule the AVOP training and licensing.
 - .3 The Contractor shall provide Gate Guard(s) at each airside gate at all times the gate(s) is unlocked.
 - .4 See the Plan of Construction Operations for further details.

7. NON-SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions. Smoking or the use of e-cigarettes are not allowed anywhere on the airside of the airport.

8. COVID-19 PROOF OF VACCINATION REQUIREMENTS

- .1 Transport Canada requires that all workers working airside provide proof of Covid-19 vaccination.
- .2 All workers working on airside must obtain an airside access pass and display the pass whenever requested. The Owner will issue the individual airside access pass to each worker upon completion of contractor orientation form and verification of proof of Covid-19 vaccination

END OF SECTION

Part 1 GENERAL

1.1 REGULATORY REQUIREMENTS

- .1 Prior to use, have weigh scales certified as meeting requirements of Statutes of Canada, Chapter 36, Weights and Measures Act 1970-71-72 and subsequent amendments. Display certificate in prominent position and provide copy to Consultant.

1.2 MEASUREMENT PROCEDURES

- .1 No measurement will be made under this Section. Include cost of certification, installation, maintenance, and removal of scales or use of local commercial scales in in appropriate sections.

Part 2 PRODUCTS

2.1 EQUIPMENT

- .1 Weigh scales: electronic truck scale of sufficient capacity to weigh loaded vehicles in single operation.
- .2 Certified commercial scales may be utilized.
- .3 Scale house: to enclose mass indicator.

Part 3 EXECUTION

3.1 INSTALLATION

- .1 Provide, install, and maintain scales, scale house and ramps, convenient to project site, at location approved by Consultant.

3.2 OPERATION

- .1 Contractor to monitor weighing of materials.
- .2 If requested, provide sufficient number of weigh tickets, with consecutive serial numbers. Obtain Consultant's approval of design.

3.3 MAINTENANCE

- .1 Maintain scale platform and scale mechanism clean and free from gravel, asphalt, snow, ice, and debris.
- .2 Maintain approach and exit ramps free from sags and ruts.
- .3 Have scales recertified if requested by Consultant.

3.4 REMOVAL

- .1 Remove scales and scale house when no longer required.
- .2 Level approach and exit ramps and regrade to approval of Consultant.

END OF SECTION

PART 1 - GENERAL

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 Quesnel Regional 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 airside security escorts for the project. The Contractor shall be responsible for payment of the security escort(s) and escort vehicle(s) based on submitted timesheets approved by the Consultant. Maximum allowable hourly rate for the airside escort is \$50/hour. No additional payment will be made for overtime or double time hours. Maximum allowable daily rate for one work shift for the airside escort vehicle including fuel and air radio is \$100/day.
 - .2 Rejuvenating Agent – A cash allowance has been provided to cover the provisions of rejuvenating agent for the Hot-In-Place Recycle rehabilitation for the project. The Contractor shall provide copies of invoices of the product used as accepted by the Consultant.
 - .3 Standby Time – A cash allowance has been provided to cover Standby Time to cover the cost of delays to the Contractor in the event the Contractor is required to stop work due to unscheduled events such as a declared emergency. Scheduled flights do not constitute a delay to which standby time would be applicable. The Consultant shall be the final authority on whether the Contractor has been delayed due to unscheduled events and is

entitled to standby time and for the final amount to be paid. Standby time will start at the minute that notification is given by the Consultant that the Contractor must ready the work area for an emergency and end at the minute that notification is given by the Consultant that the Contractor may have access back to the work area. Rates used will be the rates as provided by the Contractor on the Appendix E of the Tender Form. The actual cost of each standby shall be provided by the Contractor to the Consultant within 24 hours of the standby occurrence to be considered for payment.

- .4 Repair of Existing Collapsed Manhole – A cash allowance has been provided to cover the repair of an existing collapsed manhole. Repair methodology to be determined by the Consultant upon a field investigation with the Contractor. Contractor to be paid by Time and Materials for the work required to repair the existing collapsed manhole.

- .5 Tree Clearing – A cash allowance has been provided to cover the survey and clearing of trees that protrude through the obstacle limitation surface. Contractor to be paid by Time and Materials for the work.

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 "Issued for Construction" 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 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;

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, 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 Order of all Electrical Equipment;
 - .3 Shop Drawings, Samples;
 - .4 Permits;
 - .5 Mobilization;
 - .6 Relocation of Runway Edge Lights and PAPI's;
 - .7 Runway Asphalt and Concrete Removal and Supply and Install of Common Fill and Topsoil;
 - .8 Runway Blastpad Asphalt Removal;
 - .9 Runway Blastpad Paving (PROVISIONAL);
 - .10 Runway Blastpad Supply and Install of Topsoil (PROVISIONAL);
 - .11 Runway Crack Repairs (PROVISIONAL);
 - .12 HIPR;
 - .13 Runway PCC Panel Repairs;
 - .14 Runway Asphalt Paving;

- .15 Runway Paint Markings;
- .16 Taxiway Cold Milling;
- .17 Taxiway Crack Repairs (PROVISIONAL);
- .18 Taxiway Asphalt Paving;
- .19 Taxiway Paint Markings;
- .20 Apron Cold Milling;
- .21 Apron Asphalt Paving;
- .22 Apron Pavement Marking Removal (PROVISIONAL)
- .23 Apron PCC Panel Repairs;
- .24 Apron Paint Markings;
- .25 Removal of Existing Approach Lighting System*;
- .26 New Runway Approach Lighting Installation (PROVISIONAL)*;
- .27 Apron Edge Light Installation;
- .28 Removal of Existing Approach Light Fencing*;
- .29 Installation of New Approach Light Fencing*;
- .30 Manhole Repairs;
- .31 Airfield Sign Installation;
- .32 Windsock Installation;
- .33 Hydroseeding;
- .34 Testing and Commissioning;
- .35 Record Documentation/Drawings;
- .36 Demobilization.

*All work in Section 2 to be scheduled separately. Provide the Owner with minimum 10 days advance notice prior to beginning work in this section. Work in this section is to be completed in as short a duration as possible to minimize impact to land owner.

7. PROJECT SCHEDULE REPORTING

- .1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Provide updated Project Schedule prior to each weekly construction meeting and with monthly progress claim.
- .3 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.

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 To avoid confusion, Contractor shall take care in organizing submittals under a unique filename while submitting to the Consultant for review. Keep in consideration:
 - .1 Each submittal shall only contain documentation pertaining to one subject matter. For example: Asphalt and Concrete mix designs shall be two separate submittals.
 - .2 Submittal filename and title shall begin with "SUBMITTAL" followed by its submission number "01" and ends with a brief description of the documentation such as "Asphalt Paving Plan" or "Glass Bead Data Sheet". For example: "SUBMITTAL 01 – Asphalt Paving Plan".
 - .3 If further revisions are required to an existing submittal document, the filename shall be updated to include "REV 1" or "REV 2" based on the iteration. For example: "SUBMITTAL 08 – Project Schedule REV 3".
- .3 Do not proceed with Work affected by submittal until review is complete.
- .4 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .5 Where items or information is not produced in SI Metric units converted values are acceptable.
- .6 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 coordinated 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.
- .7 Submittals shall be in a reproducible or electronic form acceptable to the Consultant. Facsimile versions of submittals are not acceptable.

- .8 Notify the Consultant, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .9 Verify field measurements and affected adjacent Work are coordinated.
- .10 Contractor's responsibility for errors and omissions in submission is not relieved by the Consultant's review of submittals.
- .11 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by the Consultant review.
- .12 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 coordinated, 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 Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.

END OF SECTION

PART 1 - GENERAL

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.

2. RELATED SECTIONS

- .1 Section 01 52 00 – Construction Facilities
- .2 Section 01 56 00 – Temporary Barriers and Enclosures
- .3 Appendix A – Plan of Construction Operations.

3. REFERENCES

- .1 Transport Canada Aerodrome Standards and Recommended Practices, TP 312E, 5th Edition.
 - .1 Link: <https://tc.canada.ca/en/aviation/publications/aerodromes-standards-recommended-practices-tp-312>

4. MEASUREMENT FOR PAYMENT

- .1 Mobilization and Demobilization shall be measured per lump sum.
 - .1 Payment will be made at the Contract lump sum price for item “Mobilization / Demobilization / Permits / Facilities / Bonding / Insurance / Reflective Low Barricades & Red Lights / Access Control Guard / Quality Control / Project Sign / Night Lighting / Protect Existing Manholes / New Retroreflective Road Holding Position Sign”. 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.
 - .2 The item shall consist of the following:
 - .1 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 All necessary permits, bonding, and insurance required for the successful completion of the Contract.
 - .3 Twelve (12) reflective low barriers and red lights to be provided by the Contractor, the Contractor must install, maintain, relocate as required and remove at project completion. The reflective low barriers and red lights will remain the property of the Owner at the project’s completion.
 - .4 Contractor to provide access control guard(s) for all access through all gates and for any time a gate is unlocked. Access

- control guard(s) shall control the gate(s) in order to ensure unauthorized personnel, animals, etc. do not enter the airside and that the gate(s) closes behind vehicles. Access control guard(s) to confirm that each worker entering airside display a valid airside access pass.
- .5 Contractor to provide quality control material testing and survey as required in Section 01 45 00 – Quality Control and Section 01 71 00 – Examination and Preparation.
 - .6 Project sign language to be supplied by the Owner or Funding Authority. Contractor to supply and install the project sign.
 - .7 Night lighting as required for night time work hours. Portable light units with four individual light fixtures as well as night lighting on equipment are required in order to provide a safe work environment that meets Workers Compensation Board requirements as well as sufficient illumination of the work area as determined by the Consultant.
 - .8 Protection of all existing manholes and catchbasins in place to ensure that existing manholes and catchbasins are not damaged by construction activities. This includes the placement of filter fabric around all grates during construction to ensure no debris enters. Filter fabric to be removed upon construction completion.
 - .9 Supply and Install of new retroreflective road holding position sign. Sign as per Transport Canada TP312 5th Edition Aerodrome Standards and Recommended Practices Figure 5-66. Sign to adhere to colours, retroreflectivity, lettering, and other signage requirements stipulated in Section 5.4 of TP312 5th Edition.
 - .3 Partial payment for this item will be made once per month as work progresses. The 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.

5. GENERAL PROTECTION

- .1 Do not disrupt airport business except as permitted by Consultant and stated in the approved Plan of Construction Operations.
- .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.

6. 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 Security Escort.
- .3 Obey directions from the Airside Security Escort instantly.
- .4 All construction activity is monitored by the Airside Security Escort.
- .5 All instructions from the Airside Security 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.

7. 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 reflective low barriers and steady burning red lights as directed by Consultant and as indicated in the Plan of Construction Operations document and drawings.

8. TRENCHING

- .1 Conduct Work in accordance with Section 31 23 33.01 Excavating, Trenching and Backfilling.

9. 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 - PRODUCTS

1. NOT USED

Part 3 - EXECUTION

1. APPLICATION

- .1 Temporary reflective low profile barriers and steady burning red lights must be of standard dimensions and placed in accordance with the Plan of Construction Operations and TP 312E, 5th Edition.
- .2 Prevent reflective low barriers, steady red lights, and modu-loc fencing from moving due to wind and jet blast.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

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

2. REFERENCES

- .1 Definitions:
 - .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavorably 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 18).
 - .3 Canadian Environmental Assessment Act (CEAA 2012).

3. MEASUREMENT PROCEDURES

- .1 No separate payment will be made under this section. Work in this section is considered incidental to the project.

4. 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).

5. FIRES

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

6. 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.

7. 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.

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

9. 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.

10. 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

- 1. NOT USED**

Part 3 - EXECUTION

1. CLEANING

- .1 Conduct cleaning Work in accordance with Section 01 74 11 - Cleaning.
- .2 Burial 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 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 (including PROVISIONAL WORK) 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 sieve analysis, proctor, density and moisture content testing.
 - .2 Density/compaction testing.
 - .3 Portland Cement Concrete quality control and product acceptance testing.
 - .4 HIPR quality control testing.
 - .5 Hot mix asphalt concrete quality control and product acceptance testing.
 - .6 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 Quality Assurance 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 Quality Assurance 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, including supply of Marshall samples and asphalt cores, 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 the 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 the difference in value between Work performed and that called for by Contract Documents, this 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 the 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 construction 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 graveled 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 staging 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 traffic and 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.

END OF SECTION

PART 1 - GENERAL

1. 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 CGSB 1.59- [97], Alkyd Exterior Gloss Enamel.
 - .2 CAN/CGSB 1.189- [00], Exterior Alkyd Primer for Wood.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA-O121-[M1978(R2003)], Douglas Fir Plywood.
- .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.

2. MEASUREMENT FOR PAYMENT

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

3. INSTALLATION AND REMOVAL

- .1 Provide temporary controls in order to execute Work expeditiously.
- .2 Remove from site all such work after use.
- .3 Provide as required by the Plan of Construction Operations and the Owner.

4. GUARD RAILS, FENCING AND BARRICADES

- .1 Provide secure, rigid fencing, guard rails and barricades around deep excavations.
- .2 Provide as required by governing authorities or as indicated.

5. ACCESS TO SITE

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction routes as may be required for access to Work.

6. PUBLIC TRAFFIC FLOW

- .1 Provide and maintain competent signal flag operators, traffic signals, barricades, lights, or lanterns as required to perform Work and protect public.

7. FIRE ROUTES

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

8. PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

9. 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 general requirements for material and equipment that are to be installed as part of the Work by the Contractor.

2. REFERENCES

- .1 Within text of each specifications Section, reference may be made to reference standards.
- .2 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .3 If there is question as to whether products or systems are in conformance with applicable standards, the Consultant reserves right to have such products or systems tested to prove or disprove conformance.
- .4 Cost for such testing will be borne by the Contractor in event of non-conformance.

3. QUALITY

- .1 Products, materials, equipment, and articles incorporated in the Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source, and quality of products provided.
- .2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Should disputes arise as to quality or fitness of products, decision rests strictly with the Consultant based upon requirements of the Contract documents.
- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout construction.
- .5 Permanent labels, trademarks, and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

4. AVAILABILITY

- .1 Immediately upon signing the Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify the Consultant of such, in order that substitutions or other

remedial action may be authorized in ample time to prevent delay in performance of the Work.

- .2 In event of failure to notify the Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Consultant reserves right to substitute more readily available products of similar character, at no increase in the Contract Price or the Contract Time.

5. **STORAGE, HANDLING AND PROTECTION**

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration, and soiling and in accordance with the manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture away from stored materials.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of the Consultant.
- .9 Touch-up damaged factory finished surfaces to the Consultant's satisfaction. Use touch-up materials to match original. Do not paint over name plates.
- .10 Deliver, store, and maintain packaged material and equipment with manufacturer's seals and labels intact.
- .11 Prevent damage, adulteration and soiling of material and equipment during delivery, handling, and storage. Immediately remove rejected material and equipment from site.
- .12 Store material and equipment in accordance with the supplier's instructions.

6. **TRANSPORTATION**

- .1 Pay costs of transportation of products required in performance of the Work.

7. **MANUFACTURER'S INSTRUCTIONS**

- .1 Unless otherwise indicated in specifications install or erect products in accordance with the manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from the manufacturers.
- .2 Notify the Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that the Consultant can establish a course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes the Consultant to require removal and re-installation at no increase in the Contract Price or the Contract Time.

8. **QUALITY OF WORK**

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify the Consultant if the required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. The Consultant reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of the Quality of Work in cases of dispute rest solely with the Consultant, whose decision is final.

9. **SUBSTITUTION**

- .1 No substitutions will be permitted without prior written acceptance of the Consultant.
- .2 Proposals for substitution may only be submitted after award of contract. Such request must include statements of respective costs of items originally specified and the proposed substitution.
- .3 Proposals will be considered by the Consultant if:
 - .1 Materials selected by tenderer from those specified, are not available.
 - .2 Delivery date of materials selected from those materials specified would unduly delay completion of contract; or
 - .3 Alternative material to those specified, which are brought to the attention of and considered by the Consultant as equivalent to the material specified and will result in a credit to the Contract amount.

- .4 Should proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on project. Pay for design or drawing changes required as result of substitution.
- .5 Amounts of all credits arising from acceptance of substitutions will be determined by the Consultant and the Contract Price will be reduced accordingly.

10. **CO-ORDINATION**

- .1 Ensure co-operation of workers in laying out the Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves, and accessories.

11. **REMEDIAL WORK**

- .1 Perform remedial work required to repair or replace parts or portions of the Work identified as defective or unacceptable. Co-ordinate adjacent affected the Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of the Work.

12. **FASTENINGS**

- .1 Provide metal fastenings and accessories in same texture, colour, and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.
- .7 Obtain the Consultant's acceptance before using explosive actuated fastening devices. If acceptance is obtained comply with CSA Z166-1975.

13. **FASTENINGS - EQUIPMENT**

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

- .2 Use heavy hexagon heads, semi-finished unless otherwise specified.
Use No. 304 stainless steel for exterior areas.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal, and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

14. **CONSTRUCTION EQUIPMENT AND PLANT**

- .1 On request, prove to the satisfaction of the Consultant that the construction equipment and plant are adequate to manufacture, transport, place and finish work to quality and production rates specified. If inadequate, replace or provide additional equipment or plant as directed.
- .2 Maintain construction equipment and plant in good operating order.

15. **PROTECTION OF WORK IN PROGRESS**

- .1 Prevent overloading of parts of the Work. Do not cut, drill, or sleeve load bearing structural member, unless specifically indicated without written acceptance of the Consultant.

16. **EXISTING UTILITIES**

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to the Work, and pedestrian and vehicular traffic.
- .2 Protect, relocate, or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

END OF SECTION

PART 1 - GENERAL

1. REFERENCES

- .1 Owner's identification of existing survey control points and property limits.
- .2 Section 01 33 00 - Submittal Procedures
- .3 Section 01 78 00 – Closeout Submittals

2. MEASUREMENT FOR PAYMENT

- .1 Payment for construction layout, quantity measurements and as-built surveys will be made at the contract lump sum price for “Construction & As-builts Surveys, Locates, New Survey Monuments, and Operations & Maintenance Manuals”. This price shall be full compensation for furnishing all labour, materials, tools, equipment, transportation and incidentals necessary to complete this item as described in the Contract Documents and shall include but is not limited to:
 - .1 construction surveys,
 - .2 quantity surveys,
 - .3 as-built survey in AutoCAD format as required by the Consultant,
 - .4 all as-built red-lines,
 - .5 underground locates with marks on site prior to construction and record locations of all existing underground facilities for record drawings,
 - .6 new runway threshold monuments by a qualified registered British Columbia Land Surveyor as accepted by the Consultant,
 - .7 all operations & maintenance manuals noted in the specifications.

3. 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.

4. 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 benchmarks 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 British Columbia Land Surveyor.

5. 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 horizontal and vertical control grades as established from the information provided including 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 standby or shut down.

6. 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. Felt pen/paint to be used on hard surfaces, 300mm long rebar to be used in soft surfaces.**
 - .1 The Contractor shall provide granular base course, HIPR, asphalt, and milling grades referenced to finished pavement elevations. The Contractor shall be responsible for establishing grades for cold milling, granular base, HIPR, 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 are required in specific variable depth milling areas.

- .2 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
Underground Pipes and Culvers	√	√	√	Offset stakes with grades referenced to pipe inverts
Paint Markings	√			Marks at 10 m intervals on tangent lines. Marks at 5 m intervals on curves. Marks to centre or edge of numbers and letters.

7. 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.

8. 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.

9. 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.

10. SUBMITTALS

- .1 Submit name and address of the Surveyor to the Consultant.
- .2 Throughout the duration of the project, the Contractor shall submit progress estimate quantities and 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. All survey data to be complete and in format acceptable to the Consultant. See Section 01 78 00 for Final Survey requirements.
- .3 On request of the Consultant, submit documentation to verify accuracy of field engineering work.
- .4 Survey data submittals for progress estimate quantities shall be in AutoCAD Civil 3D with break lines and surfaces or other format acceptable to the Consultant with each Tender Line Item provided as a separate file/surface. For example, a surveyed surface of the existing compacted subgrade may be named "Item 3.03 Top of Subgrade" and subsequent survey surface of compacted supplied / installed base gravels may be named "Item 3.04 Installed Gravel". CSV file and feature code file showing descriptions of points to accompany data.

11. 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 soil, 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 including airside access route, 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 areas prior to start of finishing/paint markings work and maintain areas free of dust and other contaminants during finishing/painting 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. REFERENCES

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 71 00 – Examination and Preparation

3. MEASUREMENT FOR PAYMENT

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

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, four 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 or Civil 3D format as requested by the Consultant. Survey data shall have all break lines/surfaces tied to survey monument data.

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 Contractor is to 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.
 - .1 Provide files, racks, and secure storage.

- .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.
 - .2 Record documents deemed to be illegible to be redone by the Contractor at no additional cost to the Contract.
- .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. Survey data to be in ACAD Civil 3D with break lines completed and/or other format acceptable to the Consultant. CSV file and feature code file showing descriptions of points to accompany data.
- .2 Final survey for rehabilitation shall include but is not limited to: perimeter of asphalt rehabilitation, perimeter of PCC repair areas, runway threshold monuments, all new paint markings, removed paint markings, corners of all new signage, all new and relocated electrical including all light lens elevations, all pullpits, all conduit, new electrical kiosk, runway centreline including extended runway centreline at 5m increments and 5m each side of extended runway centreline to 10m past the last approach light, all PCC panel joints, all asphalt joints for each shift of paving, all asphalt crack treatments, 5m grid shots on entire runway and runway topsoil shoulder up to 35m both sides of runway centreline, taxiway centerline, 5m grid of entire taxiway, 5m grid of entire apron, edge of taxiway and apron topsoil shoulders and one shot 1m past the edge of shoulder, new fencing, four corners of any manhole grates impacted by construction, as well as any grade changes or features constructed.

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 requirements for sawcutting, removal, disposal, and salvage of site work indicated by the Contract documents or as directed by the Consultant.

2. SUMMARY

- .1 Section specifies:
 - .1 Methods and procedures for demolishing, salvaging, recycling, and removing site work items designated to be removed in whole or in part, and for backfilling resulting trenches and excavations.
- .2 Related Sections.
 - .1 Section 01 33 00 - Submittal Procedures.
 - .2 Section 01 45 00 - Quality Control.
 - .3 Section 01 35 43 - Environmental Procedures.
 - .4 Section 31 23 33.01 - Excavating, Trenching And Backfilling
 - .5 Section 03 30 00 - Cast-In-Place Concrete

3. MEASUREMENT PROCEDURES

- .1 Sawcut and remove existing Portland Concrete Cement (PCC) panels full depth (estimated 230 mm thick) and dispose off-site shall be measured by square metre of reinforced concrete removed. Payment under this item will include all equipment and operations involved in sawcutting full depth, 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, removing steel reinforcement, sweeping, dust control, loading, hauling, stockpiling if required, cleaning and disposal off-site including landfill tipping fees.
- .2 Remove existing chain link security fences shall be measured at the tendered lump sum price as per the Schedule of Quantities. Progress payments shall be on a percentage complete basis based on the fence removal, salvage, and disposal. Payment at the tendered price shall include:
 - .1 Remove and salvage existing chain link fence fabric. Material shall be rolled, tied, and delivered to the Maintenance Shop.

- .2 Remove and dispose off-site of all fence posts, rails, barbed wire, and concrete foundations.
- .3 No additional payment will be made for landfill tipping fees for any off-site disposal. Include costs for landfill tipping fees in appropriate tender items.

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 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
 - .2 Canadian Environmental Protection Act, 1999 (CEPA), c. 33.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .4 Transport Canada (TC).
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.

5. DEFINITIONS

- .1 Demolition: rapid destruction of pavements following removal of hazardous materials.
- .2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities, and hazardous products, may include but not limited to: asbestos, PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well-being or environment if handled improperly.

6. SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets.
- .3 Shop drawings.
 - .1 Submit for acceptance drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, where required by authorities having jurisdiction.

- .2 Submit drawings stamped and signed by qualified professional engineer registered or licensed in Province of British Columbia, Canada.
- .4 Hazardous Materials: provide description of hazardous materials and notification of Filing with proper authorities prior to beginning of Work as required.

7. QUALITY ASSURANCE

- .1 Regulatory Requirements: ensure Work is performed in compliance with applicable Provincial/Territorial regulations.
- .2 Site Meetings.
 - .1 Convene pre-installation meeting one week prior to beginning work of this Section.
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other construction subtrades.
 - .2 Arrange for site visit with the Consultant to examine existing site conditions adjacent to demolition work, prior to start of the Work.
 - .3 Hold project meetings every week.
 - .4 Ensure key personnel, site supervisor, project manager, and subcontractor representatives attend.

8. DELIVERY, STORAGE AND HANDLING

- .1 Perform Work in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Storage and Protection.
 - .1 Protect in accordance with Section 31 23 33.01 - Excavating, Trenching And Backfilling.
 - .2 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to acceptance of the Consultant and at no cost to the Consultant and the Owner.
 - .3 Remove and store materials to be salvaged, in manner to prevent damage.
 - .4 Store and protect in accordance with requirements for maximum preservation of material.

- .5 Handle salvaged materials as new materials.
- .6 Existing buried utilities and structures:
 - .1 Size, depth, and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
 - .2 Prior to commencing any excavation work, notify the applicable owner or authorities, confirm location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during work.
 - .3 Confirm locations of buried utilities by careful test excavations.
 - .4 Maintain and protect from damage water, sewer, gas, fuel, electric, telephone and other utilities and structures encountered. Obtain direction from the Consultant before moving or otherwise disturbing utilities or structures.
 - .5 Record as-built locations of maintained, re-routed, and abandoned underground lines on drawings.
- .3 Waste Management and Disposal.
 - .1 Separate waste materials for reuse and recycling.
 - .2 Divert excess materials from landfill to site accepted by the Consultant.
 - .3 Separate for reuse and recycling and place in designated containers such as steel, metal and plastic waste.
 - .4 Place materials defined as hazardous or toxic in designated containers.
 - .5 Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.
 - .6 Label location of salvaged material's storage areas and provide barriers and security devices.
 - .7 Ensure emptied containers are sealed and stored safely.
 - .8 Source separate for recycling materials that cannot be salvaged for reuse including wood, metal, concrete and asphalt, and gypsum.
 - .9 Remove materials that cannot be salvaged for reuse or recycling and dispose of in accordance with applicable codes at licensed facilities.

- .10 All materials suitable for re-use, other than what is designated for re-use in work shall be transported and stockpiled at locations indicated or as directed by the Consultant.
- .11 The Contractor shall be responsible for obtaining all necessary permits.

9. SITE CONDITIONS

- .1 Site Environmental Requirements.
 - .1 Perform work in accordance with Section 01 35 43 - Environmental Procedures.
 - .2 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater, and wildlife, or contribute to excess air and noise pollution.
 - .3 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
 - .1 Ensure proper disposal procedures are maintained throughout the project.
 - .4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.
 - .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities or as directed by the Consultant.
 - .6 Protect trees, plants and foliage on site and adjacent properties where indicated.

PART 2 - PRODUCTS

1. EQUIPMENT

- .1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

PART 3 - EXECUTION

1. PREPARATION

- .1 Inspect site with the Consultant and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

- .2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .3 Notify and obtain approval of utility companies before starting demolition.

2. REMOVAL OF HAZARDOUS WASTES

- .1 Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in a safe manner to minimize danger at site or during disposal.

3. EXISTING CONCRETE PAVEMENT REMOVAL

- .1 Refer to Section 03 30 00 - Cast-In-Place Concrete PART 3.10 for removal of existing reinforced concrete panels.

4. REMOVAL OPERATIONS

- .1 Remove items as indicated on the drawings and as noted elsewhere in the specifications.
- .2 Do not disturb items designated to remain in place.
- .3 Removal of items shall be staged in accordance with the operations plan to ensure the continued operation of the airport.
- .4 Removal of Pavements, Curbs and Gutters:
 - .1 Perform sawcuts to lines indicated on drawings or as directed by the Consultant.
 - .2 Square up adjacent surfaces to remain in place by saw cutting or other method accepted by the Consultant.
 - .3 Protect adjacent joints and load transfer devices.
 - .4 Protect underlying and adjacent granular materials.
- .5 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.
- .6 Excavate at least 300 mm below pipe invert, when removing pipes under existing or future pavement area.
- .7 Use equipment and methods of removal and hauling which do not tear, gouge, break or otherwise damage or disturb adjacent pavement or underlying granular material.
- .8 Provide for suppression of dust generated by removal process.

- .6 Excavate at least 300 mm below pipe invert, when removing pipes under existing or future pavement area.
- .7 Use equipment and methods of removal and hauling which do not tear, gouge, break or otherwise damage or disturb adjacent pavement or underlying granular material.
- .8 Provide for suppression of dust generated by removal process.
- .9 Salvage.
 - .1 Carefully dismantle items containing materials for salvage. Reuse items as indicated on drawings. Stockpile salvaged materials not designated for re-use in work at locations indicated or as directed by the Consultant.
- .10 Disposal of Material.
 - .1 Dispose of materials not designated for salvage or reuse on site at authorized facilities.
 - .2 All materials suitable for re-use, other than that which is designated for re-use in work shall be transported and stockpiled at locations indicated or as directed by the Consultant.
 - .3 Contractor shall be responsible for obtaining all necessary permits.
 - .4 Trim disposal areas to acceptance of the Consultant.
- .11 Backfill.
 - .1 Backfill in areas as indicated and in accordance with Section 31 23 33.01 - Excavating, Trenching And Backfilling.

5. STOCKPILING

- .1 Label stockpiles, indicating material type and quantity.
- .2 Designate appropriate security resources/measures to prevent vandalism, damage, and theft.
- .3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.
- .4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

6. RESTORATION

- .1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of the Work.
- .2 Use soil treatments and procedures which are not harmful to health, injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

7. CLEANING

- .1 Remove debris, trim surfaces, and leave work site clean upon completion of the Work.
- .2 Use cleaning solutions and procedures which are not harmful to health, injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.
- .3 Ensure all haul routes are free from debris, dust, and dirt during and after construction activities, to the satisfaction of the Consultant.

END OF SECTION

PART 1 - GENERAL

1. SECTION INCLUDES

- .1 Methods for removal of existing asphalt pavement.

2. RELATED SECTIONS

- .1 Section 01 74 11 - Cleaning.

3. MEASUREMENT PROCEDURES

- .1 Measure asphalt concrete pavement removal by cold milling in square meters to depth(s) specified. Payment under this item will include equipment and operations involved in milling, loading, hauling, stockpiling of millings at specified stockpile location on-site as directed by the Consultant, cleaning, and sweeping. Saw cutting for interior of asphalt removal areas to provide smaller pieces for removal is considered incidental to this item.
- .2 Measure HMAC crack treatment in lineal metres of crack treatments constructed includes asphalt removal after cold milling operations to width and depth shown on the drawings, disposal of asphalt off-site, loading, hauling, stockpiling if required, compaction of gravel subgrade if gravel is exposed, sweeping, cleaning, asphalt tack, new compacted hot mix asphalt concrete pavement to match existing thickness after cold milling and prior to asphalt overlay or HIPR, and all materials and labour required to complete this item. This is PROVISIONAL WORK which will be determined in the field with the Owner and the Consultant.
- .3 All saw cutting, milling, and installation and removal of temporary ramps for aircraft movements will not be paid for in this item and are considered incidental to paving. Include costs in appropriate items of work.
- .4 Saw cutting and asphalt removal, for lap joints and any construction joints will not be paid for in this item and are considered incidental to paving. Include costs in appropriate items of work.

4. WASTE MANAGEMENT AND DISPOSAL

- .1 Divert unused asphalt materials from landfill to local facility as accepted by local jurisdictions.
- .2 Separate waste materials for reuse and recycling in accordance with governing agencies.

PART 2 - PRODUCTS

1. EQUIPMENT

- .1 Use cold milling, planning, or grinding equipment with automatic grade controls capable of operating from stringline, and capable of removing pavement to depths or grades indicated.
- .2 Use mechanical saw cutting machine capable of following a straight line to provide a straight, clean vertical surface.

PART 3 - EXECUTION

1. PREPARATION

- .1 Prior to beginning removal, saw cutting, and milling operation, inspect, and verify with Consultant areas, depths, and lines of asphalt pavement to be milled or removed.

2. PROTECTION

- .1 Protect existing pavement not designated for removal or milling, light units, and structures from damage. In event of damage, immediately replace or make repairs to acceptance of Consultant at no additional cost.
- .2 Protect existing storm catch basins and inlets from slurry/debris entering the systems. In event of damage, immediately replace or make repair to acceptance of Consultant at no additional cost.
- .3 Protect existing aircraft tie down anchors which are to remain from disturbance during cold milling. In event of damage, immediately replace or make repair to acceptance of Consultant at no additional cost.

3. REMOVAL

- .1 Remove existing asphalt pavement to lines and grades as indicated or established by Consultant.
- .2 Use equipment and methods of removal and hauling which do not damage or disturb underlying pavement.
- .3 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel, or other materials.
- .4 Provide for suppression of dust generated by removal process.

4. FINISH TOLERANCES

- .1 Finished surfaces in areas where asphalt pavement has been removed to be within +/- 5 mm of grade specified but not uniformly high or low.

5. SWEEPING

- .1 Sweep remaining asphalt pavement and milled surfaces clean of debris and loose asphalt material resulting from removal operations using mechanical rotary power brooms and hand brooming as required.

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 20 00 – Concrete Reinforcing
- .2 Section 03 30 00 - Cast-in-place Concrete.

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 mm²/s at 40 °C, flashpoint minimum 150 °C, 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 03 30 00 - Cast-in-place Concrete.

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 governing agencies.
 - .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/m².

- .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 cast-in-place concrete for the construction of manholes and catch basins, concrete works associated with the installation of water mains, sewers, and electrical work and similar works incidental to site services as indicated by the Contract Documents or as directed by the Consultant.
- .2 This section is not applicable for structural facilities or airfield Portland Cement Concrete (PCC) panels.

2. RELATED SECTIONS

- .1 Section 03 10 00 - Concrete Forming and Accessories.
- .2 Section 01 45 00 - Quality Control.
- .3 Section 03 20 00 - Concrete Reinforcing.

3. MEASUREMENT PROCEDURES

- .1 Runway partial depth concrete repairs shall be measured by surveyed square metre of repaired PCC. Repair methodology as described in the Drawings and this specification. Maximum milling width is 1m unless repair merits larger width. Payment under this item will include all equipment and operations involved in sawcutting, protection of adjacent concrete and/or asphalt pavement structures, cleaning and disposal of laitance and disposal off-site, breaking if required and removing concrete, removing steel reinforcement if required, sweeping, dust control, loading, hauling, stockpiling if required, cleaning and disposal off-site, supply of asphalt tack coat, supply and install of base course Hot Mix Asphalt Concrete (HMAC), compaction, cleanup, and all other work, equipment and materials incidental to complete the work as specified.
- .2 Apron partial depth concrete repairs shall be measured by surveyed square metre of repaired PCC. Repair methodology as described in the Drawings and this specification. Payment under this item will include all equipment and operations involved in sawcutting, protection of adjacent concrete and/or asphalt pavement structures, cleaning and disposal of laitance and disposal off-site, breaking if required and removing concrete, removing steel reinforcement if required, sweeping, dust control, loading, hauling, stockpiling if required, cleaning and disposal off-site, supply of asphalt tack coat, supply and install of Delpatch™ Elastomeric Concrete, cleanup, and all other work, equipment and materials incidental to complete the work as specified.

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-16 Cold Weather Concreting
 - .2 ACI 305 R-16 Hot Weather Concreting
- .3 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C260, Standard Specification for Air-Entraining Admixtures for Concrete.
 - .2 ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .3 ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete.
- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-37.2, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
 - .2 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .5 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2:19 Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CSA-A283:19, Qualification Code for Concrete Testing Laboratories.
 - .3 CAN/CSA-A3000-18, Cementitious Materials Compendium.

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 Type HE or HEb - High early-strength cement.
 - .3 Type HS or HSb - High sulphate-resistant cement.
- .2 Fly ash:
 - .1 Type F - with CaO content less than 15%.

6. DESIGN REQUIREMENTS

- .1 Alternative 1 – Performance: in accordance with CSA-A23.1/A23.2 and described in MIXES of PART 2 - Products.

7. SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 At least 4 weeks prior to beginning Work, submit to the Consultant samples of following materials proposed for use:
- .3 Aggregates

.1 At least two weeks prior to commencing work, inform the Consultant of the proposed source and provide access for sampling.

.4 Mix Design

.1 At least two weeks prior to commencing work provide the mix design for each specified concrete.

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

.5 Joints

.1 Submit to the Consultant the 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.

.6 Miscellaneous

.1 5 L of curing compound.

.2 2 m length of each type of joint filler.

.3 2 m length of each type of waterstops.

.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 described in PART 3 - FIELD QUALITY CONTROL.

.8 Concrete hauling time: submit for review by the Consultant deviations exceeding maximum allowable time of 90 minutes for concrete to be delivered to site of Work and discharged after batching.

8. QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Site Meetings: in accordance with Section 01 32 16.07 - Construction Progress Schedules – Bar (GANTT) Chart, convene pre-installation meeting one week prior to beginning concrete works.

.1 Ensure key personnel, site supervisor, Consultant, specialty contractor - finishing, forming and testing laboratories attend.

.2 Verify project requirements.

.3 Submit to the Consultant, minimum 4 weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.

.1 When plant does not hold valid certification, provide test data and certification by qualified independent inspection and testing laboratory that materials used in concrete mixture will meet specified requirements.

.4 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures for review by the Consultant on following items:

.1 Hot weather concrete

- .2 Cold weather concrete
- .3 Finishing/Texturing
- .4 Curing
- .5 Sawcutting
- .6 Joints Sealing
- .5 Quality Control Plan: submit written report, as described in PART 3 - VERIFICATION, to Consultant verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

9. DELIVERY, STORAGE, AND HANDLING

- .1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 90 minutes after batching.
 - .1 Modifications to maximum time limit must be agreed to Consultant and concrete producer as described in CSA-A23.1/A23.2.
 - .2 Deviations to be submitted for review by Consultant.
- .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA-A23.1/A23.2.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Divert unused concrete materials from landfill to local facility approved by the Consultant.
 - .3 Provide an appropriate area on the job site where concrete trucks can be safely washed.
 - .4 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by the Consultant.
 - .5 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
 - .6 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, non-combustible material and remove for disposal. Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

PART 2 - PRODUCTS

1. MATERIALS

- .1 Hydraulic Cement: to CAN/CSA-A23.1-04, Table 6 and CAN/CSA-A300-03. Type: GU.
- .2 Fly ash: Type F.
- .3 Supplementary cementing materials: to CAN/CSA-A23.1, Table 8 and CAN/CSA-A3000.
- .4 Water: to CSA-A23.1.
- .5 Aggregates: to CAN/CSA-A23.1 and Section 31 05 16 - Aggregate Materials
 - .1 Coarse aggregates: nominal maximum size 20 mm or large maximum 40 mm.
Each size fraction > 5 % retained.
 - .2 On 5, 10, 14, 20, and 28 mm sieves to contain at least 50% two face crushed particles.
 - .3 The contractor shall submit aggregate test data indicating conformance with
CSA-A23.1-09 Clause 4.2.3.2.2.
- .6 Admixtures:
 - .1 Air entraining admixture: to ASTM C260.
 - .2 Chemical admixture: to ASTM C494. Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.
 - .3 Monomolecular film (Evaporation reducer) – Confilm by Master Builders Technologies or approved equal. Application in accordance with the manufacturer's recommendations.
- .7 Curing compound low VOC: to CSA-A23.1/A23.2 white and ASTM C309, Type 2.
- .8 Premoulded joint fillers:
 - .1 Bituminous impregnated fiber board: to ASTM D1751.
 - .2 Sponge rubber: to ASTM D1752, Type I, firm grade.
- .9 Dowels and tie-bars: to CSA-G30.18.
 - .1 Dowels: clean, straight and free from flattened or burred ends, plain round bars of grade 300 or better conforming to CSA-G40.21 and be epoxy-coated to ASTM A775/A775M.
 - .2 Tie-Bars: deformed steel bars in compliance with CSA-G30.18 and be epoxy-coated to ASTM A775/A775M.

2. MIXES

- .1 Alternative 1 - Performance Method for specifying concrete: to meet the Consultant's performance criteria in accordance with CAN/CSA-A23.1/A23.2.

- .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described in PART 3 - VERIFICATION.
- .2 Concrete mixes to be designed to prevent excessive expansion due to alkali aggregate reactivity.
- .3 Provide concrete mix to meet following hard state requirements:
 - .1 Durability and class of exposure: C-2.
 - .2 Minimum compressive strength at 28 days: 32 MPa or as noted on drawings and other specifications.
 - .3 Minimum flexural strength (MR) of 4.2 MPa.
 - .4 Minimum cementing material content: 310 Kg/m³
 - .5 Maximum fly ash replacement 20%.
 - .6 Surface texture: broom / brush finish.
- .4 Provide quality control plan to ensure verification of concrete quality to specified performance.
- .5 Mix design to be approved by the Consultant prior to commencement of concrete work onsite.
- .6 Mix design to be proportioned in accordance with Table 1 and the specified mix as per the Contract Documents.
- .7 Use of chemical admixtures will be approved only when specified mix requirements or workability cannot be achieved by proportioning of aggregates, water, cement, and air entraining admixtures.
- .8 Do not change concrete mix design without prior approval to the Consultant.
- .9 Do not change material source without prior approval of the Consultant.
- .10 Concrete supplier's certification to include documentation confirming concrete materials and concrete production conform to CSA-A23.1.

TABLE 1	
Cement Type	GU
Class of Exposure	C-2
Compressive Strength (minimum 28-day average MPa)	32
Slump (Maximum mm)	80
Air Content (%)	5 – 8
Minimum Portland Cement (kg/m ³)	310
Maximum Water/Cement Ratio	0.45
Nominal Maximum Size of Coarse Aggregate (mm)	20

PART 3 - EXECUTION**1. PREPARATION**

- .1 Obtain the Consultant's approval before placing concrete.
 - .1 Provide 24 hours notice prior to placing of concrete.
- .2 Construct formwork, if required, in accordance with Section 03 10 00 - Concrete Forming and Accessories.
- .3 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .4 Do cast-in-place work in accordance with CSA-A23.1.
- .5 During concreting operations:
 - .1 Development of cold joints not allowed.
 - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .6 Pumping of concrete permitted after approval of equipment and design by the Consultant.
 - .1 Provide 48 hours' notice to the Consultant prior to placing concrete by pumping.
- .7 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .8 Prior to concrete being placed, obtain approval from the Consultant for the proposed method to protect concrete, place and cured, in adverse weather conditions.
- .9 Protect previous Work from staining.
- .10 Clean and remove stains prior to application for concrete finishes.
- .11 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .12 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.
 - .1 Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.
- .13 Do not place load upon new concrete until authorized by the Consultant.
- .14 Contractor shall supply and place all necessary barricades and delineation devices to keep people, animals, and vehicles off of the work for a minimum period of five days.

2. CONSTRUCTION

- .1 Do cast-in-place concrete work in accordance with CSA-A23.1/A23.2.

- .2 Insert tie bars as indicated.
- .3 Sleeves and inserts:
 - .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by the Consultant.
 - .2 Where approved by the Consultant, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
 - .3 Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by the Consultant.
 - .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from the Consultant before placing of concrete.
 - .5 Check locations and sizes of sleeves and openings shown on drawings.
 - .6 Set special inserts for strength testing as indicated and as required by on-destructive method of testing concrete.
- .4 Anchor Bolts
 - .1 Set bolts, ties and other inserts and openings as indicated or specified elsewhere.
 - .2 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from the Consultant before placing of concrete.
 - .3 Check locations and sizes of anchor bolts and openings shown on drawings.
 - .4 Place anchor bolts to templates under supervision of trade supplying anchors prior to placing concrete. Tie anchor bolts at bottom together and align spacing and vertically accurately. Maximum allowable tolerance in spacing is ± 2.0 mm.
- .5 Finishing and curing:
 - .1 Finish concrete in accordance with CSA-A23.1/A23.2.
 - .2 Use procedures as reviewed by the Consultant or those noted in CSA-A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
 - .3 Use curing compounds compatible with applied finish on concrete surfaces. Applied finish on concrete: Provide written declaration that compounds used are compatible.
 - .4 Rub exposed sharp edges of concrete with a carborundum stone to produce a 3 mm radius edge unless indicated otherwise.
 - .5 Trowel smooth top surfaces of exposed concrete.
- .6 Joint fillers:

- .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by the Consultant.
- .2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
- .3 Locate and form isolation, expansion joints as indicated.
- .4 Install joint filler.
- .5 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

3. JOINTS

- .1 General:
 - .1 Construct joints plumb, straight and square to details indicated.
 - .2 Transverse joints to coincide with those in adjacent pavement unless indicated or directed otherwise.
 - .3 Install preformed joint filler at locations and to details indicated.
 - .4 Install isolation joints around structures and features that project through, into or against pavement.
- .2 For sawn joints.
 - .1 Ensure joints are sawn straight. Install end stakes to ensure straight joint alignment across paved area. Mark joint alignment with chalk line or other suitable guide to approval of the Consultant.
 - .2 Saw joints using approved equipment and methods to produce joint dimensions indicated.
 - .3 Restrict speed of saw cutting to ensure proper joint alignment and to avoid damage to concrete.
 - .4 Supply sufficient workers and equipment including standby equipment, to maintain satisfactory sawing schedule.
 - .5 Schedule sawing operations on 24 hours basis and consistent with concrete placing.
 - .6 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.
 - .7 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. Adjust sawing schedule accordingly.
 - .8 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 slabs.

- .9 Immediately on completion of sawing, flush joints with water to remove laitance.

4. SPECIAL REQUIREMENTS

- .1 Hot Weather
 - .1 When the ambient air temperature is or forecasted to be 23 °C or greater than the following requirements shall be followed:
 - .1 Concrete temperature at time of placing shall not exceed 20 °C.
 - .2 Retarding admixtures may be used subject to approval of the Consultant.
 - .2 Cold Weather
 - .1 When the air temperature is at or below 5 °C or when there is a probability of it falling below 5 °C within 24 hours of placing, the requirements of CSA A23.1:19, Clause 7.8.3.3.2 shall be followed.
 - .2 The aggregate and mixing water shall have a temperature of not less than 5 °C and be entirely free of frozen materials.

5. SURFACE TOLERANCE

- .1 Concrete tolerance in accordance with CSA-A23.1/A23.2 straightedge method to tolerance schedule as indicated.

6. FIELD QUALITY CONTROL

- .1 Site tests: conduct following test in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - SUBMITTALS.
 - .1 Concrete pours.
 - .2 Slump tests.
 - .3 Air content test.
- .2 Inspection and testing of concrete and concrete materials will be carried out by Contractor's independent testing laboratory in accordance with CSA-A23.1/A23.2.
 - .1 Ensure testing laboratory is certified in accordance with CSA-A283.
- .3 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and the Consultant.
- .4 Consultant may request additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .5 Non-Destructive Methods for Testing Concrete: in accordance with CSA-A23.1/A23.2.

- .6 Inspection or independent testing by the Consultant will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

7. DEFECTIVE CONCRETE

- .1 Concrete is defective when:
 - .1 It contains: honeycombing, embedded debris, uncontrolled shrinkage, cracking, or other surface defects.
 - .2 It is damaged by freezing.
 - .3 It is placed at too high temperature.
 - .4 Average 28 day strength of any three consecutive strength tests is less than specified minimum 28 day strength.
 - .5 Any 28 day strength test result is less than 80 % of specified minimum 28 day strength.

8. REPAIR/RESTORATION

- .1 Repair of defective concrete work:
 - .1 Repair defective areas while concrete is still plastic, otherwise wait until curing is completed. Use repair methods approved by the Consultant.
- .2 Remove and replace defective concrete where directed by the Consultant.
 - .1 Replace with new concrete to this specification.
 - .2 Construct contraction joint at boundary between sawn face of existing concrete and new concrete.
 - .3 Install new tie bars between old and new concrete as directed by the Consultant.

9. VERIFICATION

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established in PART 2 - Products, by Consultant and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

10. EXISTING CONCRETE PAVEMENT REMOVAL AND REPAIR

- .1 This section applies to existing panels to be removed or existing panels to be repaired.
- .2 All operations shall be carefully controlled to prevent damage to the existing adjacent concrete and/or asphalt 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, tie bars, or deformed bars.
- .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 accepted 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, tie bars, deformed bars, 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 Part 3 Section 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, keys, deformed bars, or tie-bars cannot be determined the Contractor shall saw the full depth at the existing joint face through the existing dowel bars, deformed 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 previously.

- .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.
- .4 Repair of existing concrete panels
- .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 Damaged areas shall be identified, surveyed, and recorded by the Contractor and agreed upon with the Consultant prior to start of construction.
 - .4 Spall Repair: Spalls shall be repaired where indicated and where directed.
 - .1 Where directed by the Consultant, spalls along joints of 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 Material used for spall repairs on the Apron shall be Delpatch™ Elastomeric Concrete, or Consultant reviewed and accepted equivalent.
 - .4 Material used for spall repairs on the Runway shall be base course HMAC.
 - .5 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.
 - .6 The cavity shall be filled with material(s) as specified above.
 - .7 Material(s) selected for repairs shall be applied using proportions and mixing and placing procedures as recommended by the manufacturer and accepted by the Consultant.

- .8 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.
- .9 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 Underbreak Repair:
 - .1 All underbreaks between 38 and 100 mm shall be repaired. If an underbreak over 100 mm occurs, the entire panel containing the underbreak shall be removed and replaced.
 - .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.
 - .1 Care shall be taken to produce an even joint face from top to bottom.
 - .2 Prior to placing concrete, the underlying material shall be thoroughly moistened.
 - .3 After placement, curing compound shall be applied to the exposed surface.
- .6 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 or other specified material, 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 on Underbreak Repair.

- .4 The underlying material outside the joint line shall be thoroughly cleaned when new concrete is placed.

11. TRAFFIC ON FINISHED SURFACES

- .1 Do not open concrete pavement to traffic or construction equipment until concrete reaches 80% of specified strength and minimum of 7 days after placement.
- .2 Do not open concrete repair areas until Delpatch™ Elastomeric Concrete has cured for a minimum of one hour or base course HMA is cool and sufficiently compacted.
- .3 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.
- .4 The Contractor shall be responsible for maintaining the finished concrete in good condition.
- .5 Protect concrete from damage from oil, fuel stains, and excessive tire marks. Repair and clean marks to provide uniform finished appearance.
- .6 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 repaired concrete.

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 01 33 00 - Submittal Procedures.
- .2 Section 03 30 00 - Cast-in-place Concrete.

3. SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 – Submittal Procedures
- .2 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 sawcutting and 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 asphalt and/or concrete laitance and disposal off-site; removal of existing joint sealant and disposal off-site; cleaning of joints; supply and installation of 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, closed cell, polyethylene, non-gassing, heat-resistant, round foam rod, compatible with the joint sealant manufacturer's recommendations.
- .2 Diameter to meet contract drawings.

- .3 Hot applied joint sealant: ASTM D5329 jet fuel resistant and are as follows:
 - .1 PCC/HMAC: Crafc® RoadSaver 522 sealant, or accepted equivalent.
 - .2 PCC/PCC: Crafc® RoadSaver 522 sealant, or accepted equivalent.

PART 3 - EXECUTION

1. PREPARATION

- .1 Saw cut joints to dimensions as shown on the drawings or specified by the Consultant.
- .2 Flush joints with water to remove saw slurry immediately after sawing.
- .3 Sandblast joint to remove remaining residue.
- .4 After sandblasting, 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.

2. 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 sealant 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.

3. 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

1.1 RELATED SECTIONS

- .1 Section 26 05 28 – Grounding – Secondary
- .2 Section 26 05 34 – Conduit Fastenings and Conduit Fittings
- .3 Section 26 05 43.01 – Installation of Cables in Trenches and Ducts
- .4 Section 33 65 76 – Direct Buried Underground Cable Ducts
- .5 Section 34 43 10 – Airfield Lighting – General
- .6 Section 34 41 10.01 – Illuminated Airport Guidance Signs
- .7 Section 34 43 13.16 – Airfield Runway and Taxiway Inset Lighting
- .8 Section 34 43 13.19 – Edge Lighting for Airport Runways, Taxiways, Aprons
- .9 Section 34 43 16.26 – Airfield Omni-Directional Approach Lighting Equipment
- .10 Section 34 43 16.34 – Airfield Medium Intensity Approach Lighting Equipment
- .11 Section 34 43 16.36 – Airfield Precision Approach Path Indicator
- .12 Section 34 43 26.23 – Airfield Lighting Regulator Assembly

1.2 GENERAL INSTRUCTIONS

- .1 The "Instructions to Bidders", "The General Conditions", (and addenda thereto) form an integral part of this division and shall be read in conjunction herewith. All addenda or corrections issued during the time of bidding become part of the contract documents, and shall be covered in the Contractor's bid.

1.3 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1, Canadian Electrical Code, Part 1 (Latest Edition), Safety Standard for Electrical Installations.
 - .2 CAN3-C235-83(R2006), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
 - .3 Underground Systems: To C22.3, No. 7, except where specified otherwise.
- .2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
 - .1 IEEE SP1122-[2000], The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.
- .3 Transport Canada, TP312, 5th Edition, Aerodrome Standards and Recommended Practices.

1.4 DEFINITIONS

- .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.5 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification nameplates and labels for control items in English.

1.6 MEASUREMENT FOR PAYMENT

- .1 Electrical work shall be measured as Lump Sum or unit price Items as described in unit price table. Payment at the tendered Lump Sum or unit price shall be full compensation for supply of all materials and labour required to complete the work as described in the Contract Documents.
- .2 Electrical Mobilization / Demobilization / General Conditions / Etc.
 - .1 Payment shall be on a lump sum basis for full completion of mobilization / demobilization and general electrical requirements for the project.
 - .2 All mobilizations and demobilizations shall be included in the lump sum price for this item.
 - .3 All other general electrical conditions and requirements, not included in other payment items, shall be included in this payment item.
- .3 Record Drawings and O&M Manuals
 - .1 Payment shall be on a lump sum basis for full completion and submittal of the red-line record drawings and O&M Manuals.
 - .2 Red-line drawings to be submitted as mark-up prints or scanned PDF documents.
 - .3 O&M Manuals shall be a record of new equipment supplied, included data sheets, approved shop drawings, as-built information, and vendor supplied operations and maintenance instructions. O&M Manuals shall be supplied in both hard copy (3 binders, with tabbed dividers) and PDF formats.
- .4 Site Clean-up / Restoration
 - .1 Payment shall be on a lump sum basis and shall include all clean-up related to electrical work undertaken on site, including removal of construction debris, cleaning of surfaces and equipment, and restoration of all surfaces and equipment affected by electrical construction activities.
 - .2 All trenching/excavation/backfill areas (not in pavement areas) shall be restored by a layer of topsoil, seed, and mulch.
- .5 Spare Parts

- .1 Spare parts shall be covered by a cash allowance.
- .2 After award of contract, the owner/consultant will prepare a list of preferred spare parts for the contractor to price. Once the pricing has been submitted, the owner/consultant will advise on which spare parts are to be procured, along with quantity.
- .3 Only spare parts procured, if any selected, to be charged against this cash allowance.

1.7 INTERPRETATION OF DRAWINGS

- .1 The drawings and specifications provide together a complete and workable facility, with all components in satisfactory and operating condition. These drawings and specifications shall form a basis for the bid price and shall be used to provide a complete electrical installation as directed in each or both documents. Do not scale from electrical drawings.
- .2 All notes on drawings, which make exception to these specifications, have precedence except addenda where specific reference is made.

1.8 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop drawings:
 - .1 Submit drawings stamped for all major electrical equipment being supplied under this contract. All engineering drawings must be stamped by an engineer registered to practice in the British Columbia. Shop drawings shall be submitted to the consultant/owner for review, prior to installation.
 - .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
 - .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .4 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.
 - .5 For unit sub-stations and other equipment, as required, submit shop drawings showing manufacturer's recommended concrete foundation/base for the equipment.
 - .6 Submit 3 copies of 216 x 279 mm minimum size drawings and product data to consultant/owner. Alternatively, shop drawings may be submitted in PDF electronic document format.
 - .7 All shop drawings must be certified by the manufacturer and carefully checked by the Trade Contractor noting all changes required and shall bear the Trade Contractor's approval stamp and signature. Shop drawings must be clearly labelled as to job, contractor and manufacturer. All stamps and labelling shall appear on the front of the shop drawings in order to reproduce properly. Drawings shall incorporate a minimum 100 mm x 75 mm space to accept the consultant's review stamp.
 - .8 The Electrical Consultant's review of shop drawings is for general design only, and does not relieve the Trade Contractor, Trade Sub-Contractor or suppliers from

their responsibilities for errors, proper fittings, construction of the work and furnishing of materials. The review shall not be construed as approving departures from the contract document requirements, where such departures are not specifically noted in a covering letter accompanying such drawings. Any work done prior to the return of properly reviewed shop drawings is done at the risk of the Contractor.

- .9 Note that a MINIMUM of seven (7) working days is required by the Electrical Consultant to process shop drawings. The Trade Contractor is, therefore, requested to submit all shop drawings with this in mind in ample time in order to avoid unnecessary delay of shipment of materials or construction.
- .10 If changes are required, notify consultant/owner of these changes before they are made.
- .3 Quality Control: in accordance with Section 01 45 00 - Quality Control.
 - .1 Provide CSA certified equipment and material.
 - .2 Where CSA certified equipment and material is not available, submit such equipment and material to local inspection authorities for special approval before delivery to site. Cover all costs for special approval.
 - .3 Submit test results of installed electrical systems and instrumentation.
 - .4 Permits and fees: in accordance with General Conditions of contract.
 - .5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.
 - .6 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to consultant/owner.
- .4 Record Drawings
 - .1 Consultant will provide two sets of white prints for record drawing purposes.
 - .2 Maintain project record drawings and record accurately deviations from Contract documents.
 - .3 Record changes in red. Mark on one set of prints and at completion of project and prior to final inspection, neatly transfer notations to second set, and submit both sets to Consultant.
 - .4 Record the following information:
 - .1 Any existing cables, services, etc., encountered which vary from those shown on contract drawings as existing;
 - .2 Horizontal location of underground cables and appurtenances referenced to permanent surface improvement;
 - .3 Field changes of dimension and detail.
 - .4 Changes made by Change Order or Field Order.

1.9 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

- .2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices (British Columbia Certification) in accordance with authorities having jurisdiction respecting manpower vocational training and qualification.
 - .1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
 - .2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.
- .3 Site Meetings:
 - .1 In accordance with Contract Documents.
- .4 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .5 Electrical Permit: Coordinate and pay for all required electrical permits.

1.10 NOT USED

1.11 SYSTEM STARTUP

- .1 Instruct owner/consultant in operation, care and maintenance of systems, system equipment and components.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

1.12 WORKMANSHIP STANDARDS

- .1 All phases of the electrical installation shall be executed in a satisfactory workmanlike manner and shall present a neat mechanical appearance when completed. The work considered unsatisfactory to the Consultant shall be corrected at the Contractor's expense.
- .2 Keep on the job during its progress, a competent foreman, holding a First Class Journeymen Certificate, and necessary assistants, all satisfactory to the Airport Authority. The foreman shall not be changed, except with the consent of the Consultant, unless he proves to be unsatisfactory and ceases to be an employee of the Contractor.
- .3 The foreman shall represent the Contractor in his absence and all directions given to him shall be held as being given to the Contractor. Give efficient supervision to the work, using skill and attention.

1.13 CHANGES IN WORK

- .1 The Consultant, without invalidating the contract, may alter, add to or deduct from the work, the contract sum being adjusted accordingly. All such changes shall be governed by the conditions of the original contract.
- .2 All changes involving costs shall be approved by the Consultant prior to any actual work being proceeded with.
- .3 All supplemental cost proposals by the Contractor shall be accompanied by a complete itemized breakdown of labour and materials. NO EXCEPTIONS will be made. At the Consultant's request, Contractor's estimating sheets for supplemental cost proposals shall be submitted. Labour must be broken out and allocated to each item of work included in the Notice of Change. Submissions must itemize all material used and shall show labour units assigned to each item of material.
- .4 Location of any device may be changed to within three (3) metres of the position indicated on the drawings, without an extra, providing the Contractor is advised of the change in ample time to avoid removal of any equipment or material installed.

1.14 SUBSTITUTIONS

- .1 Notwithstanding the General Conditions, the following shall apply.
- .2 No substitutions will be permitted without prior written approval by Consultant.
- .3 Proposals for substitutions may be submitted ONLY AFTER award of contract. Such request must include statements of respective costs of items originally specified and proposed substitutions.
- .4 Substitution proposals will be considered by the Electrical Consultant ONLY IF:
 - .1 Products selected by the Trade Contractor from those specified are not available.
 - .2 Delivery date of products selected from those specified is not available for reasons beyond the Trade Contractor's control, which he could not reasonably have anticipated, and provided that the Trade Contractor diligently verified availability at the commencement of the contract, or
 - .3 Alternative products to those specified, which are brought to the attention of and considered by the Electrical Engineer as alternative to those specified, will result in a credit to the contract amount.
- .5 Should proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other works on the project.
- .6 All credits arising from approval of substitutions will be credited to contract in such amounts as may be determined by the Design Manager and contract price will be adjusted accordingly.

1.15 PERMITS, CODES, AND INSPECTIONS

- .1 Submit to the Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.
- .2 Pay the associated fees.

- .3 Consultant will provide the drawings and specifications required by the Electrical Inspection Department and Supply Authority at no cost.
- .4 Notify Consultant of the changes required by the Electrical Inspection Department prior to making changes.
- .5 Installation shall comply with the requirements of the latest edition of the Canadian Electrical Code and all relevant by-laws of a local electrical authority.
- .6 Obtain all permits required and, after completion of the work, furnish to the Consultant a Certificate of Final Inspection and Approval from the Inspection Department. Take out all permits required at the beginning of the work.

1.16 SCHEDULING

- .1 Project work will be governed by the fact that the other disciplines will be conducting work at the same time as the electrical work is being undertaken. Include in the tender amount all costs associated with the required scheduling. All necessary power shutdowns must be co-ordinated with the Owner.
- .2 Requests for power shut downs shall be submitted in writing a minimum of forty-eight (48) hours prior to scheduled shutdown. Requests shall indicate scope of work, area, circuits, panels affected, as well as the date and time of requested shutdown.

1.17 WORK COORDINATION

- .1 Where location of work depends upon equipment being installed by others, confirm location of all such equipment with the trade concerned prior to installing any conduit, outlets, etc. Where equipment is being supplied that is being built-in with work of other Contractors, supply the equipment or necessary dimensions to the respective trades concerned.
- .2 Give the work personal supervision, lay out own work, do all necessary levelling and measuring or employ a competent Engineer to do so. Figures, full size and detail drawings shall take precedence over scaled measurements off drawings. No plea as to the actions and directions of other than the Consultant will be accepted in justification of any error in construction where a departure is made from the drawings, specifications or contract; it shall remain the duty of the Contractor to take his own measurements of the work.
- .3 Correct all work completed contrary to the intent of the drawings and specifications and bear all costs for same. Where the intent of the drawings and specifications is not clear, obtain clarification from the Consultant before proceeding with the work
- .4 Prior to commencing work, check the drawings and specifications of other trades for conflicts with the electrical work. Any such conflicts shall be reported to the Consultant and a written ruling obtained before proceeding with this work. Failure to report such conflicts will result in the Contractor's responsibility to make whatever adjustments are required.
- .5 All anchors, sleeves, inserts, etc. required for the electrical portion of the contract shall be installed at the proper time and when required to co-ordinate job progress with other trades.

1.18 OPERATING INSTRUCTIONS

- .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
- .2 Operating instructions to include following:
 - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
 - .3 Safety precautions.
 - .4 Procedures to be followed in event of equipment failure.
 - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.
- .3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
- .4 Post instructions where directed.
- .5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
- .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.19 GUARANTEE

- .1 Furnish a written guarantee/warranty countersigned and guaranteed by the Trade Contractor stating:
 - .1 That all work executed under this contract will be free from defects of workmanship and materials for a period of one (1) year from the date of final acceptance of this work, except for incandescent lamps, which shall be for a period of six (6) months.
 - .2 The above parties further agree that they will, at their own expense, repair and replace all such defective work and other work damaged thereby, which fails or becomes defective during the term of the guarantee/warranty provided that such failure is not due to improper usage.
 - .3 The period of the guarantee specified shall in no way supplant any other guarantee of a longer period but shall be binding on work not otherwise covered.

1.20 FINAL

- .1 Specifically note that the Civil drawings shall be checked for device locations before junction boxes and conduits are roughed-in. If this is not done and that conflict occurs, the outlets and/or conduits shall be moved and any repairs made at the expense of the Trade Contractor.
- .2 Points not specifically mentioned shall be in strict accordance with the Canadian Electrical Code and regulations of the Electrical Inspection Department from which the permit was obtained. The latest revisions and/or amendments to this code with applicable date restrictions shall also govern work on this contract.

- .3 It is the intent that these drawings and specifications provide for an electrical installation complete and in operating condition and the contractor shall be responsible for supplying and installing all material and work necessary to accomplish this, except where specifically noted that such work or material is not included.
- .4 These drawings and specifications are to be read in conjunction with the civil drawings and specifications and what may be called for in another shall be binding on this contract.
- .5 Leave the work complete to the approval of the Owner.

1.21 SCOPE OF WORK

- .1 The scope of work shall include, but not be limited to, the following:
 - .1 Relocation and reinstallation of existing Runway Edge Lighting.
 - .2 Supply and installation of new Medium Intensity Taxiway Edge Lighting.
 - .3 Supply and installation of pullpits.
 - .4 Supply and installation of new illuminated airfield sign.
 - .5 Relocation and reinstallation of existing PAPI systems (2).
 - .6 Supply and installation of new approach lighting systems (ODALS, MALS/MALSF/MALSR provisional)
 - .7 Supply an installation of new Runway Guard Lights (RGLs) (Provisional)
 - .8 Supply and installation of new aircraft receptacle kiosk.
 - .9 Supply and installation of new Constant Current Regulators (CCRs) in FEC (scope and quantity TBD depending on approach lighting systems chosen).
 - .10 Supply and installation of cables/conduit in trench as indicated on drawings.
 - .11 Supply and installation of series isolating transformers, primary/secondary cabling, connector kits, and all other associated equipment and work.

Part 2 Products

2.1 MATERIALS AND EQUIPMENT

- .1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from local inspection authorities before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.
- .3 Factory assemble control panels and component assemblies.

2.2 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of authority having jurisdiction / inspection authorities.
- .2 Decal signs, minimum size 175 x 250 mm.

2.3 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors. Penatrox to be used on aluminum connections.

2.4 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates and labels as follows:
 - .1 Nameplates: lamicaid 3 mm thick plastic engraving sheet, white face, black core, mechanically attached with self tapping screws.
 - .2 Sizes as follows:

NAMEPLATE SIZES

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

- .2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
- .3 Wording on nameplates and labels to be approved by owner/consultant prior to manufacture.
- .4 Allow for average of twenty-five (25) letters per nameplate and label.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .7 Terminal cabinets and pull boxes: indicate system and voltage.
- .8 Transformers: indicate capacity, primary and secondary voltages.

2.5 WIRING IDENTIFICATION

- .1 For indoor wiring, identify wiring with permanent lamicaid indelible identifying markings, numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring. (See further instruction in section, below).
- .2 For airfield wiring, identify wiring with lamicaid cable tags as follows:
 - .1 lamicaid 3 mm thick plastic engraving sheet, white face, black core, 20mm x 50mm, with 8mm high lettering
 - .2 tag to be punched with a 6mm diameter hole for connection to cables with two (2) black tye-wraps
 - .3 Identification to include circuit numbering, and include “(R)” for return leg of circuits, eg. “CCT#5 (R)”. Designations to be confirmed with owner/consultant, prior to manufacture of tags.

- .4 Label cables in all pullpits, and pull boxes. Labelling requirements include any straight through cable.
- .5 Where there are 2 or more transformers in a pulpit, each secondary conductor to fixtures are to be clearly identified with markers to clearly denote which plug is associated with which transformer.
- .3 Maintain phase sequence and colour coding throughout.
- .4 Colour coding: to CSA C22.1.
- .5 Use colour coded wires in communication cables, matched throughout system.

2.6 CONDUIT AND CABLE (NON-AIRFIELD LIGHTING) IDENTIFICATION

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- .3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

- .4 Underground cables: Provide lamicoïd tags, black face with white core, fastened to cables with black nylon ties, for all cables in pulpits to indicate the function/purpose of each cable, including the following:
 - .1 Each cable entering and leaving pulpit at every primary connector.
 - .2 All straight-through cable in pulpits.

2.7 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
 - .1 Paint outdoor electrical equipment “international orange” to EEMAC Y1-1 unless otherwise specified.
 - .2 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1 unless otherwise specified.

Part 3 Execution

3.1 INSTALLATION

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- .2 Do overhead and underground systems in accordance with CSA C22.3 No.1 except where specified otherwise.

3.2 NAMEPLATES AND LABELS

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.3 CONDUIT AND CABLE INSTALLATION

- .1 Install conduit and sleeves prior to pouring of concrete.
 - .1 Sleeves through concrete: Rigid PVC, size as indicated and protruding 50 mm.
- .2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation and fire stop opening.
- .3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.4 LOCATION OF OUTLETS

- .1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.
- .2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.
- .4 Locate light switches on latch side of doors.
 - .1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of door.

3.5 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.
 - .1 Local switches: 1400 mm.
 - .2 Wall receptacles:

- .1 General: 300 mm.
- .2 Above top of continuous baseboard heater: 200 mm.
- .3 Above top of counters or counter splash backs: 175 mm.
- .4 In mechanical rooms: 1400 mm.
- .3 Panelboards: as required by Code or as indicated.
- .4 Telephone and interphone outlets: 300 mm.
- .5 Wall mounted telephone and interphone outlets: 1500 mm.
- .6 Fire alarm stations: 1500 mm.
- .7 Fire alarm bells: 2100 mm.
- .8 Television outlets: 300 mm.
- .9 Wall mounted speakers: 2100 mm.
- .10 Clocks: 2100 mm.
- .11 Door bell pushbuttons: 1500 mm.

3.6 CO-ORDINATION OF PROTECTIVE DEVICES

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.7 FIELD QUALITY CONTROL

- .1 Load Balance:
 - .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
 - .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
 - .3 Provide upon completion of work, load balance report as directed in PART 1 - SUBMITTALS: phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.
- .2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
 - .1 Power distribution system including phasing, voltage, grounding and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.
 - .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
 - .5 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Megger 5kV circuits, feeder and equipment with a 5kV instrument.

- .4 Reference Section 34 43 10 for detailed Megger Test Procedures to be utilized.
- .6 Calibrate and adjust the settings of regulators as per manufacturer's recommendations. Ensure the supply voltage corresponds to the input tap. Check that the open circuit protector de-energizes the circuit within 2 or 3 seconds when load is disconnected.
- .3 Carry out tests in presence of owner/consultant.
- .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .5 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.8 CLEANING

- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 – Common Work Results – Electrical
- .2 Section 34 43 10 – Airfield Lighting – General

1.2 REFERENCES

- .1 Canadian Standards Association, (CSA International)

1.3 MEASUREMENT FOR PAYMENT

- .1 Payment for all grounding work shall be included in the respective pay items for electrical equipment.

Part 2 Products

2.1 EQUIPMENT

- .1 Rod electrodes: Ground Rods / Electrodes:
 - .1 Copper clad steel, 19mm diameter x 3m long, or
 - .2 Plate electrodes: 300mm x 300mm x 15mm copper plate. (Only use where it is not possible to install rod type electrode, and only with the acceptance of the consultant / owner.)
- .2 Grounding conductors: bare stranded copper, soft annealed, #8 AWG, or as otherwise indicated.
- .3 Insulated grounding conductors: green, type TW, #8 AWG.
- .4 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
 - .1 Grounding and bonding bushings.
 - .2 Protective type clamps.
 - .3 Bolted type conductor connectors.
 - .4 Thermite welded type conductor connectors.
 - .5 Bonding jumpers, straps.
 - .6 Pressure wire connectors.
 - .7 Ground Bus (in all electrical manholes / vaults).

Part 3 Execution

3.1 INSTALLATION GENERAL

- .1 Install complete permanent, continuous grounding system including electrodes, conductors, connectors, and accessories. Where EMT is used, run ground wire in conduit.
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.

- .4 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermite process, permanent mechanical connectors, or inspectable wrought copper compression connectors to ANSI/IEEE 837.
- .5 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .6 Soldered joints not permitted.
- .7 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
- .8 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.
- .9 Install separate ground conductor to outdoor lighting standards.
- .10 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.
- .11 Ground secondary service pedestals.
- .12 Install ground counterpoise 75mm above all cables / ducts in trench.

3.2 ELECTRODES

- .1 Install rod electrodes and make grounding connections. Ground rods to be installed in all pullpits for PAPI, ODALS, signs, etc.
- .2 Bond separate, multiple electrodes together.
- .3 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.3 EQUIPMENT GROUNDING

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list: Service Equipment, Transformer, Airfield Lighting Fixtures, Pullpit Lids.

3.4 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of consultant and local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 – Common Work Results for Electrical

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
 - .2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.
 - .3 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
 - .4 CSA C22.2 No. 83-M1985(R2003), Electrical Metallic Tubing.
 - .5 CSA C22.2 No. 211.2-M1984(R2003), Rigid PVC (Unplasticized) Conduit.
 - .6 CAN/CSA C22.2 No. 227.3-05, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

1.3 SUBMITTALS

- .1 Product data: submit manufacturer's printed product literature, specifications and datasheets.
 - .1 Submit cable manufacturing data.
- .2 Quality assurance submittals:
 - .1 Test reports: submit certified test reports.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .3 Instructions: submit manufacturer's installation instructions.

1.4 MEASUREMENT FOR PAYMENT

- .1 No separate payment for work is included under this section. Include costs in the appropriate lump sum or unit price item indicated in Section 26 05 00 – Common Work Results for Electrical.

Part 2 Products

2.1 CONDUITS

- .1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded.
- .2 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.
- .3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

- .4 Rigid PVC conduit: to CSA C22.2 No. 211.2.
- .5 Flexible metal conduit: to CSA C22.2 No. 56, aluminum liquid-tight flexible metal.

2.2 CONDUIT FASTENINGS

- .1 One (1) galvanized hole straps to secure surface conduits 50 mm and smaller.
- .2 Two (2) hole steel straps for conduits larger than 50 mm.
- .3 Beam clamps to secure conduits to exposed steel work.

2.3 CONDUIT FITTINGS

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified.
Coating: same as conduit.
- .2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.
- .3 Watertight connectors and couplings for EMT.
 - .1 Set-screws are not acceptable.

2.4 EXPANSION FITTINGS FOR RIGID CONDUIT

- .1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.
- .2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.
- .3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.5 FISH CORD

- .1 Polypropylene 6 mm DIA.

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 INSTALLATION

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.

- .3 Surface mount conduits.
- .4 Use rigid galvanized steel, PVC, and EMT threaded conduit where specified.
- .5 Use rigid PVC conduit underground.
- .6 Minimum conduit size for lighting and power circuits: 19 mm.
- .7 Bend conduit cold:
 - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .8 Mechanically bend steel conduit over 19 mm diameter.
- .9 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .10 Install fish cord in empty conduits.
- .11 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.
- .3 Run conduits in flanged portion of structural steel.
- .4 Do not pass conduits through structural members except as indicated.
- .5 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONCEALED CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Do not install horizontal runs in masonry walls.
- .3 Do not install conduits in terrazzo or concrete toppings.

3.5 CONDUITS IN CAST-IN-PLACE CONCRETE

- .1 Locate to suit reinforcing steel.
 - .1 Install in centre one third of slab.
- .2 Protect conduits from damage where they stub out of concrete.
- .3 Install sleeves where conduits pass through slab or wall.
- .4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed.

- .1 Use cold mastic between sleeve and conduit.
- .5 Conduits in slabs: minimum slab thickness 4 times conduit diameter.
- .6 Encase conduits completely in concrete per details on the drawings.
- .7 Organize conduits in slab to minimize cross-overs.

3.6 CONDUITS IN CAST-IN-PLACE SLABS ON GRADE

- .1 Run conduits 25 mm and larger below slab and encase in 75 mm concrete envelope.
 - .1 Provide 50 mm of sand over concrete envelope below floor slab.

3.7 CONDUITS UNDERGROUND

- .1 Slope conduits to provide drainage.
- .2 Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

3.8 CLEANING

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 – Common Work Results - Electrical
- .2 Section 33 65 76 – Direct Buried Underground Cable Ducts
- .3 Section 34 43 10 – Airfield Lighting – General

1.2 REFERENCES

- .1 Canadian Standards Association, (CSA International)
- .2 Insulated Cable Engineers Association, Inc. (ICEA)

1.3 MEASUREMENT FOR PAYMENT

.1 Supply & Installation of Cables

- .1 Payment for installation of cables in existing/new ducts shall include:
 - .1 Supply and installation of cables of type specified. The Contractor shall note that cable supply shall include any extra cable necessary for cable loops, connections, fittings, splices, offsets, as well as all surplus cables brought above ground.
 - .2 Transition to/from polytube/duct.
 - .3 All other accessories necessary to complete the installation to the satisfaction of the consultant.
- .2 Payment for these items shall be on the basis of lineal metre of installed cables measured horizontally along trenches and ducts from the cable source to the end use device. This cable length payment will be approximately equal to the length of trenching for the same device. It shall be this contractor's responsibility to factor the cost of all surplus cable, loops, and accessories required to make a complete system into his tendered price.

Part 2 Products

2.1 NOT USED.

Part 3 Execution

3.1 SITE PREPARATION AND STOCKPILING

- .1 Remove obstructions from surfaces to be excavated.

- .2 Stockpile granular materials in areas designated by Consultant.
- .3 Protect granular materials from contamination.

3.2 TRENCHING

- .1 Advise Consultant in advance of excavation operations.
- .2 Excavate to depth indicated.
- .3 Wall of trench to be vertical as much as possible so that a minimum of shoulder surface is disturbed.
- .4 Dispose of surplus and unsuitable excavated material and rocks on site at an area approved by the Consultant.
- .5 Bottom of trench to be level and free from loose, soft, or coarse aggregate and organic matter.
- .6 When a boulder or rock is encountered, remove to a depth of at least 80 mm below the required cable depth and replace with granular bedding material.
- .7 Trenches shall be excavated only to the extent that cables can be installed and the trench backfilled as per Item 3.3 in the same working day.

3.3 BACKFILLING

- .1 Do not proceed with backfilling operations until the Consultant has inspected and given approval.
- .2 Areas to be backfilled are to be free from debris.
- .3 Place and compact granular and native backfill materials in continuous horizontal layers as indicated on drawings.
- .4 At locations 200 mm above counterpoise, provide underground protective hazard tape as outlined in Item 2.3.1.
- .5 If, during progress of work, granular materials do not meet approval, replace and retest at no extra cost to the Owner.
- .6 Backfill and compact, level with adjacent finished surface.

3.4 DIRECT BURIAL OF CABLES

- .1 After granular bedding is in place, lay cables, maintaining a minimum of 75 mm clearance from each side of trench to nearest cable. Do not pull cable into trench.

- .2 Provide offsets for thermal action and minor earth movements. Offset cables 150 mm for each 60 m run, maintaining minimum cable separation and bending radius requirements.
- .3 Make termination and splice only as indicated, leaving at least 1000 mm of surplus cable in each direction.
 - .1 Make splices and terminations in accordance with manufacturer's instructions using approved splicing kits.
 - .2 All splices and terminations shall be in a pull pit.
- .4 Minimum permitted radius at cable bends for rubber- or plastic-covered cables is 8 times diameter of cable, or in accordance with manufacturer's instructions.

3.5 CABLE INSTALLATION IN DUCTS

- .1 Install cables as indicated in ducts.
 - .1 Do not pull spliced cables inside ducts.
- .2 Install multiple cables in duct simultaneously.
- .3 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .4 To facilitate matching of colour coded multi-conductor control cables reel off in same direction during installation.
- .5 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.
- .6 After installation of cables, seal duct ends with duct sealing compound.
- .7 All cables shall go through to pull pits, and all terminations shall be at pull pits.
- .8 The bare copper counterpoise shall be laid outside and above the duct, as shown on the drawings.
- .9 Primary cable piping to enter through bottom of pullpit.
- .10 Pre-drill pull pits to accept installation of secondary cable duct.

3.6 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.
- .2 Perform tests using qualified personnel. Provide necessary instruments and equipment.
- .3 Check phase rotation and identify each phase conductor of each feeder.
- .4 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 500 megohms.

- .5 Pre-acceptance tests.
 - .1 After installing cable but before splicing and terminating, perform insulation resistance test with 5000 V megger on each phase conductor.
 - .2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.
 - .3 The above megger testing is to be undertaken non-destructively at 5000V. Circuits to be tested in a non-energized, fully functional configuration (with transformers connected, etc.).
- .6 Provide owner/consultant with list of test results showing location at which each test was made, circuit tested and result of each test.
- .7 Remove and replace entire length of cable if cable fails to meet any of test criteria.

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling
- .2 Section 31 22 14 - Airfield Grading.

1.2 REFERENCES

- .1 All references to this Specifications, Standards, or Methods shall be understood to refer to the latest adopted revision, including all amendments
- .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C127-[04], Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
 - .2 ASTM D698-[00ae1], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - .3 ASTM D1557-[02e1], Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - .4 ASTM D4253-[00], Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

1.3 DEFINITIONS

- .1 Corrected maximum dry density is defined as:
 - .1 $D = D1xD2/(F1 \times D2) + (F2 \times D1)$
 - .2 $D = (F1 \times D1) + (0.9 \times D2 \times F2)$
 - .3 Where: D = corrected maximum dry density kg/m³.
 - .1 F1 = fraction (decimal) of total field sample passing [19] [4.75] mm sieve
 - .2 F2 = fraction (decimal) of total field sample retained on [19] [4.75] mm sieve (equal to 1.00 - F1)
 - .3 D1 = maximum dry density, kg/m³ of material passing [19] [4.75] mm sieve determined in accordance with Method [A] [C] of [ASTM D698] [ASTM D1557].
 - .4 D2 = bulk density, kg/m³, of material retained on [19] [4.75] mm sieve, equal to 1000 G where G is bulk specific gravity (dry basis) of material when tested to ASTM C127.
 - .4 For free draining aggregates, determine D1 (maximum dry density) to ASTM D4253 [dry method] [wet method] when directed by the Consultant.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

- .1 This specification covers the general and specific requirements for aggregates incorporated in various portions of the work.

2. RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 32 11 23 – Aggregate Base Course
- .3 Section 32 12 16 – Asphalt 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 American Society for Testing and Materials (ASTM)
 - .1 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
 - .2 ASTM C117, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
 - .3 ASTM C131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .4 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .5 ASTM D422, Standard Test Method for Particle-Size Analysis of Soils.
 - .6 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³)(600 kN-m/m³).
 - .7 ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³)(2,700 kN-m/m³).
 - .8 ASTM D1883, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
 - .9 ASTM D2321, Standard Practice for Underground Installation of Thermal Plastic Pipe For Sewers and Other Gravity Flow Applications.

- .10 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.
- .4 CSA
 - .1 CSA-A23.2-1A Sampling aggregates for use in concrete
 - .2 CSA-A23.2-12A Relative density and absorption of coarse aggregate.
 - .3 CSA-A23.2-6A Relative density and absorption of fine aggregate.
 - .4 CSA-A23.2-16A/17A Resistance to degradation of small-size coarse aggregate by abrasion and impact in the Los Angeles machine.
 - .5 CSA-A23.2-9A Soundness of aggregate by use of magnesium sulphate
 - .6 CSA-A23.2-2A Sieve analysis of fine and coarse aggregate.
 - .7 CSA-A23.2-5A Amount of material finer than 80 µm in aggregate.

4. MEASUREMENT FOR PAYMENT

- .1 No measurement to be made under this section. Include costs in appropriate tender items.

5. SOURCE APPROVAL

- .1 Inform the Consultant of proposed source of aggregates and provide current satisfactory test data on proposed source of aggregates at least four weeks prior to delivery of aggregate to the site.
- .2 If, in the opinion of the Consultant, materials from proposed source(s) do not meet, or cannot reasonably be processed to meet specified requirements, procure alternative source.
- .3 Should change of material source be proposed during work, advise the Consultant and provide current satisfactory test data on proposed aggregate source at least two weeks prior to delivery of aggregate to the site.
- .4 Acceptance of material at source does not preclude future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified when incorporated into work.

6. SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Allow continual sampling by the Consultant during production.
- .3 Provide the Consultant with access to source and processed material for sampling.
- .4 Install sampling facilities at discharge end of production conveyor, to allow the Consultant to obtain representative samples of items being produced. Stop conveyor belt when requested by the Consultant to permit full cross section sampling.
- .5 Pay cost of sampling and testing of aggregates which fail to meet specified requirements if so required.
- .6 Provide water, electric power and propane to the Consultant’s laboratory trailer at production site. **(Not Required)**.
- .7 For existing stockpiles of material submit results of Quality Control testing to Consultant at least two weeks prior to delivery of aggregate to the site.
- .8 For material produced during the course of the work, submit the results of Quality Control testing within 24 hours of completion of the test.
- .9 Submit samples of aggregates (minimum 50 kg) as requested by the Consultant for Quality Assurance testing. Provide the Consultant with access to aggregate sources if requested.

7. WASTE MANAGEMENT AND DISPOSAL

- .1 Divert unused granular materials from landfill to local recycling facility.

8. TEST METHODS

- .1 The latest edition of the test methods in Table 1 will be used to determine material characteristics unless otherwise specified.

TABLE 1			
	Name of Test	CSA/ASTM Designation for PCC Pavement	ASTM Designation for HMAC Pavement
1	Sampling Aggregates for Use in Concrete	CSA - A23.2 - 1A	

TABLE 1			
	Name of Test	CSA/ASTM Designation for PCC Pavement	ASTM Designation for HMAC Pavement
.2	Relative Density and Absorption of Coarse Aggregate	CSA - A23.2 - 12A	ASTM C127-09
.3	Relative Density and Absorption of Fine Aggregate	CSA - A23.2 - 6A	ASTM D854 - 06
.4	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine	CSA - A23.2 - 16A	ASTM C131 - 06
.5	Soundness of Aggregate by Use of Magnesium Sulphate	CSA - A23.2 - 9A	ASTM C88 - 05
.6	Sieve Analysis of Fine and Coarse Aggregate	CSA - A23.2 - 2A	ASTM C136 - 06
.7	Amount of Material Finer than 80 µm in Aggregate	CSA - A23.2 - 5A	ASTM C117- 04
.8	Sieve Analysis of Mineral Filler for Road and Paving Materials	ASTM D546	ASTM D546
.9	Sand Equivalent Value of Soils and Fine Aggregate	ASTM D2419	ASTM D2419
.10	Plasticity Index of Soils	ASTM D4318	ASTM D4318
.11	Liquid Limit of Soils	ASTM D4318	ASTM D4318

9. QUALITY ASSURANCE TESTING

- .1 The Consultant will undertake a Quality Assurance program of aggregates testing as material is delivered on site and/or as it is produced and placed in stockpile at the aggregate source. The location of sampling will be at the Consultant's discretion
- .2 Testing by the Consultant will not relieve the Contractor of the responsibility to supply aggregate in accordance with the Contract Documents
- .3 Provide access and assistance to the Consultant to sample aggregates as required for Quality Assurance testing.
- .4 Contractor to bear cost of sampling and testing of aggregates which fail to meet specified requirements.

- .5 Quality Assurance testing by the Consultant does not relieve the Contractor of the responsibility to supply and bear costs for quality control testing and reporting.

PART 2 - PRODUCTS

1. GENERAL

- .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
 - .1 Greatest dimension to exceed five times least dimension.
- .3 Particles having at least two freshly fractured face are considered as crushed fragments.
- .4 Fine Aggregates for purposes of standard CSA tests, shall be all mineral matter passing the 5 mm sieve including mineral fillers.
- .5 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
 - .1 Natural sand.
 - .2 Manufactured sand.
 - .3 Screenings produced in crushing of quarried rock, boulders, gravel, or slag.
- .6 Coarse Aggregates for the purposes of standard CSA tests, shall be all mineral material retained on the 5 mm sieve.
- .7 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
 - .1 Crushed rock.
 - .2 Gravel and crushed gravel composed of naturally formed particles of stone.
 - .3 Light weight aggregate, including slag and expanded shale.

2. MATERIALS

- .1 Aggregates shall satisfy all the requirements of this specification and unless specified otherwise shall be:

- .1 Crushed Aggregate
 - .1 Crushed rock composed of hard, uncoated fragments, products from rock formations or boulders of uniform quality.
 - .2 Crushed gravel composed of hard, durable, uncoated particles, produced from naturally formed deposits.
- .2 Screened Aggregate
 - .1 Aggregates shall be composed of clean, hard, durable uncoated particles and shall satisfy all requirements for the material required.
- .2 Unless otherwise directed by the Consultant in consultation with the Design Manager, specifications for various aggregate types are as follows:
 - .1 Gravel shall conform to the following:

Metric Sieve Sizes	% Passing by Weight (Nominal Gravel Size)	
	75 mm (Screened)	19 mm (Crushed)
75 mm	100	
50 mm	–	
40 mm	–	
25 mm	50 – 90	
19 mm	–	100
10 mm	–	–
4.75 mm	–	40 – 80
2.36 mm	–	27 – 65
1.18 mm	–	18 – 50
0.600 mm	–	12 – 35
0.300 mm	0 – 15	8 – 25
0.150 mm	–	4 – 17
0.075 mm	0 – 6	2 – 8

- .1 75 mm Screened Gravel:

- .1 To be well-graded granular material, substantially free from clay lumps, organic matter and other extraneous material, screened to remove all stones in excess of maximum diameter specified in material description.
- .2 19 mm Crushed Gravel:
 - .1 Minimum percent fractured shall be 60%. (2 Face)
 - .2 Maximum 45% loss when tested in accordance with CSA-A23.2-16A and CSA-A23.2-17A.
- .2 Crushed or graded gravel for pipe bedding shall conform to the following **(NOT USED)**:

% Passing by Weight (Nominal Gravel Size)		
Sieve Sizes	Type 1(% Passing)	Type 2 (% Passing)
25.0 mm	100	100
19.0 mm	90 – 100	90 – 100
12.5 mm	65 – 85	70 – 100
9.5 mm	50 – 75	
4.75 mm	25 – 50	40 – 70
2.36 mm	10 – 35	
0.85 mm	5 – 20	8 – 30
0.425 mm	0 – 15	
0.300 mm		3 – 20
0.180 mm	0 – 8	
0.075 mm	0 – 5	0 – 8

Type 1: Standard gradation.

Type 2: To be used only in dry trench conditions and with the Consultants prior approval

- .3 Coarse gravel for bedding and drainage shall conform to the following **(NOT USED)**:

% Passing by Weight (Nominal Gravel Size)		
Metric Sieve Sizes	50 mm	40 mm
50 mm		100
40 mm	90 – 100	100
25 mm	–	95 – 100

20 mm	35 – 70	–
16 mm	–	25 – 60
10 mm	10 – 30	–
5 mm	0 – 5	0 – 10
2.5 mm	–	0 – 5

- .4 Coarse sand for bedding and drainage shall conform to the following **(NOT USED)**:

Metric Sieve Sizes	% Passing by Weight
10 mm	100
5 mm	95 – 100
2.5 mm	80 – 100
1.25 mm	50 – 85
0.630 mm	25 – 60
0.160 mm	10 – 30
0.080 mm	2 – 10

- .5 For Coarse Gravel and Sand for bedding and drainage **(NOT USED)**:

- .1 Coarse aggregate retained on the 5 mm sieve shall consist of durable particles of crushed stone, gravel or slag capable of withstanding the effects of handling, spreading and compacting without degradation which produces deleterious fines. Of the particles retained on the plus 5 mm sieves at least 50% shall have two or more fractured faces.
- .2 Fine aggregate shall consist of fines from crushing and natural sands.

- .6 PVC Pipe Bedding **(NOT USED)**:

- .1 In accordance with Local Sewer Construction Standard Specifications, bedding materials shall conform to the embedment materials so noted within ASTM D2321 standard. ASTM D2321 requires Class I, II or III materials to be used. General descriptions of these materials are as follows:
- .1 Class I: Angular 6 to 40 mm graded stone.
- .2 Class II: Coarse sands and gravels with maximum particle size passing the 40 mm sieve. Soil types GW, GP, SW, and SP are included in this class.
- .3 Class III: Fine sand and clayey gravels, including fine sands, sand-clay mixtures, and gravel-clay mixtures.

- .2 Refer to ASTM. D2321, Table 1 and 2 for details of Class I, II, and III materials.

3. SOURCE QUALITY CONTROL

.1 General

- .1 Quality Control shall be the responsibility of the Contractor. Quality Assurance tests performed by the Consultant shall not be considered Quality Control tests.
- .2 The Contractor shall use professional engineering services and a CSA certified testing laboratory licensed to practice in the Province of Alberta to assess and where necessary, modify the aggregate materials being produced to ensure their end use meets all specification requirements.
- .3 Advise the Consultant 2 weeks in advance of proposed change of material source.
- .4 Inspection or testing by the Consultant shall not in any way relieve the Contractor of the responsibility for providing aggregates that meet the specification in all respects.

.2 Testing Frequency

The Contractor shall provide current aggregate test results as per Table 3.

TABLE 3		
Test	Standard	Minimum Frequency
SIEVE ANALYSIS: Crushed or Screened Aggregate or Sand	ASTM C136	One per 1000 tonnes of aggregate produced
SIEVE ANALYSIS: Pit-run Aggregate or Sand	ASTM C136	One per 1000 tonnes of aggregate produced
PERCENT FRACTURE	See Note 1	One per 5000 tonnes of aggregate produced
L.A. ABRASION	ASTM C131	One per 10,000 tonnes of aggregate produced

Note 1: The percentage (%) of fractured material will be determined by examining the fraction retained on the 5 mm sieve and dividing the mass of the fractured particles having two or more fractured faces by the total mass retained on the 5 mm sieve.

PART 3 - EXECUTION

1. PREPARATION

.1 Handling

- .1 Handle and transport aggregates to avoid segregation, contamination and degradation.

.2 Stockpiling

- .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by the Consultant. Do not stockpile on completed pavement surfaces.
- .2 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
- .3 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
- .4 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by the Consultant within 24 hours of rejection.
- .5 Stockpile materials in uniform layers of thickness as follows:
 - .1 Max 1.5 m for coarse aggregate and base coarse materials.
 - .2 Max 1.5 m for fine aggregate and sub-base materials.
 - .3 Max 1.5 m for other materials.
- .6 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
- .7 Do not cone piles or spill material over edges of piles.

2. CLEANING

- .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .2 Leave any unused aggregates in neat compact stockpiles as directed by the Consultant.
- .3 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

- .1 This section specifies the requirements for excavation, disposal of material, construction of common fill areas, and preparation of pavement subgrade in accordance with the specifications and conforming to lines, grades, dimensions, and typical cross sections indicated by the Contract Documents or as established by the Consultant.

2. MEASUREMENT PROCEDURES

- .1 Measure supply and install of common fill in compacted cubic meters in place as accepted by Consultant. Payment at the tendered unit price shall be full compensation for the supply, processing, loading, hauling, stockpiling, placing, moisture conditioning, compacting, grading, maintaining, cleanup, survey quantification by Contractor, and any other work incidental to this section.
- .2 No payment shall be made for overbuild of common fill beyond neat lines shown on the drawings.

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 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM C117, Test Method for Materials Finer Than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136, Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422, Method for Particle-Size Analysis of Soils.
 - .4 ASTM D4318, Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .3 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

4. DEFINITIONS

- .1 Excavation shall include the following:

- .1 Excavation and disposal of muck or other unsuitable materials.
 - .2 Excavation for the preparation and construction of the subgrade of roadways, runways, taxiways, and aprons.
 - .3 Excavation for subcuts.
 - .4 Excavation for the backfill of subcuts.
 - .5 Excavation for the construction of drainage ditches.
 - .6 Excavation of material for ditch blocks and ditch checks.
 - .7 Excavation for construction of approaches, entrances, and parking areas for vehicles and aircraft.
 - .8 Excavation for the general grading of areas adjacent to roadways, runways, taxiways, and aprons.
 - .9 Excavation for the backfill of holes or false grading to correct surface irregularities.
 - .10 The trimming and cleanup of all materials or excavation areas.
 - .11 Trimming and rounding of slopes.
 - .12 Free haul distance: distance that excavated material is to be hauled without compensation. Free haul distance to be 3000m.
 - .13 The construction of detours or other suitable provision to accommodate traffic, either pedestrian, vehicular or aircraft over or around any part of the work being performed.
 - .14 Maintaining the work in a finished condition until it has been accepted as completed by the Consultant.
- .2 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
- .1 Rock Excavation: excavation of material from solid masses of igneous, sedimentary, or metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders or rock fragments having individual volume in excess of 1 m³.
 - .2 Common Excavation: excavation of materials of whatever nature, which are not included under definition of rock excavation, including dense tills, hardpan and frozen materials and partially cemented materials which can be ripped and excavated with heavy construction equipment.

- .3 Unclassified excavation: excavation of deposits of whatever character encountered in work.

- .3 Compaction classes: two classes of soil are recognized for compaction purposes; cohesionless and cohesive soil:
 - .1 Cohesionless soil:
 - .1 Soils which have less than 20% passing 0.075 mm sieve, when tested to ASTM C117, regardless of plasticity of fines.
 - .2 Soils containing between 20% to 50% passing 0.075 mm sieve and having liquid limit less than 25 and plasticity index less than 6 when tested to ASTM D4318.
 - .2 Cohesive soil: soil not having properties to be classified as cohesionless.

- .4 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping, and seeding.

- .5 Waste material: excavated material unsuitable for use in work or surplus to requirements to be disposed as directed.

- .6 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of work.

- .7 Pavement structure: combination of layers of unbound or stabilized granular sub-base, base, and asphalt or concrete surfacing.

- .8 Subgrade elevation: Elevation immediately below base or subbase, whichever is lower.

- .9 Subcut: Excavation within or below the subgrade to length, width, and depth established by the Consultant.

- .10 Common Fill: Material derived from usable excavation and placed above original ground or stripped surface up to subgrade elevation.

- .11 Subgrade: In fills, the material confined between subgrade elevation and original ground, and between side slopes; in cuts, the material below subgrade elevation confined between side slopes.

- .12 Stripping: Material composed of organic, unsuitable for common fill regardless of moisture content.

- .13 Unsuitable materials:
 - .1 Weak and compressible materials under pavement areas.

- .2 Frost susceptible materials under pavement areas.

5. WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of excavated waste materials off-site.

PART 2 - PRODUCTS

1. MATERIALS

- .1 Materials: to acceptance of the Consultant. Material used for common fill not to contain more than 3% organic matter by mass.
- .2 Material used for common fill must have a proctor (Modified Proctor Maximum Dry Density) and optimum moisture content established as defined by ASTM D1557.

PART 3 - EXECUTION

1. EXCAVATING

- .1 General:
 - .1 Advise the Consultant at least 7 days in advance of excavation operations for initial cross sections to be taken.
 - .2 Excavate to lines, grades, elevations, and dimensions as indicated or as directed by the Consultant.
 - .3 Ensure drainage of excavated areas and maintain crowns and cross slopes to provide surface drainage. Do not allow standing water to occur on the excavated or fill surface at any time.
 - .4 Provide ditches as the work progresses to provide drainage.
 - .5 All deposits of frost susceptible and unsuitable materials shall be removed below subgrade to the length, widths and depths as directed by the Consultant, and such unsuitable materials shall be replaced with acceptable backfill material and compacted in place. Notify the Consultant when unsuitable materials are uncovered.
 - .1 The Consultant will require timely placement of backfill material, if such action is deemed essential to minimize deterioration or degradation of exposed materials.
 - .6 Treat ground slopes at grade points, where subgrade is on transition from excavation to embankment or earth to rock, as indicated or as directed by the Consultant.

- .7 Dispose of waste material as specified in the Contractor's Waste Reduction Work Plan.
- .2 Do not disturb foundation materials of adjacent pavements or structures which are to remain in place.
- .3 Side Ditches:
 - .1 Construct side ditches to depths and widths indicated in contract documents or as directed by the Consultant, to permit ready flow of surface water.
 - .2 Ditches in airfield cuts will be constructed as soon as possible to provide drainage in the cut to prevent softening of the subgrade.
 - .3 Maintain and keep ditches open and free from debris at all times.
 - .4 Provide drainage control devices in ditches to minimize flow rates and prevent erosion.
- .4 Unsuitable or surplus material:
 - .1 Disposal of unsuitable or excess material shall be at locations as indicated in the Contract Documents or as directed by the Consultant.
- .5 Owner Supplied Gravels:
 - .1 Consultant to designate location and extent of gravel stockpiles.
 - .2 Contractor is responsible for maintenance of all haul roads. No separate payment will be made.

2. COMPACTION

- .1 General:
 - .1 Shape and roll alternately to obtain smooth, even, and uniform compacted layers.
 - .2 When necessary apply water during compaction to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.
 - .3 Any soft, weak, or otherwise unsuitable material discovered at any stage of the work shall be excavated to the depth and extent designated by the Consultant. The material shall be replaced by suitable material.
 - .4 Quality assurance testing of materials will be carried out by the testing laboratory designated by the Consultant. Quality control testing of

materials will be carried out by the testing laboratory designated by the Contractor, at a higher frequency.

- .5 Should the surface become rutted or disturbed for any reason prior to or during the placing of the next layer, the Contractor shall re-grade and re-compact the subgrade at his own expense.
- .6 Place and compact to full width in layers not exceeding 200 mm loose thickness. The Consultant may authorize thicker lifts if specified compaction can be achieved and if material contains more than 25% by volume stone or rock fragments larger than 100 mm.
- .7 Break soil down to a size suitable for compaction and mix for uniform moisture and soil conditions to full depth of layer.
- .8 Compact each layer to at least a minimum of 98% Modified Proctor Maximum Dry Density ASTM D1557.
- .9 During performance of the work, sufficient water shall be added or the soil shall be aerated to bring the moisture content to within $\pm 2\%$ of optimum required for compaction.
- .10 The moisture content shall be maintained at $\pm 2\%$ of the optimum moisture content as defined by ASTM D1557 until the next layer is placed.

3. FINISHING AND TOLERANCES

- .1 Ditches:
 - .1 Blade finished ditch subgrade surfaces in cut and fill areas free from ruts, depressions, rock in excess of 75 mm and debris. Hand finish areas that cannot be finished satisfactorily by machine.
 - .2 Finished ditch subgrade to be within 30 mm of design elevations, but not uniformly high or low.
- .2 Pavement and Shoulder Subgrade:
 - .1 Fine grade finished subgrade to be free from ruts, depressions, rock in excess of 75 mm, and debris and attain a tight dense surface.
 - .2 Following fine grading, static rolling subgrade surface using a smooth drum type roller can be done (if needed), to help attain a tight dense condition.
 - .3 Finished subgrade to be within 30 mm of design elevations, but not uniformly high or low.

- .4 Finished subgrade surfaces to be free from depressions exceeding 30 mm in 5 m.

4. PROOF ROLLING

- .1 For proof rolling, use fully loaded dual axle dump truck with an effective single axle load of 18,000 lbs (80 kN).
- .2 The Consultant may authorize use of other acceptable proof rolling equipment.
- .3 Proof roll top of subgrade upon completion of compaction, fine grading work, and density testing to verify compliance with density and moisture specification.
- .4 Make sufficient passes of proof roller to subject every point on the surface to three separate passes of loaded tire.
- .5 Where proof rolling reveals areas of unstable subgrade, proceed as follows:
 - .1 Investigate material in unstable area to a depth of about 600 to 750 mm below subgrade elevation, or as directed by the Consultant. If the material below the subgrade surface is deemed to be suitable, redo subgrade preparation to a depth necessary to achieve requirements of this section. After completion of rework, proof roll subgrade again.
 - .2 If the investigation reveals unsuitable material, remove such material to the depth and extent as directed by the Consultant. Use of geotextile and geogrid in the bottom of the excavation shall be at the discretion of the Consultant.
 - .3 Backfill area of excavation with common material in compliance with the compaction and moisture content requirements of this section. Proof roll subgrade again.
 - .4 The use of geotextile and geogrid as a means to help correct areas of unstable subgrade shall be at the discretion of the Consultant and shall only be used after all methods noted in this section have been attempted. Unauthorized use of geotextile and geogrid shall be at the Contractors' expense.

5. MAINTENANCE

- .1 Maintain finished surfaces in a condition in accordance with this Section until succeeding material is applied.
- .2 Acceptance of finished subgrade by the Consultant does not relieve the Contractor of his responsibility to provide a subgrade meeting the requirements of this Section until succeeding material is applied.
- .3 Maintain work area such that dust does not create a safety hazard to the airport.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

- .1 This section specifies the requirements for excavating, trenching, and backfilling of underground utility installations and related structures.
- .2 The section is not applicable to excavation and backfill below, above, or adjacent to structural assemblies.

2. MEASUREMENT PROCEDURES

- .1 No separate payment shall be made for excavating, trenching, and backfilling. Include costs for work performed under this section in the appropriate tender items.
- .2 No separate payment shall be made for drainage and dewatering during construction.

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 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C117, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-63, Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft) (600 kN-m/m).
 - .5 ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft) (2,700 kN-m/m).
- .3 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils. Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.
- .4 Canadian Green Building Council (CaGBC)

- .1 LEED Canada-NC Version 1.0, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations.
- .5 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .1 CSA-A3001, Cementitious Materials for Use in Concrete.
 - .2 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .6 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

4. DEFINITIONS

- .1 Class 1 Backfill.
 - .1 Class 1 backfill shall consist of backfilling the trench with sand or gravel material compacted in even layers not exceeding 200 mm in depth.
- .2 Class 2 Backfill.
 - .1 Class 2 backfill shall consist of backfilling the trench with excavated material in even layers not exceeding 200 mm in depth.
- .3 Class 3 Backfill.
 - .1 Class 3 backfill shall consist of backfilling the trench with excavated material in even layers not exceeding 300 mm in depth.
- .4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .7 Unsuitable materials:
 - .1 Weak, chemically unstable, and compressible materials.

- .2 Frost susceptible materials:
 - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.
 - .2 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.
- .8 Unshrinkable fill: very weak mixture of cement, concrete aggregates, and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

5. SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Quality Control in accordance with Section 01 45 00 - Quality Control:
 - .1 Submit condition survey of existing conditions as described in Part 1 Section 9 Existing Condition
 - .2 Submit for review by the Consultant dewatering and heave prevention methods as described in Part 3 Section 7.
 - .3 Submit to the Consultant written notice at least seven days prior to excavation work, to ensure cross sections are taken.
 - .4 Submit to the Consultant testing/inspection results and report as described in Part 3.
- .3 Preconstruction Submittals:
 - .1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.
 - .2 Submit records of underground utility locates, indicating: location plan of existing utilities as found in field, clearance record from utility authority and location plan of relocated and abandoned services, as required.
- .4 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

- .2 Inform the Consultant at least four weeks prior to beginning Work, of proposed source of fill/unshrinkable fill materials and provide access for sampling.
- .3 Contractor shall provide sieve analysis, proctor, and source location of material that may be imported to the site for work performed under this section.
- .4 Imported materials shall be accepted by the Consultant prior to use by the Contractor.
- .5 If requested by the Consultant, submit 70 kg samples of type of fill/unshrinkable fill specified including representative samples of excavated material.
- .6 Ship samples prepaid to the Consultant, in tightly closed containers to prevent contamination and exposure to elements.

6. QUALITY ASSURANCE

- .1 Engage services of qualified Professional Engineer who is registered or licensed in Province of British Columbia, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing, and underpinning required for the Work.
- .2 Do not use soil material until written report of soil test results are reviewed and accepted by the Consultant.

7. WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with the Contract Documents.
- .2 Divert excess aggregate materials from landfill to local facility for reuse as specified in the Contract Documents (excess aggregate material should stay at pit location).

8. EXISTING CONDITIONS

- .1 Examine soil report.
- .2 Buried services:
 - .1 Before commencing work verify location of buried services on and adjacent to site.
 - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.

- .3 Size, depth, and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
- .4 Prior to beginning excavation Work, notify applicable authorities having jurisdiction establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during the Work.
- .5 Confirm locations of buried utilities by careful soil hydrovac methods.
- .6 Maintain and protect from damage, water, sewer, gas, electric, telephone, and other utilities and structures encountered as indicated. Obtain acceptance from the Consultant before moving or otherwise disturbing utilities or structures.
- .7 Where utility lines or structures exist in area of excavation, obtain direction of the Consultant before removing/re-routing.
- .8 Record location of maintained, re-routed, and abandoned underground lines.
- .9 Confirm locations of recent excavations adjacent to area of excavation.
- .3 Existing buildings and surface features:
 - .1 Conduct, with the Consultant, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey benchmarks, and monuments which may be affected by Work.
 - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by the Consultant.
 - .3 Where required for excavation, cut roots or branches as directed by the Consultant.

PART 2 - PRODUCTS

1. MATERIALS

- .1 General excavation fill and bedding material shall be as shown on the drawings.
- .2 Geotextiles: to Section 31 32 19.01 - Geotextiles.

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 Section 01 35 43 - Environmental Procedures.
- .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.

2. SITE PREPARATION

- .1 Remove obstructions, ice, and snow, from surfaces to be excavated within limits indicated.
- .2 Remove all brush, weeds, grasses, and accumulated debris from the site.
- .3 Remove existing pavements to limits indicated or as directed by the Consultant. Work shall be performed in accordance with Section 02 41 13 - Selective Site Demolition and Section 02 41 13.14 – Asphalt Paving Removal.
- .4 Strip and stockpile topsoil as indicated or as directed by the Consultant. Work shall be performed in accordance with Section 31 14 13 - Soil Stripping and Stockpiling.

3. PREPARATION/PROTECTION

- .1 Record as-built location of maintained, re-routed, and abandoned underground lines on Contract Drawings.
- .2 Protect existing features in accordance with applicable local regulations.
- .3 Keep excavations clean, free of standing water, and loose soil.
- .4 Where soil is subject to significant volume change due to change in moisture content, cover, and protect in a manner acceptable to the Consultant.
- .5 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .6 Protect buried services that are required to remain undisturbed.

4. STRIPPING OF TOPSOIL

- .1 Complete work in accordance with Section 31 14 13 - Soil Stripping and Stockpiling.

5. STOCKPILING

- .1 Complete work in accordance with Section 31 14 13 - Soil Stripping and Stockpiling.

6. COFFERDAMS, SHORING, BRACING AND UNDERPINNING

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Occupational Health and Safety Regulation for the Province of British Columbia.
- .2 Obtain permit from authority having jurisdiction for temporary diversion of water course.
- .3 Construct temporary Works to depths, heights, and locations as indicated or directed by the Consultant.
- .4 When close sheeting is required, it shall be so driven as to prevent adjacent soil from entering the trench either below or through such sheeting. The Consultant reserves the right to order the sheeting driven to the full depth of the trench or to such additional depths as may be required for the protection of the Work.
- .5 Trench bracing may be removed when the backfilling has reached the respective level of such bracing. Sheeting shall be removed as the backfilling proceeds. Backfilling of holes left by sheeting below the trench bottom shall be carefully compacted, and thereafter backfilling and withdrawal of sheeting shall proceed together. No voids shall be left in the backfill by the withdrawal of the sheeting.
- .6 When a cage or shield is used in the trench instead of shoring, special care shall be taken to ensure that there is no lateral or longitudinal movement of the pipe when the cage is moved. The cage shall be raised vertically so that the bottom member is clear of the crown of the pipe before the cage is pulled forward in the trench.
- .7 During backfill operation:
 - .1 Unless otherwise indicated or directed by the Consultant, remove sheeting and shoring from excavations.
 - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.

- .3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.
- .8 When sheeting is required to remain in place, cut off tops at elevations as indicated.
- .9 Upon completion of substructure construction:
 - .1 Remove cofferdams, shoring, and bracing.
 - .2 Remove excess materials from site and restore watercourses as indicated and as directed by the Consultant.

7. DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for the Consultant's acceptance details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
 - .1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Gutters and natural drainage channels shall not be obstructed. Satisfactory provisions shall be made for alternate drainage where this is impractical.
- .6 The trench shall be so drained that the workers may work safely and effectively. All water encountered in trenches shall be pumped or bailed out, and in no case shall the pipe be used as a drain for such water. It is essential that the discharge of the trench dewatering pumps be conducted away from the site of the work and into natural drainage channels, drains or storm sewers. Ensure pumped water is free of suspended materials prior to release into native drainage channels, drains or storm sewers.
- .7 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures to approved runoff areas in manner not detrimental to public and private property, or portion of Work completed or under construction.
 - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

8. EXCAVATION

- .1 Advise the Consultant at least seven days in advance of excavation operations for initial cross sections to be taken.
- .2 Excavate to lines, grades, elevations, and dimensions as indicated or as directed by the Consultant.
- .3 Where excavated material will be used as backfill, stockpile material onsite or as directed by the Consultant. If material is surplus to backfill requirements stockpile material as indicated as directed by the Consultant.
- .4 Where excavated material is unsuitable as backfill, stockpile material as indicated or as directed by the Consultant.
- .5 Material that is suspected of contamination shall be stockpiled as directed by the Consultant. The Consultant will test the material to determine the extent of contamination and then direct the Contractor as to method of disposal or reuse.
- .6 Trenching
 - .1 The minimum trench width below the crown of the pipe shall be not less than the nominal diameter of the pipe plus 400 mm. The maximum width of the trench below the crown of the pipe including shoring shall be not more than the nominal diameter of the pipe plus 600 mm or not more than a total width of 900 mm, whichever is the greatest. Where the maximum trench width is exceeded, the Contractor shall, at his own expense, provide special bedding or take other precautions as directed by the Consultant. Where more than one pipe is laid in the same trench, the minimum and maximum widths shall be as directed by the Consultant.
 - .2 The Contractor shall confine his activities to the immediate area of the trench. All activities outside trench boundaries shall be performed so as not to damage other existing features. The Contractor shall generally have the option of using either vertical shored trenches or Vee trenches. Every effort shall be made to restrict the trench widths to minimize the area disturbed.
 - .3 All excavated material shall be piled at least 1.0 m clear of the trench tip to prevent material from falling back into the excavation. The material shall be piled in such a manner that it will not endanger the work, or obstruct other work or rights-of-way, or affect the safety and operation of aircraft. Sufficient clear space must be left on one side of the trench to accommodate the work stakes.
 - .4 The trench shall be excavated so that the pipe can be laid to the alignment, grade and depth required, or the pipe can be removed as required.

- .5 The subgrade shall provide a uniform and continuous support for the pipe and fittings on solid undisturbed ground. Any over excavation by the Contractor below the required grade shall be backfilled at his expense with material acceptable to the Consultant.

- .7 Do not disturb soil within branch spread of trees or shrubs that are to remain.
 - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

- .8 For trench excavation, unless otherwise authorized by the Consultant in writing, do not excavate more than 30 m of trench in advance of installation operations and no trenches shall be left open at the end of day's operation.

- .9 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by the Consultant, and the contents of this specification and requirements of the British Columbia OH&S.

- .10 Restrict vehicle operations directly adjacent to open trenches.

- .11 Dispose of surplus and unsuitable excavated material as indicated or as directed by the Consultant off site.

- .12 Do not obstruct flow of surface drainage or natural watercourses.

- .13 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft, or organic matter.

- .14 Notify the Consultant when bottom of excavation is reached.

- .15 Obtain the Consultant acceptance of completed excavation.

- .16 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by the Consultant.
 - .1 Replace material with suitable material acceptable to the Consultant.

- .17 Correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with Type 2 fill compacted to not less than 100% of corrected Standard Proctor maximum dry density.
 - .2 Unauthorized excavation and replacement with suitable materials shall be at the Contractor's expense.

- .18 Hand trim, make firm, and remove loose material and debris from excavations.
 - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

- .2 Where required for electrical trenches, clean out rock seams and fill with concrete mortar or grout to acceptance of the Consultant.
- .19 Trench Subgrade
 - .1 Trim and remove loose material and debris from excavation prior to installing bedding and pipe.
 - .2 If the Trench subgrade is disturbed, compact foundation soil to density at least equal to undisturbed soil.
- .20 Install geotextiles in accordance with Section 31 32 19.01 - Geotextiles.

9. UTILITY INSTALLATION

- .1 Place and compact bedding materials as specified by the appropriate section.
- .2 Install the required pipe or duct as specified by the corresponding section.
- .3 Place the remaining bedding and surround materials as specified by the Contract Drawings.

10. FILL TYPES AND COMPACTION

- .1 Compact materials specified in this section as follows:
 - .1 Cohesive soils compacted to a minimum of 98% of Standard Proctor Maximum Dry Density (ASTM D698). Cohesionless soils compacted to a minimum of 100% of Standard Proctor Maximum Dry Density (ASTM D698). The type of compaction equipment shall be chosen with regard to minimizing the vibration effect on nearby structures and utilities. The Consultant shall have the right to request the Contractor to replace any equipment causing unacceptable vibrations. The Contractor is responsible for any damage caused due to construction.
 - .2 Place unshrinkable fill in areas as indicated.

11. BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Place and compact granular material for bedding and surround of underground services as indicated and as specified in Section 33 41 00 - Storm Utility Drainage Piping.
- .2 Place bedding and surround material in unfrozen condition.

12. BACKFILLING

- .1 Do not proceed with backfilling operations until completion of following:

- .1 The Consultant has inspected and accepted installations.
- .2 The Consultant has inspected and accepted construction below finish grade.
- .3 Inspection, testing, acceptance, and recording location of underground utilities.
- .4 Removal of concrete formwork.
- .5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .2 Areas to be backfilled to be free from debris, snow, ice, water, and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 200 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
 - .1 Place bedding and surround material as specified elsewhere.
 - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
 - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 0.5 m.
 - .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
 - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and acceptance obtained from the Consultant.
 - .2 If accepted by the Consultant, erect bracing or shoring to counteract unbalance, and leave in place until removal is accepted by the Consultant.
 - .5 Place material by hand under, around, and over installations until 600 mm of cover is provided. Dumping material directly on installation will not be permitted.
- .6 Place unshrinkable fill in areas as indicated.

- .7 Consolidate and level unshrinkable fill with internal vibrators.
- .8 Install drainage filter system in backfill as indicated or as directed by the Consultant.

13. RESTORATION

- .1 Upon completion of Work, remove waste materials and debris in accordance to Contract Documents, trim slopes, and correct defects as directed by the Consultant.
- .2 Replace topsoil as indicated or as directed by the Consultant.
- .3 Reinstate lawns to elevation which existed before excavation.
- .4 Reinstate pavements disturbed by excavation to thickness, structure, and elevation which existed before excavation.
- .5 Clean and reinstate areas affected by Work as directed by the Consultant.
- .6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.
- .7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

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 will be made. Include cost in the line item for paint marking.

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, 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, sand blasting, 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

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 74 11 – Cleaning

1.2 MEASUREMENT PROCEDURES

- .1 Measurement for payment shall be at the tendered unit price per lineal metre. Payment at the tendered unit price shall include full compensation for layout, sawcutting, routing, cleaning (as required with water and compressed air), supply and installation of joint sealant, protection during curing and all other incidentals necessary to complete the work.

1.3 REFERENCES

- .1 ASTM International
 - .1 ASTM D244-[09], Standard Test Methods for Emulsified Asphalt.
 - .2 ASTM D6690-[12], Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
 - .3 ASTM D7116-[05], Standard Specification for Joint Sealant, Hot Applied, Jet-Fuel-Resistant Type for Portland Cement Concrete Pavements.
- .2 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).
 - .2 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.
 - .3 LEED Canada 2009 for Design and Construction-[2010], LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide.
 - .4 LEED Canada for Existing Buildings, Operations and Maintenance-[2009], LEED Canada 2009 Leadership In Energy and Environmental Design Green Building Rating System Reference Guide.
- .3 General Services Administration Federal Specifications (GSA) - Federal Specifications (FS)

- .1 FS-SS-S-200-[E(2)1993], Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for products specified and include product characteristics, performance criteria, physical size, finish, and limitations.
- .3 Tests and Evaluation Reports:
 - .1 Submit manufacturer's test data and certification that sealant materials meet requirements of this Section as soon as possible after award and prior to beginning Work.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect products from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Hot poured sealant: to ASTM D6690.
 - .1 All Hot Pour Joint Sealant to be:
 - .1 MACSEAL 6690-4 MOD (previously BERAM 3060 LM)

2.2 EQUIPMENT

- .1 Heating equipment for melting sealant:

- .1 Insulated double shell, oil jacketed kettle.
- .2 Motor driven agitator.
- .3 Totally automatic temperature control system controlling both heat transfer oil temperature and sealing compound temperature.
- .2 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.
- .3 Small diameter diamond bladed pavement saws.
- .4 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.
- .5 Mixer: in accordance with manufacturer's recommendations.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for pavement sealant application in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Consultant.
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and accepted by Consultant.

3.2 PREPARATION

- .1 Provisional items to be reviewed in field with Consultant for extent of work.
- .2 Refer to Contract Drawings for extents of work.
- .3 Use joint plows or high-pressure water to remove old sealant material from designated cracks/joints.
- .4 Saw/rout cracks/joints to width and depth as specified on Contract Drawings.

- .5 Centre of sawcut/rout to deviate not more than plus or minus 10 mm from centreline of crack.
- .6 Dispose of material removed from cracks off-site.
- .7 Clean and dry sawn/routed cracks/joints using pressurized water and compressed air lance with oil-free hot compressed air, applied at minimum pressure of 600 kPa.
- .8 Where crack extends into base or subgrade, fill crack with clean dry fine sand/crusher dust to within 15 mm of pavement surface.
- .9 Obtain Consultant's acceptance of preparation of cracks/joints before application of sealant.

3.3 APPLICATION OF SEALANT

- .1 Do not use sealant material that has been frozen.
- .2 Ensure cracks are clean and dry immediately before applying sealant.
- .3 Heat joint sealant slowly to application temperature in accordance with manufacturer's recommendations.
- .4 Mix two-component sealant in accordance with manufacturer's recommendations.
- .5 Fill crack with sealant immediately after cleaning. Maintain tip of cone or wand close to bottom of routed groove during filling.
- .6 Fill cracks only when air temperature is above 10 degrees C, daily low temperature does not fall below 5 degrees C, and no rain is forecast.
- .7 Pour sealant in crack so that cured sealant fills crack from bottom up to level 3 mm to 5 mm below pavement surface.
- .8 Keep traffic off newly sealed cracks for 4 hours or as recommended by manufacturer.

3.4 CLEANING

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

END OF SECTION

PART 1 - GENERAL

1. RELATED SECTIONS

- .1 Section 31 05 16 - Aggregate Materials.
- .2 Section 31 22 14 - Airfield Grading.

2. MEASUREMENT PROCEDURES

- .1 Measure granular base course in compacted square meters in place to specified thickness as accepted by Consultant. Payment at the tendered unit price shall be full compensation for the survey, supply, processing, loading, hauling, stockpiling, placing, moisture conditioning, compacting, grading, maintaining, cleanup, and any other work incidental to this section.
- .2 No payment shall be made for overbuild of granular base course beyond neat lines shown on the drawings.
- .3 Measure water and compact existing granular base in compacted square meters. Payment at the tendered unit price shall be full compensation for the survey, moisture conditioning, compacting, grading, maintaining, cleanup, and any other work incidental to this section.

3. REFERENCES

- .1 As set out in Section 31 05 16 - Aggregate Materials.

4. DELIVERY, STORAGE, AND HANDLING

- .1 Deliver and stockpile aggregates in accordance with Section 31 05 16 - Aggregate Materials. Stockpile sufficient aggregate required prior to beginning operation.

PART 2 - PRODUCTS

1. MATERIALS

- .1 Granular base: material in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
 - .1 19 mm Crushed Gravel.
 - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2, CAN.

PART 3 - EXECUTION

1. SEQUENCE OF OPERATION

- .1 Place granular base after granular sub-base or subgrade surface is inspected and accepted by the Consultant.
- .2 Placing
 - .1 Scarify existing granular shoulder materials as required to ensure compaction of new granular material will meet compaction requirements.
 - .2 Construct granular base to depth and grade in areas indicated.
 - .3 No frozen material is permitted to be placed.
 - .4 Place material only on clean unfrozen surface, free from snow and ice.
 - .5 Have sufficient graders, water trucks, and rollers on site to meet the specified spreading and compaction requirements for the amount of material hauled in each shift.
 - .6 Organize equipment such that the material hauled in one day is spread and compacted that day.
 - .7 Do not leave windrows unspread overnight.
 - .8 Do not commence spreading and compacting crushed material until the hauled material is bladed into a uniform continuous windrow.
 - .9 Begin spreading base material on crown line or on high side of one-way slope.
 - .10 Place material using methods which do not lead to segregation or degradation of aggregate.
 - .11 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Consultant may accept thicker lifts (layers) if specified compaction can be achieved.
 - .12 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
 - .13 Remove and replace or remix that portion of layer in which material becomes segregated during spreading as directed by the Consultant.
 - .14 Segregation of aggregates shall be avoided and the material as spread shall be free from pockets of large or fine material. Segregated materials shall be remixed until uniform.

- .3 Compacting
 - .1 Compact to density not less than 100% Modified Proctor Maximum Dry Density in accordance with ASTM D1557.
 - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
 - .3 Apply water as necessary during compacting to obtain specified density.
 - .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers accepted by Consultant.
 - .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
 - .6 The moisture content shall be maintained at the optimum moisture content as defined by ASTM D1557 until the next layer is placed.

2. PROOF ROLLING

- .1 For proof rolling use a legally loaded dual axle truck with an effective single axle load of 18,000 lbs (or 80 kN).
- .2 Obtain acceptance from the Consultant to use non-standard proof rolling equipment.
- .3 Proof roll at level in Granular Base Course as indicated. If non-standard proof rolling equipment is accepted, Consultant to determine level of proof rolling.
- .4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.
- .5 Where proof rolling reveals areas of defective aggregate base:
 - .1 Remove base, sub-base and subgrade material to depth and extent as directed by Consultant.
 - .2 Backfill excavated subgrade with acceptable common material and compact.
 - .3 Replace sub-base material and compact as per Section 32 11 16.01 – Granular Sub-Base.
 - .4 Replace base material and compact in accordance with this Section.
- .6 Where proof rolling reveals defective base or sub-base, remove defective materials to depth and extent as directed by Consultant and replace with new materials in accordance with this section and as directed by Consultant.

- .7 Supply and install geotextile and/or geogrid reinforcement as directed by the Consultant.

3. SITE TOLERANCES

- .1 Finished granular base surface to be within ± 10 mm of established grade and cross section but not uniformly high or low.
- .2 Finished granular base shoulder surface to be flush with new / existing asphalt surface.
- .3 Correct surface irregularities greater than ± 10 mm by adding or removing material until surface is within specified tolerances.
- .4 Provide confirmation to Consultant that design grades have been achieved by survey and other field checks as acceptable to the Consultant.

4. PROTECTION

- .1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Consultant.
- .2 Acceptance of finished Granular Base Course by the Consultant does not relieve the Contractor of his responsibility to provide a finished Granular Base Course meeting the requirements of this Section until succeeding material is applied.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

- .1 This section specifies the requirements for the supply and application of asphalt tack coat as indicated by the Contract Documents or as directed by the Consultant.

2. SECTION INCLUDES

- .1 Materials and application of asphalt tack coat to an existing asphalt or concrete surface prior to asphalt paving.

3. RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 32 12 16 - Asphalt Paving.

4. MEASUREMENT PROCEDURES

- .1 Asphalt tack coat shall be measured in square metres of plan area of surface treated per asphalt lift including vertical edges as specified and accepted by the Consultant. No payment will be made for overlap of tack.
- .2 Payment at the tendered unit price shall be full compensation for supply, heating, and placing asphalt tack coat and all work incidental to this section.
- .3 No additional payment for reapplication of asphalt tack coat that fails to cure.

5. 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 D140, Standard Practice for Sampling Bituminous Materials.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-16.2, Emulsified Asphalts, Anionic Type, for Road Purposes.

6. SUBMITTALS

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Sample asphalt tack coat material to ASTM D140.

- .3 Provide access on tank truck for Consultant to sample asphalt material to be incorporated into Work, in accordance with ASTM D140.
- .4 Provide one 4 litre sample of asphalt emulsion per 5,000 litres of asphalt emulsion delivered, if requested by Consultant.

7. QUALITY ASSURANCE

- .1 Upon request by the Consultant, submit manufacturer's test data and certification that asphalt tack coat material meets requirements of this section.

8. DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store, and handle materials in accordance with ASTM D140.
- .2 Provide, maintain, and restore asphalt storage area.

9. WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with governing agencies.
- .2 Divert unused asphalt from landfill to facility capable of recycling materials.

PART 2 - PRODUCTS

1. MATERIALS

- .1 Anionic emulsified asphalt: to CAN/CGSB-16.2, grade: SS-1.
- .2 Water: clean, potable, free from foreign matter.

2. EQUIPMENT

- .1 Pressure distributor to be:
 - .1 Designed, equipped, maintained, and operated so that asphalt material can be:
 - .1 Maintained at even temperature.
 - .2 Applied uniformly on variable widths of surface up to 5 m.
 - .3 Applied at readily determined and controlled rates from 0.2 to 0.5 L/m² with uniform pressure, and with an allowable variation from any specified rate not exceeding 0.1 L/m².
 - .4 Distributed in uniform spray without atomization at temperature required.

- .2 Equipped with meter, registering metres of travel per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.
- .3 Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.
- .4 Equipped with an easily read, accurate and sensitive device which registers temperature of liquid in reservoir.
- .5 Equipped with accurate volume measuring device or calibrated tank.
- .6 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.
- .7 Equipped with nozzle spray bar, with operational height adjustment.
- .8 Cleaned if previously used with incompatible asphalt material.

PART 3 - EXECUTION

1. APPLICATION

- .1 Obtain the Consultant's acceptance of surface before applying asphalt tack coat.
- .2 Apply asphalt tack coat only on clean and dry surface.**
- .3 Dilute asphalt emulsion with water at 1:1 ratio for application. Mix thoroughly by pumping or other method accepted by the Consultant.
- .4 Apply asphalt tack coat evenly to pavement surface at rate as directed by the Consultant, between 0.2 and 0.5 L/m² but not to exceed 0.6 L/m².
- .5 Paint contact surfaces of curbs, gutters, headers, manholes, and like structures with thin, uniform coat of asphalt tack coat material.
- .6 Do not apply asphalt tack coat when air temperature is less than 10°C or when rain is forecast within two hours of application.
- .7 Apply asphalt tack coat only to surfaces that are expected to be overlaid on same day.
- .8 Apply asphalt tack coat only on unfrozen surface.
- .9 Evenly distribute localized excessive deposits of tack coat by brooming as directed by the Consultant.

- .10 Where traffic is to be maintained, treat no more than one half of width of surface in one application.
- .11 Keep traffic off tacked areas until asphalt tack coat has set.
- .12 Re-tack contaminated or disturbed areas as directed by the Consultant.
- .13 Permit asphalt tack coat to set before placing asphalt pavement.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

- .1 This section specifies the requirements for producing and placing hot mix asphalt concrete to the lines, grades and dimensions shown in the Contract Documents or as directed by the Consultant.

2. SECTION INCLUDES

- .1 Materials and installation for asphalt concrete paving for airport runways, taxiways, apron, and roads.

3. RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 31 05 16 – Aggregate Materials.
- .3 Section 32 12 13.16 – Asphalt Tack Coats.
- .4 Section 32 01 11.01 - Pavement Cleaning and Marking Removal

4. MEASUREMENT PROCEDURES

- .1 Surface Course Hot Mix Asphalt Concrete Paving shall be measured in square metres of hot mix asphalt concrete at the compacted thickness shown on the drawings, based on final surface measured by Contractor's survey and accepted by the Consultant.
- .2 Base Course Hot Mix Asphalt Concrete Paving shall be measured in cubic metres of hot mix asphalt concrete, based on cubic metre volume measured by Contractor's survey and accepted by the Consultant.
- .3 No payment shall be made for overbuild of Hot Mix Asphalt Concrete Paving beyond neat lines shown on the drawings.
- .4 Hot Mix Asphalt Concrete Paving for temporary ramps, lap joints, and any construction joints will not be paid for in this item and are considered incidental to paving. Include costs in appropriate items of work.
- .5 Payment at the tendered unit price for Hot Mix Asphalt Concrete Paving shall be full compensation for the mix design, production and supply of aggregates, supply of polymer modified Performance Graded Asphalt Binder (PGAB), supply and incorporation of anti-stripping agent into the mix as required by mix design, production and transportation of hot mix asphaltic concrete mix, preparation of the surface to be paved including tack on vertical surfaces, saw cutting required for staggered paving areas, placement and compaction of the mixture, finishing,

quality control plan and testing, supply of Marshall samples and cores for quality assurance, cleanup, survey quantification by Contractor, and all other work, equipment and materials incidental to complete the work as specified.

5. 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 Association of State Highway and Transportation Officials (AASHTO)
 - .1 AASHTO M320, Standard Specification for Performance Graded Asphalt Binder.
 - .2 AASHTO R29, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.
 - .3 AASHTO T245, Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.
 - .4 AASHTO T283, Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage.
- .3 Asphalt Institute (AI)
 - .1 AI MS2, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.
- .4 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C117, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C127, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
 - .3 ASTM C128, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
 - .4 ASTM C131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .5 ASTM C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .6 ASTM C1252, Standard Method for Un-compacted Void Content.

- .7 ASTM C207, Standard Specification for Hydrated Lime for Masonry Purposes.
- .8 ASTM D995, Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
- .9 ASTM D2419, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- .10 ASTM D2041, Test Method for Theoretical Maximum Specific Gravity of Bituminous Paving Mixtures.
- .11 ASTM D2726, Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens.
- .12 ASTM D3203, Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
- .13 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- .14 ASTM D6927, Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures.
- .15 ASTM D 6928 Standard Test Method for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.
- .16 ASTM D7428 Standard Test Method for Resistance of Fine Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.
- .5 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.2, Sieves Testing, Woven Wire, Metric.
 - .2 CAN/CGSB-16.3, Asphalt Cements for Road Purposes.

6. PRODUCT DATA

- .1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit asphalt concrete mix design and trial mix test results reviewed and signed by a BC Registered Professional Engineer to the Consultant for review at least two (2) weeks prior to beginning Work. Prove optimum asphalt cement content with a minimum of five (5) points of curves relating asphalt cement content to density, stability, air voids, flow, voids in mineral aggregate (VMA), and voids filled with asphalt (VFA) versus asphalt cement content (% by weight of total mix).

7. SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit the following to the Consultant at least two (2) weeks prior to commencing paving operations.
 - .1 Mix Design
 - .1 Mix Design by Marshall method, as outlined in the latest edition of the Asphalt Institute Manual (MS-2), including all laboratory testing results. Mix formulas only are not acceptable. A qualified and independent testing laboratory engaged by the Contractor shall be employed to prepare a mix design and job mix formulae.
 - .2 Asphalt Cement
 - .1 Viscosity – temperature chart for asphalt cement to be supplied showing Kinematic Viscosity in centistokes (mm²/s), temperature range 105 to 175°C.
 - .2 Proposed source of asphalt cement and manufacturers test data.
 - .3 Submit one (1) – 1 L containers of asphalt cement, if requested by the Consultant.
 - .3 Aggregates
 - .1 Proposed source of aggregates.
 - .2 Submit 10 kg samples of coarse and fine aggregates, if requested by the Consultant.
 - .3 Submit aggregate processing Quality Control test results.
 - .4 Plant Scale Certificate
 - .1 Submit a copy of the plant scale certificate(s).
 - .5 During paving operations submit the following samples as specified.
 - .1 Asphalt cement: One (1) – 1 litre container of asphalt cement per 2000 tonnes of asphalt placed, if requested by the Consultant.
 - .2 The Manufacture's test data and certification that the asphalt cement meets the requirements of this specification.
 - .3 Printed temperature record of asphalt mix produced on a daily basis.

- .4 Scale tickets recording mass of asphalt delivered and incorporated into the work on a daily basis.

8. PAVING PLAN

- .1 The Contractor shall submit a paving plan at least two weeks prior to commencing paving operations.
- .2 This plan shall detail:
 - .1 Proposed paving equipment.
 - .2 Outline planned equipment access and egress routes for each specified work areas.
 - .3 A plan illustrating the sequence of pavement lane construction including mat width, mat edge offset, locations of transverse joints, joint construction and other information requested by the Consultant.
 - .4 Contingency plans to deal with the interruption in asphalt concrete supply, breakdown in equipment and inclement weather during paving operations.
 - .5 Modifications to the production and paving operation to accommodate production rates lower than the recommended minimum contained in this specification.
- .3 Acceptance of the plan by the Consultant will not relieve the Contractor of any responsibility in attaining a defect free product.

9. QUALITY CONTROL PLAN

- .1 Quality Control (QC) and all QC testing is the responsibility of the Contractor.
- .2 QC is defined as the sum total of activities performed by the HMAC producer and/or the Contractor to make sure that the HMAC product meets specification requirements. This includes materials handling and construction procedures, calibration and maintenance of equipment, production process control and any sampling, testing, and inspection that is done for these purposes.
- .3 The Contractor's QC Plan shall contain appropriate information regarding the sampling and testing that will be performed by the Contractor's personnel. The sampling and testing plan should contain testing information which will be used by the Contractor to maintain control of the production and placement of the asphalt concrete and to ensure a product that complies with the specifications.

- .4 The Contractor's QC Plan shall contain a detailed testing plan outlining the characteristic or quality to be inspected, the test method to be used, the frequency, the sampling location, and designation of responsibility. Every quality shall define the tolerances that are allowed or specified. A sample of a "Quality Control Sampling and Testing Plan" is included in Part 2, Section 4 – Sampling and Testing.
- .5 Quality Control reports shall be submitted daily to the Consultant.

10. DELIVERY, STORAGE AND HANDLING

- .1 Deliver and stockpile aggregates in accordance with Section 31 05 16 – Aggregate Materials. Stockpile minimum 100% of total amount of aggregate required before beginning asphalt mixing operation.
- .2 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.
- .3 Stockpile fine aggregate separately from coarse aggregate, although separate stockpiles for more than two mix components are permitted.
- .4 Provide approved storage, heating tanks and pumping facilities for asphalt cement.

PART 2 - PRODUCTS

1. MATERIALS

- .1 Asphalt cement: to AASHTO M320 – PG 64-34.
- .2 Aggregates:
 - .1 Materials
 - .1 Aggregate shall satisfy all requirements of Tables 1 and 2 of this specification and unless otherwise specified shall be:
 - .1 Crushed rock composed of hard, uncoated, cubical fragments, produced from rock formations or boulders of uniform quality;
 - Or
 - .2 Crushed gravel composed of hard, durable, uncoated particles, produced from naturally formed deposits.
 - .2 Fine aggregates shall consist of natural sand and/or manufactured material derived from crushing stone, or gravel. All particles shall be clean, durable, moderately

sharp and free from coatings of clay, silt or other deleterious materials and shall contain no organic matter.

.3 Natural sand and/or blend sand shall be limited to 15% maximum of the aggregate blend.

.2 Physical Requirements

.1 Physical requirements of aggregates shall be within limits shown on Table 2.

.2 Do not use aggregates having known polishing characteristics in mixtures for surface courses.

.3 Irrespective of compliance with the physical requirements, aggregates may be accepted or rejected based on past field performance.

.3 Gradation

.1 Gradation of aggregates blended to job mix formula to be within the limits shown in Table 1 when tested to ASTM C117 and ASTM C136 and giving smooth curve without sharp breaks when plotted on semi-log grading chart.

.2 Coarse aggregate is aggregate retained on 5 mm sieve and fine aggregate is aggregate passing 5 mm sieve.

.3 Process aggregate and stockpile fine aggregate separately from coarse aggregate.

.4 Mineral Filler

.1 Finely ground particles of limestone, hydrated lime, Portland cement or other approved non-plastic mineral matter, thoroughly dry and free from lumps.

.2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed to improve mix properties.

.3 Mineral filler to be dry and free flowing when added to aggregate.

.5 Blend Sand

Shall be a blend of the following:

.1 Screenings produced in crushing of quarried rock, boulders or gravel.

- .2 Add blend sand when necessary to meet job mix aggregate gradation or as directed, to improve mix properties.
- .3 Blend sand to be sufficiently dry to be free flowing when added to aggregate.

Table 1 Percent Passing Designated Sieve		
Sieve Size (mm)	New Limits	
Imperial	Base	Surface
19	100	
16	80-95	100
12.5	67-85	82-95
9.5	58-78	70-85
4.75	40-60	50-65
2.36	27-47	35-50
1.18	18-37	23-40
0.600	12-30	15-30
0.300	8-23	10-23
0.150	5-15	6-16
0.075	3-8	3-8

Table 2 Physical Tests for Hot Mix Aggregate			
Physical Test	Fine Aggregate	Coarse Aggregate	Notes
Los Angeles Abrasion ASTM C131 Gradation "B" Max % Loss	----	25	
Percent Crushed Minimum * (Minimum 2 fractured faces)	----	80	For Surface Course
	----	70	For Base Course
Sand Equivalent ASTM D2419 Minimum	50	----	
Micro Deval ASTM D7428, % Loss	18	16	
Absorption ASTM C127 Max % by Mass	----	1.75	
Loss by Washing ASTM C117 Max % Passing Sieve	----	1.5	For Surface Course Only
	----	2.0	For Base Course Only
Flat & Elongated Particles Ratio greater than 5:1 Max % by Mass	----	15	
Fine Aggregate Angularity (Uncompacted Void Content), Min. %	45	----	For Surface Course Only
Liquid Limit ASTM D4318 (maximum)	25	----	
Plasticity Index ASTM D4318 (maximum)	0	----	

* The percent of crushed material will be determined by examining the fraction retained on the 5 mm sieve and dividing the mass of the crushed particles by the total mass retained on the 5 mm sieve.

2. EQUIPMENT

- .1 Pavers: automatic grade-controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated. Provide two pavers for echelon paving.
- .2 Rollers: sufficient number, minimum of three per paver of type and weight to obtain specified density of compacted mix.
- .3 Vibratory rollers:
 - .1 Minimum drum diameter: 1200 mm.
- .4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
 - .1 Boxes with tight metal bottoms.
 - .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
 - .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
 - .4 Use only trucks which can be weighed in single operation on scales supplied.
- .5 Hand tools:
 - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
 - .2 Tamping irons having mass not less than 12 kg and bearing area not exceeding 310 cm² for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by the Consultant, may be used instead of tamping irons.
 - .3 Straight edges, 4.5 m in length, to test finished surface.

3. MIX DESIGN

- .1 Mix design to be provided by contractor and approved by the Consultant.
- .2 Mix design to be developed by testing laboratory approved by the Consultant.
- .3 Design of mix by Marshall Method as outlined in the latest edition of the Asphalt Institute Manual (MS-2), to the following requirements.
 - .1 Compaction blows on each face of test specimens: 50.
 - .2 Mix physical requirements.

Marshall Method Mix Criteria	Base Course	Surface Course
Stability ASTM D6927 (kN @ 60°C) Minimum	8	10
Flow ASTM D6927 (mm)	2 – 4	2 – 4
Air Voids ASTM D3203 (%)	4.0 - 4.5	3.5 – 4.0
Voids in Mineral Aggregates (% , Minimum)	13	14
Voids Filled with Asphalt (%)	65 - 78	65 – 78
Tensile Strength Ratio (% , Minimum) AASHTO T283	70	75

.3 Notes:

- .1 Percent voids in mineral aggregate to be calculated on the basis of the ASTM bulk specific gravity for the aggregate.
 - .2 The portion of asphalt cement lost by absorption into the aggregate particles must be allowed for when calculating percent air voids.
 - .3 For AASHTO T 283, include the freeze cycle.
- .4 Do not change job mix without prior acceptance of the Consultant. When change in material source proposed, new job-mix formula to be accepted by the Consultant.

4. 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. Quality Assurance testing shall be done by the Consultant. Quality Control testing shall be done by the Contractor.

.2 Quality Control Testing

- .1 The Contractor shall use Professional Engineering Services and a qualified testing laboratory, licensed to practice in the Province, for Quality Control testing. The Contractor shall provide and maintain equipment and qualified personnel to perform all field testing necessary to determine and monitor the characteristics of the materials produced and incorporated into the work. The Contractor shall bear the cost of all Quality Control sampling and testing services.
- .2 The frequencies of Quality Control testing are to be indicated on a Quality Control Sampling and Testing Plan. Results of all Quality Control tests shall be made available to the Consultant at any time, and two (2) copies of the tests shall be given to the Consultant at the end of each day.
- .3 The following is a sample of a blank “Quality Control Sampling and Testing Plan” for production and placement of asphalt concrete pavement.

- SAMPLE -					
QUALITY CONTROL SAMPLING AND TESTING PLAN					
Characteristic	Test Method	Frequency	Sample Location	Responsibility	Tolerance
Asphalt Content					
Aggregate Gradation					
Relative Compaction					
Asphalt Temperature					
Mix Temperature					
Mix Moisture					

.3 Quality Assurance Testing

- .1 Quality Assurance testing for compliance with the specifications will be carried out by the testing agency designated by the Consultant.

PART 3 - EXECUTION

1. PLANT AND MIXING REQUIREMENTS

- .1 Batch and continuous mixing plants:
 - .1 To ASTM D995.
 - .2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders. Do not load frozen materials into bins.
 - .3 Feed cold aggregates to plant in proportions to ensure continuous operations.
 - .4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.
 - .5 Before mixing, dry aggregates to moisture content not greater than 0.5% by mass or to lesser moisture content if required to meet mix design requirements.
 - .6 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.
 - .7 Store hot screened aggregates in manner to minimize segregation and temperature loss.
 - .8 Heat asphalt cement and aggregate to mixing temperature directed by Consultant. Do not heat asphalt cement above 160°C, maximum temperature indicated on temperature-viscosity chart.
 - .9 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used, the Consultant to approve temperature of completed mix at plant and at paver after considering hauling and placing conditions.
 - .10 Maintain temperature of materials within 5°C of specified mix temperature during mixing.
 - .11 Mixing time:
 - .1 In batch plants, both dry and wet mixing times for not less than 10 seconds. Continue wet mixing as long as necessary to obtain thoroughly blended mix but not less than 30 s or more than 75 s.
 - .2 In continuous mixing plants, mixing time as directed by the Consultant but not less than 45 s.
 - .3 Do not alter mixing time unless directed by the Consultant.

- .2 Dryer drum mixing plant:
 - .1 To ASTM D995.
 - .2 Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.
 - .3 Feed aggregates to burner end of dryer drum by means of multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.
 - .4 Meter total flow of aggregate by an electronic weigh belt system with indicator that can be monitored by plant operator and which is interlocked with asphalt pump so that proportions of aggregate and asphalt entering mixer remain constant.
 - .5 Provide for easy calibration of weighing systems for aggregates without having material enter mixer.
 - .6 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved. Calibrate weigh bridge on charging conveyor by weighing amount of aggregate passing over weigh bridge in set amount of time. Difference between this value and amount shown by plant computer system to differ by not more than plus or minus 2%.
 - .7 Make provision for conveniently sampling full flow of materials from cold feed.
 - .8 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate from cold feed prior to entering drum.
 - .9 Provide system interlock stop on feed components if either asphalt or aggregate from bin stops flowing.
 - .10 Accomplish heating and mixing of asphalt mix in approved parallel flow dryer-mixer in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream. Control heating to prevent fracture of aggregate or excessive oxidation of asphalt. Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with printing recorder that can be monitored by plant operator. Submit printed record of mix temperatures at end of each day to the Consultant.
 - .11 Mixing period and temperature to produce uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer to be less than 1%.
- .3 Temporary storage of hot mix:

- .1 Provide mix storage of sufficient capacity to permit continuous operation and designed to prevent segregation.
- .2 Do not store asphalt mix in storage bins in excess of 3 hours.
- .4 While producing asphalt mix for this Project, do not produce mix for other users unless separate storage and pumping facilities are provided for materials supplied to this project.
- .5 Mixing tolerances:
 - .1 Permissible variation in aggregate gradation from job mix (percent of total mass):

Sieve Designation Imperial (mm)	% Passing by Mass	
	Individual Sample	Average of Last 5 Samples
	± 5.0	± 3.0
4.75	± 5.0	± 3.0
2.36	± 4.0	± 2.5
0.60	± 3.0	± 2.0
0.300	± 3.0	± 2.0
0.150	± 2.0	± 1.5
0.075	± 1.5	± 1.0

- .2 Asphalt Content Tolerance: Allowable variation from accepted design asphalt content shall be ± 0.3 % by mass of mix.
- .3 Air Void Content Tolerance: Allowable variation from accepted design air void content shall be ± 1.0 %.
- .4 Mixing Temperature Tolerance: Allowable variation from design mixing temperature shall be ± 5°C.
- .6 Addition of anti-stripping agent:
 - .1 If required, only liquid anti-strip additive accepted by the Consultant will be allowed.

2. PREPARATION

- .1 When paving over existing asphalt surface, clean pavement surface. When levelling course is not required, patch and correct depressions and other irregularities to approval of the Consultant before beginning paving operations.

- .2 Apply prime coat and tack coat in accordance with Section 32 12 13.23 – Asphalt Prime and Section 32 12 13.16 – Asphalt Tack Coat prior to paving.
- .3 Prior to laying mix, clean surfaces of loose and foreign material.

3. TRANSPORTATION OF MIX

- .1 Transport mix to job site in vehicles cleaned of foreign material.
- .2 Paint or spray truck beds with limewater, soap or detergent solution, or non-petroleum based commercial product, at least daily or as required. Elevate truck bed and thoroughly drain. No excess solution to remain in truck bed.
- .3 Schedule delivery of material for placing in daylight, unless the Consultant approves artificial lighting for paving.
- .4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation. Do not dribble mix into trucks.
- .5 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.
- .6 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within range as directed by Consultant, but not less than 135°C.

4. TEST STRIP

- .1 Construct and test strip to approval of the Consultant.
- .2 For airfield pavement, construct test strip in non-critical area to resolve anticipated problems with equipment, mix behaviour or compaction, prior to starting paving operation.
- .3 Establish optimum rolling pattern by taking nuclear densometer readings and observations to:
 - .1 Determine sequence and number of passes.
 - .2 Determine correct operating characteristics of vibratory rollers.
 - .3 Determine maximum density of asphalt mix.
 - .4 Ensure smooth surface finish.
 - .5 Establish actual density achieved by coring in order to determine if additional or other rolling equipment is required to achieve density of not less than 94% of density obtained with specimens prepared from samples of mix being used.

5. PLACING

- .1 Obtain the Consultant's approval of existing surface and tack coat or prime coat prior to placing asphalt.
- .2 Place asphalt concrete to thicknesses, grades and lines as specified on Contract Drawings or as directed by the Consultant.
- .3 Placing conditions:
 - .1 Place asphalt mixtures only when air temperature is above 5°C.
 - .2 When temperature of surface on which material is to be placed falls below 10°C, provide extra rollers as necessary to obtain required compaction before cooling.
 - .3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.
- .4 Place individual strips no longer than 500 m.
- .5 On airport runways, taxiways, aprons, and parking lots commence spreading at high side of pavement or at crown and span crowned centerlines with initial strip.
- .6 Place surface course using a minimum of two pavers in echelon. Alternatively submit, to the Consultant for approval, alternate method(s) of placing asphalt concrete paving.
- .7 Spread and strike off mixture with self-propelled mechanical finisher.
 - .1 Construct longitudinal joints and edges true to line markings. The Contractor will establish lines for paver to follow parallel to centerline of proposed pavement. Position and operate paver to follow established line closely.
 - .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case permit them to be more than 30 m apart.
 - .3 Maintain constant head of mix in auger chamber of paver during placing.
 - .4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
 - .5 Correct irregularities in alignment left by paver by trimming directly behind machine.

- .6 Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.
- .7 Do not throw surplus material on freshly screeded surfaces.
- .8 Do not re-use runoff/over build asphalt in the hopper
- .9 Do not allow asphalt delivery trucks to clean on the prepared surface. Direct the trucks to clean excess material in designated area outside paving limits.
- .10 When the paver hopper is almost empty, during the paving operation, do not fold the wings to incorporate residual asphalt into the mat
- .11 Ensure the surface in front of the paver is clean of any deleterious material including accumulation of asphalt that would be deemed detrimental to placement of specified full thickness of the mat.
- .8 When hand spreading is used:
 - .1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.
 - .2 Distribute material uniformly. Do not broadcast material.
 - .3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. Reject material that has formed into lumps and does not break down readily.
 - .4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
 - .5 Provide heating equipment to keep hand tools free from asphalt. Control temperature to avoid burning material. Do not use tools at higher temperature than temperature of mix being placed.

6. COMPACTING

- .1 Compact HMAC to a density not less than 94% of the maximum theoretical density to ASTM D 2041.

7. JOINTS

- .1 General:

- .1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.
- .2 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.
- .3 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.
- .2 Transverse joints:
 - .1 Offset transverse joint in succeeding lifts by at least 3 m.
 - .2 Sawcut back to full depth vertical face, clean all slurry and tack face with thin coat of hot asphalt tack prior to continuing paving.
 - .3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.
- .3 Longitudinal joints:
 - .1 Offset longitudinal joints in succeeding lifts by at least 150 mm.
 - .2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100°C prior to paving of adjacent lane.
 - .1 If cold joint cannot be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, clean to provide sludge-free edge and tack face with thin coat of hot asphalt tack of adjacent lane.
 - .3 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.
 - .4 Overlap previously laid strip with spreader by 50 mm.
- .4 Construct lap joints as indicated.

8. FINISH TOLERANCES

- .1 Finished asphalt surface to be within ± 5 mm of design elevation but not uniformly high or low.
- .2 Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5 m straight edge placed in any direction.
- .3 Finish asphalt surface to provide positive drainage without ponding water.

9. DEFECTIVE WORK

- .1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.
- .2 Repair areas showing checking, rippling, or segregation. All repair methods to be submitted to the Consultant for acceptance.
- .3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.
- .4 Asphalt pavement not meeting the specified compaction, thickness or finish tolerances shall be subject to removal and replacement, at the Contractor's expense, as directed by the Consultant.
- .5 Skin patches, or other thin layer repairs or surface treatments, including sanding, are not acceptable repair methods for final asphalt surfaces.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

- .1 The provisions of this specification supplement the British Columbia Ministry of Transportation and Infrastructure, 2020 Standard Specifications for Highway Construction, Section 502 – Asphalt Pavement Construction (EPS), Section 514 - Hot In-Place Recycle, Section 515 - Hot In-Place Recycled Asphalt Pavement Construction (EPS) and Section 952 - Contractor Supply Asphalt and Paving Materials for Highway Use.
- .2 Where the provisions of this supplement specification are in conflict with the British Columbia Ministry of Transportation and Infrastructure Specifications, the provisions of this supplement specification take precedence.
- .3 Measurements and payment provisions set out in the British Columbia Ministry of Transportation and Infrastructure Specifications are superseded by Section 3 – Measurement for Payment below.
- .4 Preparations and submissions of asphalt mix designs for review by the Consultant is the responsibility of the Contractor. All costs incurred in mix design formulation are the responsibility of the Contractor. The Contractor shall utilize a qualified registered member of the Engineers and Geoscientists of British Columbia or a qualified, registered member of the Applied Science Technologists and Technicians of British Columbia who shall sign off the asphalt mix designs. The Contractor shall also use a testing laboratory, meeting the approval of the Consultant, to assess the aggregate material proposed for use and to carry out the asphalt mix designs.
- .5 Consultant's HIPR Considerations is being made available as a reference document during the tender period. The Consultant's coring program laboratory test data will be made available to the successful contractor at time of award.

2. RELATED SECTIONS

- .1 Section 01 21 00 – Allowances
- .2 Section 32 12 16 – Hot Mix Asphalt Concrete Paving

3. MEASUREMENT FOR PAYMENT

- .1 Hot-In-Place Recycle (HIPR) shall be at the unit price bid and will be measured in square metres of asphalt surface recycled to a depth as shown on the drawings and accepted by the Consultant.
- .2 Unit prices for HIPR of existing pavements shall include all costs associated with HIPR including incorporating new Hot Mix Asphalt Concrete Admix at the addition rate of 20% to permit the addition of the optimum quantity rejuvenating

agent while maintaining the air void content of the total placed mix of between 2 – 4%, loading, cleaning, sweeping, hauling, placing, grade control, compacting and all incidental work as required. The measurement for payment will include the plan surface area rehabilitated as accepted by the Consultant with no extra payment for overlap areas.

- .3 Hot Mix Asphalt Concrete for HIPR Admix shall be at the unit price bid and will be measured in tonnes of asphalt concrete admix actually incorporated into the work, based on accepted weigh tickets submitted as the asphalt concrete admix is delivered to the paving site.
 - .1 No payment shall be made for overbuild of Hot Mix Asphalt Concrete Paving beyond neat lines shown on the drawings.
 - .2 Payment at the tendered unit price for Hot Mix Asphalt Concrete HIPR Admix shall be full compensation for the mix design, production and supply of aggregates, supply of Asphalt Binder and anti-stripping additive (if required), production and transportation of hot mix asphaltic concrete admix, incorporating into the HIPR process, and all other work, equipment, and materials incidental to complete the work as specified.
- .4 The rejuvenating agent will be supplied by the Contractor and measured and paid for under Section 01 21 00 - Allowances.

4. REFERENCES

- .1 British Columbia Ministry of Transportation and Infrastructure, 2020 Standard Specifications for Highway Construction, Section 502 – Asphalt Pavement Construction (EPS).
- .2 British Columbia Ministry of Transportation and Infrastructure, 2020 Standard Specifications for Highway Construction, Section 515 - Hot In-Place Recycled Asphalt Pavement Construction (EPS).
- .3 British Columbia Ministry of Transportation and Infrastructure, 2020 Standard Specifications for Highway Construction, Section 952 - Contractor Supply Asphalt and Paving Materials for Highway Use.
- .4 The terms 'Ministry' and 'Ministry Representative', when referenced in the British Columbia Ministry of Transportation and Infrastructure, 2020 Standard Specifications, shall refer to the 'City of Quesnel' and a 'City of Quesnel designated representative'.
- .5 The Contractor shall disregard the following parts from the British Columbia Ministry of Transportation and Infrastructure, 2020 Standard Specifications for Highway Construction, Section 515 - Hot In-Place Recycled Asphalt Pavement Construction (EPS):

- .1 515.32 - Ministry Purchase of Surplus Aggregate in Stockpile
- .2 515.12 - Smoothness
- .3 515.23.02 - Smoothness

END OF SECTION

PART 1 - GENERAL

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.

2. RELATED WORK

- .1 Section 32 01 11.01 - Pavement Cleaning and Markings Removal.

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.

4. SAMPLES

- .1 Submit certified test reports in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples are not required.

5. MEASUREMENT FOR PAYMENT

- .1 Temporary and permanent pavement markings will be measured as one lump sum including survey layout, supply, installation of two coats of paint at intervals accepted by the Consultant for permanent paint markings, one coat of paint for temporary paint markings, protection, and clean-up.

PART 2 - PRODUCTS

1. MATERIALS

- .1 Paint (Permanent):
 - .1 Low VOC **alkyd** traffic paint (VOC's of 150 g/l or less).
 - .2 Use low temperature traffic paint between temperatures greater than 0°C and lower than 10°C.

- .3 Use normal 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 Temporary paint shall be compatible with permanent paint.
- .3 Colour as indicated.
- .4 Methods of Testing Paints and Pigments to CAN/CGSB 1-GP-71.
- .5 Glass beads:
 - .1 Overlay type: to CGSB1-GP-74M.
 - .2 Glass beads are required for all Runway Hold Position markings only.

NOTE: The Contractor shall furnish certified test reports for the materials shipped to the project. The report shall not be interpreted as a basis for final acceptance. The Contractor shall notify the Consultant upon arrival of a shipment of paint to the work site. All emptied containers shall be returned to a paint storage area for checking by the Consultant. The containers shall not be removed from the airport or destroyed until authorized by the Consultant. The Contractor shall be responsible for disposing the containers off airport property in accordance with all applicable laws and regulations.

PART 3 - EXECUTION

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.

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. Method of paint removal / eradication must be approved by the Consultant.

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 for painting letters and numbers.
- .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/m² per single coat of paint.
- .6 Apply second coat of paint, after the first coat has dried or after a minimum of one hour.
- .7 Apply paint to the locations and dimensions indicated in the Contract Documents or as directed by the Consultant.
- .8 Do not thin paint unless accepted by the Consultant.
- .9 Symbols and letters to conform to dimensions indicated.
- .10 Paint lines to be of uniform colour and density with sharp edges.
- .11 Thoroughly clean distributor tank before refilling with paint of different colour.

4. TOLERANCE

- .1 Paint markings to be within plus or minus 5mm 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.

5. PROTECTION OF COMPLETED WORK

- .1 Protect pavement markings until dry.

END OF SECTION

PART 1 - GENERAL

1. SECTION INCLUDE

- .1 Materials and installation for chain link fences and gates.

2. RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 03 30 00 - Cast-In-Place Concrete.

3. MEASUREMENT PROCEDURES

- .1 Measurement for payment for supply and installation of new 1.22m high chain link security fence with barbed wire and 1.83m wide gate shall be at the tendered unit price bid per lineal meter. Payment shall be full compensation for supply and installation of chainlink fencing and gate including; posts, concrete footings, all fittings and hardware, barbed wire, security signs; all necessary labour; grading of ground; cleanup and other work incidental to this section.

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 A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A90/A90M, Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
 - .3 ASTM A121, Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
 - .4 A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .5 ASTM C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 - .6 ASTM F1664, Standard Specification for Poly(Vinyl Chloride) (PVC)-Coated Steel Tension Wire Used with Chain-Link Fence.
- .3 Canadian General Standards Board (CGSB).

- .1 CAN/CGSB-138.1, Fabric for Chain Link Fence.
- .2 CAN/CGSB-138.2, Steel Framework for Chain Link Fence.
- .3 CAN/CGSB-138.3, Installation of Chain Link Fence.
- .4 CAN/CGSB-138.4, Gates for Chain Link Fence.
- .5 CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating.
- .4 Canadian Standards Association (CSA International).
 - .1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
 - .2 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CAN/CSA-A3000, Cementitious Materials Compendium. Includes:
 - .1 CAN/CSA-A23.5, Supplementary Cementing Materials
- .5 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .7 The Master Painters Institute (MPI) - Architectural Painting Specification Manual.
 - .1 MPI # 18, Organic Zinc Rich Primer.
- .8 Transport Canada (TC).
 - .1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

5. SUBMITTALS

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

6. HEALTH AND SAFETY (NOT USED)

7. DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store, and handle materials in accordance with manufacturer's written instructions.

- .2 Delivery and acceptance requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and handling requirements:
 - .1 Store materials in accordance with manufacturer's recommendations.
 - .2 Store and protect fence and gate materials from damage.
 - .3 Replace defective or damaged materials with new.

8. WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with the Contract Documents.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with the Contract Documents.
- .4 Separate for reuse and recycling and place in designated containers Steel, Metal, Plastic waste in accordance with the Contract Documents.
- .5 Place materials defined as hazardous or toxic in designated containers.
- .6 Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.
- .7 Divert unused metal and wiring materials from landfill to metal recycling facility as accepted by the Consultant.
- .8 Divert unused concrete materials from landfill to local facility as accepted by the Consultant.
- .9 Unused paint or coating material must be disposed of at official hazardous material collections site as accepted by the Consultant.
- .10 Do not dispose of unused paint material into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
- .11 Fold up metal banding, flatten, and place in designated area for recycling.

9. SUSTAINABLE REQUIREMENTS (NOT REQUIRED)

PART 2 - PRODUCTS

1. MATERIALS

- .1 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-place Concrete and CAN/CSA-A23.1.
 - .1 Nominal coarse aggregate size: 20-5.
 - .2 Compressive strength: 20 MPa minimum at 28 days.
 - .3 Additives: fly ash to CAN/CSA-A23.5, ASTM C618.
- .2 Chain-link fence fabric: to CAN/CGSB-138.1.
 - .1 Fence wire shall be 4 mm (9 gauge) diameter steel, hot dip galvanized after weaving, Type 1, Class A, heavy style.
 - .2 The fence fabric shall be a uniform 50 mm diamond pattern chain link mesh closed at one edge by knuckling and the other edge by twisting to form a barb.
 - .3 Height of fabric: as indicated on the contract drawings, 1.22 m.
- .3 Posts, braces, and rails: to CAN/CGSB-138.2, galvanized steel pipe. Dimensions as indicated on drawings.
 - .1 Line Posts: 60mm outside diameter.
 - .2 Gate and Corner Posts: 100mm outside diameter.
 - .3 Rails: 45 mm outside diameter.
 - .4 Gate and Corner posts to be 280 mm higher than line posts.
- .4 Top and bottom tension wire: to CAN/CGSB-138.2, single strand, galvanized steel wire, 5 mm diameter.
- .5 Tie wire fasteners: steel wire, to CAN/CGSB-138.1, 5 mm diameter.
- .6 Tension bar: to ASTM A653/A653M, 5 x 20 mm minimum galvanized steel.
- .7 Gates: to CAN/CGSB-138.4.
- .8 Gate frames: to ASTM A53/A53M, galvanized steel pipe, standard weight 45 mm outside diameter pipe for outside frame, 35 mm outside diameter pipe for interior bracing.

- .1 Fabricate gates as indicated with electrically welded joints, and hot-dip galvanized after welding.
- .2 Fasten fence fabric to gate with twisted selvage at top.
- .3 Furnish gates with galvanized malleable iron hinges, latch and latch catch with provision for padlock which can be attached and operated from either side of installed gate.
- .4 Furnish double gates with chain hook to hold gates open and centre rest with drop bolt for closed position.
- .5 Fittings and hardware: to CAN/CGSB-138.2, galvanized steel.
- .6 Tension bar bands: 3 x 20 mm minimum galvanized steel or 5 x 20 mm minimum aluminum.
- .7 Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail.
- .8 Overhang tops to provide waterproof fit, to hold top rails and an outward and inward projection (Y bracket) to hold barbed wire overhang.
- .9 Provide projection with clips or recesses to hold 3 strands of barbed wire spaced 100 mm apart.
- .10 Projection of approximately 300 mm long to project from fence at 45° above horizontal.
- .11 Turnbuckles to be drop forged.
- .9 Organic zinc rich coating: to CAN/CGSB-1.181.
- .10 Barbed wire: to ASTM A121 2 mm diameter galvanized steel wire 4 point bars 125 mm spacing, 3 strands on each projection arm for a total of 6 strands.
- .11 Grounding rod: 16 mm diameter copperwell rod, 3 m long.

2. FINISHES

- .1 Galvanizing:
 - .1 For chain link fabric: to CAN/CGSB-138.1 Grade 2.
 - .2 For pipe: 550 g/m² minimum to ASTM A90.
 - .3 For barbed wire: to ASTM A121, Class 2.
 - .4 For other fittings: to CAN/CSA-G164.

PART 3 - EXECUTION

1. GRADING

- .1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.
- .1 Provide clearance between bottom of fence and ground surface of 10 mm to max of 20 mm.

2. ERECTION OF FENCE

- .1 Erect fence along lines as indicated or as directed by the Consultant and to CAN/CGSB-138.3.
- .2 Excavate post holes to dimensions indicated or as directed by the Consultant.
- .3 Space line posts 3.0 m apart, measured parallel to ground surface.
- .4 Space straining posts at equal intervals not to exceed 150.0 m if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade, is greater than 150.0 m.
- .5 Install additional straining posts at sharp changes in grade and where directed by the Consultant.
- .6 Install corner post where change in alignment exceeds 10°.
- .7 Install end posts at end of fence and at buildings.
 - .1 Install gate posts on both sides of gate openings.
- .8 Place concrete in post holes then embed posts into concrete to depths indicated.
 - .1 Extend concrete 50 mm above ground level and slope to drain away from posts.
 - .2 Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.
- .9 Do not install fence fabric until concrete has cured minimum of 5 days.
- .10 Install brace between end and gate posts and nearest line post, placed in centre of panel and parallel to ground surface at inclination as indicated.
 - .1 Install braces on both sides of corner and straining posts in similar manner.
- .11 Install overhang tops and caps.

- .12 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.
- .13 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.
- .14 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals.
 - .1 Knuckled selvedge at bottom.
 - .2 Twisted selvedge at top.
- .15 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 450 mm intervals.
 - .1 Give tie wires minimum two twists.
- .16 Install barbed wire strands and clip securely to lugs of each projection.
- .17 Install grounding rods as indicated.

3. INSTALLATION OF GATES

- .1 Install gates in locations as indicated or as directed by the Consultant.
- .2 Level ground between gate posts and set gate bottom approximately 40 mm above ground surface.
- .3 Determine position of centre gate rest for double gate.
 - .1 Cast gate rest in concrete as directed.
 - .2 Dome concrete above ground level to shed water.
- .4 Install gate stops where indicated.

4. VERIFICATION (NOT USED)

5. OPERATIONAL REQUIREMENTS (NOT USED)

6. TOUCH UP

- .1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas as indicated or as directed by the Consultant.

- .1 Pre-treat damaged surfaces according to the manufacturers' instructions for zinc-rich paint.

7. CLEANING

- .1 Clean and trim areas disturbed by operations.
- .1 Dispose of surplus material as directed by the Consultant.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

- .1 This section specifies the requirements for supply and placement of topsoil and subsequent final grading to the lines, grades and cross section indicated by the Contract Documents or as directed by the Consultant.

2. RELATED SECTIONS

- .1 Section 32 92 19.16 - Hydraulic Seeding.

3. MEASUREMENT PROCEDURES

- .1 Supply and Install Topsoil shall be measured in square metres of plan area within limits approved by the Consultant. Payment at the unit price tendered shall be full compensation for surface preparation, supply and placement of topsoil, finish grading and all work incidental to this section. Payment shall be for the actual plan area topsoiled. No additional payment shall be made for areas that exceed the design quantity unless approved by 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 Agriculture and Agri-Food Canada
 - .1 The Canadian System of Soil Classification, Third Edition, 1998.
- .3 Canadian Council of Ministers of the Environment
 - .1 PN1340, Guidelines for Compost Quality.
- .4 Canadian Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0, LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations.

5. SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Quality control submittals:
 - .1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in SOURCE QUALITY CONTROL.
 - .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

6. PRODUCTS

- .1 Stripping material from the areas of construction site may be stockpiled and re-used as topsoil to supplement the requirement for imported topsoil. However, the Contractor shall ensure the following requirements are met.
- .2 Topsoil for seeded areas: mixture of particulates, micro-organisms and organic matter which provides suitable medium for supporting intended plant growth.
 - .1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 % sand, minimum 7 % clay, and contain 4 to 10 % organic matter by weight.
 - .2 Contain no toxic elements or growth inhibiting materials.
 - .3 Finished surface free from:
 - .1 Debris and stones over 25 mm diameter.
 - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2 % of soil volume.
 - .4 Consistence: friable when moist.

7. SOIL AMENDMENTS

- .1 Fertilizer:
 - .1 Fertility: major soil nutrients present in following amounts:
 - .2 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
 - .3 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.
 - .4 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.
 - .5 Calcium, magnesium, sulphur, and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
 - .6 Ph value: 6.5 to 8.0.
- .2 Peatmoss:
 - .1 Derived from partially decomposed species of Sphagnum Mosses.
 - .2 Elastic and homogeneous, brown in colour.
 - .3 Free of wood and deleterious material which could prohibit growth.
 - .4 Shredded particle minimum size: 5 mm.
- .3 Sand: washed coarse silica sand, medium to course textured.
- .4 Organic matter: compost Category A, B in accordance with CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability, and contaminant requirements.
- .5 Use composts meeting Category B requirements for land fill reclamation and large-scale industrial applications.
- .6 Limestone:
 - .1 Ground agricultural limestone.

- .2 Gradation requirements: percentage passing by weight, 90 % passing 1.0 mm sieve, 50 % passing 0.125 mm sieve.
- .7 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.

8. SOURCE QUALITY CONTROL

- .1 Advise the Consultant of sources of topsoil and manufactured topsoil to be utilized with sufficient lead time for testing.
- .2 Contractor is responsible for amendments to supply topsoil as specified.
- .3 If Contractor intends to use the topsoil stripped and stockpiled from the site, it is Contractor's responsibility to screen the topsoil if required to ensure compliance with specifications.
- .4 Soil testing by recognized testing facility for PH, P, and K, and organic matter.
- .5 Testing of topsoil will be carried out by testing laboratory designated by the Consultant.
 - .1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

PART 2 - 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 sediment and erosion control plan, specific to site, or that complies with requirements of authorities having jurisdiction, whichever is more stringent.
- .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.

2. STRIPPING OF TOPSOIL

- .1 NOT USED.

3. PREPARATION OF EXISTING GRADE

- .1 Verify that grades are correct. If discrepancies occur, notify the Consultant, and do not commence work until instructed by the Consultant.
- .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
- .3 Cultivate and scarify topsoil areas to a minimum depth of 150 mm.

- .4 In areas of where subgrade compaction equals or exceeds 95% of Standard Proctor Maximum Dry Density or in areas where equipment used for hauling and spreading has compacted the subgrade, cultivate and cross cultivate to a minimum depth of 300 mm.
- .5 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.
 - .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
 - .2 Remove debris which protrudes more than 50 mm above surface.
 - .3 Dispose of removed material off site.
- .6 Cultivate entire area which is to receive topsoil to minimum depth of 150 mm.
 - .1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

4. PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

- .1 Place topsoil after the Consultant has accepted subgrade.
- .2 Spread topsoil during dry weather.
- .3 Spread topsoil over unfrozen subgrade free of standing water.
- .4 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
- .5 Spread topsoil in uniform layers to the following minimum depths after compaction and settlement.
 - .1 100 mm for seeded areas, and/or to be flush with new asphalt edges.
- .6 Manually spread topsoil/planting soil around obstacles.

5. FINISH GRADING

- .1 Fine grade entire topsoiled area to contours and elevations as indicated or directed by the Consultant.
- .2 Ensure transitions from slopes to level areas are smooth and even.
- .3 Grade to eliminate rough spots and low areas and ensure positive drainage.
 - .1 Prepare loose friable bed by means of cultivation and subsequent raking.
- .4 Consolidate (roll) topsoil to required bulk density using equipment approved by the Consultant.
 - .1 Leave surfaces smooth, uniform and firm to support vehicles without rutting.

6. ACCEPTANCE

- .1 The Consultant will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

7. SURPLUS MATERIAL

- .1 Dispose of materials except topsoil not required where directed by the Consultant off site.

8. CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools, and equipment barriers.
- .3 Clean up immediately soil or debris deposited onto pavement surfaces.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

- .1 This section specifies the requirements for supply and application of seed by hydraulic (hydroseeding) method in areas indicated by the Contract Documents or as directed by the Consultant.

2. RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 32 91 19.13 - Topsoil Placement and Grading.

3. MEASUREMENT PROCEDURES

- .1 Hydroseeding shall be measured in square metres of plan area within limits as supplied by the Consultant. Payment at the tendered unit price shall be full compensation for supply and application of seed mixture or hydroseed mixture including seed and fertilizer, mulch, tackifier, water, cleanup, and all other work incidental to this section. The Contractor shall provide watering applications as required to ensure germination and growth of the mix.
- .2 Payment shall be for the actual plan areas hydroseeded. No additional payment shall be made for areas, which exceed the design quantity unless approved by the Consultant.

4. SUBMITTALS

- .1 Product Data.
 - .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 At least two weeks prior to commencing work submit to the Consultant product data and certification that the products meet the requirements for this section:
 - .1 Seed.
 - .2 Mulch.
 - .3 Tackifier.
 - .4 Fertilizer.
 - .3 Submit in writing to the Consultant ten (10) days prior to commencing work:
 - .1 Volume capacity of hydraulic seeder in litres.
 - .2 Amount of material to be used per tank based on volume.
 - .3 Number of tank loads required per hectare to apply specified slurry mixture per hectare.

5. QUALITY ASSURANCE

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

6. DELIVERY AND STORAGE

- .1 Deliver and store grass seed in original containers showing:
 - .1 Analysis of seed mixture.
 - .2 Percentage of pure seed.
 - .3 Year of production.
 - .4 Net mass.
 - .5 Date when tagged and location.
 - .6 Name and address of distributor.
- .2 Deliver wood fibre mulch and tackifier in moisture-proof containers indicating manufacturer, content, and net air-dry mass.
- .3 Supply fertilizer to the contract site in shrink wrapped or other suitable moisture proof containers, with guaranteed chemical analysis clearly shown on each container.
- .4 Provide to the Consultant before and as a condition of use, a shipping bill issued by the supplier of the material, designating the supplier, the manufacturer, the type of material, and a certification of the net weight or volume of material in each container.
- .5 Protect all materials as required during transportation and storage.
- .6 Store the materials onsite only where and as directed and approved by the Consultant.
- .7 Take precautions to prevent damage of stored materials by vandalism or weathering.
- .8 Any material which has become wet or otherwise damaged during delivery or storage, or does not meet the requirements specified shall be rejected and the Contractor shall immediately remove rejected material from the project area.

7. SCHEDULING

- .1 Schedule hydraulic seeding to coincide with preparation of soil surface.

8. WASTE MANAGEMENT AND DISPOSAL

- .1 Divert unused fertilizer from landfill to official hazardous material collections site approved by the Consultant.
- .2 Do not dispose of unused fertilizer into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

PART 2 - PRODUCTS

1. MATERIALS

- .1 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.
 - .1 Grass mixture:
 - .1 Mixture composition:
 - .1 35% - Turf Type Fescue like Foxhound
 - .2 30% - Creeping red fescue
 - .3 25% - Replicator 4N Perennial Rye
 - .4 10% - Hard fescue
 - .2 Alternative readily available mixtures acceptable to the Consultant may also be utilized.
 - .2 Mulch: specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green colouring, free of germination and growth inhibiting factors with following properties:
 - .1 Type I mulch:
 - .1 Made from wood cellulose fibre.
 - .2 Organic matter content: 99 - 100 %.
 - .3 Value of pH: 4.8.
 - .4 Potential water absorption: 320 %.
 - .5 The material used for mulching shall be a natural wood fibre specially prepared for use in hydroseeding equipment.
 - .6 Contain no growth or germination inhibiting properties.
 - .7 Capable of dispensing in water to form a homogeneous slurry.
 - .8 Capable of forming an absorptive mat ground cover allowing water percolation.
 - .3 Tackifier:
 - .1 The tackifier shall be one of:
 - .1 Free flowing non-corrosive biodegradable organic powder produced from a natural plant gum.
 - .2 Water dilatable liquid dispersion containing polyvinyl acetate polymer emulsion.

- .3 Approved equivalent by the Consultant.
- .4 Water: free of impurities that would inhibit germination and growth.
- .5 Fertilizer:
 - .1 To Canada "Fertilizers Act" and "Fertilizers Regulations".
 - .2 Complete synthetic, slow release with 35 % of nitrogen content in water-insoluble form.
 - .3 Recommended fertilizer mix ratio: N-P-K = 1-4-4.
- .6 Inoculants: inoculants containers to be tagged with expiry date.

PART 3 - EXECUTION

1. EQUIPMENT

- .1 Cultivators: Capable of scarifying, discing or harrowing.
- .2 Hydro Seeders: Capable of thoroughly mixing water, seed, fertilizer and pulverized wood fibre and of uniformly spraying the mix at designated rate.
- .3 Rollers: Of suitable size and mass.
- .4 Equipment for hydroseeding, mulch and fertilizing shall be capable of mixing the seed, fertilizer, mulch and tackifier as herein described, and evenly distributing the mixtures for efficient treatment of the selected areas.
- .5 The equipment shall have a build-in agitation system with an operating capacity sufficient to agitate, suspend and homogeneously mix a slurry of materials in the amounts specified.
- .6 The slurry tank shall have working capacity of at least 4500 litres, and the pump shall be capable of maintaining a continuous, non-fluctuating stream of solution. Distribution lines shall be of large enough diameter to prevent blockage, and the discharge lines shall be equipped with appropriate nozzles.
- .7 The equipment shall be capable of hydroseeding to the extremities of all areas designated for hydroseeding.

2. WORKMANSHIP

- .1 Do not spray onto structures, signs, guide rails, fences, plant material, utilities and other than surfaces intended.
- .2 Clean-up immediately, any material sprayed where not intended, to satisfaction of the Consultant.
- .3 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.
- .4 Protect seeded areas from trespass until plants are established.

- .5 Do not seed when prepared topsoil is covered with frost, snow or standing water. Proceed with seeding operations only during favourable weather conditions in accordance with sound horticultural practices.
- .6 Clean areas or items as requested by the Consultant.

3. PREPARATION OF SURFACES

- .1 Fine grade areas to be seeded free of humps and hollows. Ensure areas are free of deleterious and refuse materials.
- .2 Cultivated areas identified as requiring cultivation to depth of 25 mm.
- .3 Ensure areas to be seeded are moist to depth of 150 mm before seeding.
- .4 Obtain the Consultant's approval of grade and topsoil depth before starting to seed.

4. PREPARATION OF SLURRY

- .1 Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to the Consultant. Supply equipment required for this work.
- .2 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.
- .3 After all materials are in the seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

5. SLURRY APPLICATION

- .1 Hydraulic seeding equipment:
 - .1 Slurry tank.
 - .2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method.
 - .3 Capable of seeding by 50 m hand operated hoses and appropriate nozzles.
 - .4 Tank volume to be certified by certifying authority and identified by authorities "Volume Certification Plate".
- .2 Slurry mixture applied per hectare.
 - .1 Seed: 300 kg.
 - .2 Mulch: 1,350 kg.
 - .3 Tackifier: 340 kg.
 - .4 Water: as required to form recommended slurry.
 - .5 Fertilizer: 275 kg.

- .3 Thoroughly mix seed, fertilizer, mulch and tackifier and uniformly distribute the mixture with the hydroseeder over the area indicated or designated by the Consultant.
- .4 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.
 - .1 Using correct nozzle for application.
 - .2 Using hoses for surfaces difficult to reach and to control application.
- .5 Blend application 300 mm into adjacent grass areas or sodded areas or previous applications to form uniform surfaces.
- .6 Re-apply where application is not uniform.
- .7 Remove slurry from items and areas not designated to be sprayed.
- .8 Protect seeded areas from trespass satisfactory to the Consultant.
- .9 Remove protection devices as directed by the Consultant.
- .10 Hand broadcast seeding is unacceptable under any conditions except for isolated repair work.
- .11 Spread fertilizer evenly at rate specified.
- .12 Thoroughly harrow the site after fertilizing, on areas flatter than 3 horizontal to 1 vertical.
- .13 Sow the seed at the rate specified for the seed type, in 2 directions, 50 % in one direction and remaining 50 % of seed at right angles to first seeding pattern.
- .14 Protect all newly seeded areas as required.

6. ACCEPTANCE

- .1 Seeded areas will be accepted by the Consultant provided that:
 - .1 Grass is uniformly established
 - .2 Seeded areas are free of rutted, eroded, bare or dead spots.
 - .3 Areas have been mown at least twice.
 - .4 Areas have been fertilized.
- .2 Areas seeded in fall will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

7. CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools, and equipment barriers.

END OF SECTION

PART 1 - GENERAL

1. DESCRIPTION

- .1 This section specifies the requirements for the supply and installations of manholes, cleanouts, catch basins, storm sewer end walls, raising manhole tops and related appurtenances to the lines, grades and dimensions shown in the Contract Documents or as directed by the Consultant.

2. RELATED SECTIONS

- .1 Section 03 10 00 - Concrete Forming and Accessories.
- .2 Section 03 20 00 - Concrete Reinforcing.
- .3 Section 03 30 00 - Cast-In-Place Concrete.
- .4 Section 31 05 16 - Aggregate Materials.

3. MEASUREMENT PROCEDURES

- .1 Payment for raising of manhole top shall be at the unit price bid to raise existing manhole top as shown on the drawings including supply and install of all materials, equipment and labour required to raise manhole top to match new design grades, steel, welding, salvage of existing frame and grate; construction of cast in-place concrete top complete with reinforcing steel; installation of new ladder rung(s) if required to meet WCB, and miscellaneous appurtenances for a complete installation, and all other work incidental to this section to provide a complete installation.

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- μ m (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/ft³) (600 kN-m/m³).
- .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.

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 Quality control 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.

6. QUALITY ASSURANCE

- .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.

7. DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling, and unloading:
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with local jurisdictions.

PART 2 - PRODUCTS

1. MATERIALS

- .1 Cast-in-place concrete:
 - .1 In accordance with Section 03 30 00 - Cast-in-Place Concrete.
 - .2 Cement: to CAN/CSA-A3001, Type GU (General use cement).
 - .3 Concrete mix design to produce 32 MPa minimum compressive strength at 28 days and containing 20 mm maximum size coarse aggregate, with 0.45 water/cement ratio to CAN/CSA-A23.1, and 80 mm slump at time and point of deposit.
 - .1 5-8% Air entrainment to CAN/CSA-A23.1, class C-2 exposure.
 - .4 Concrete reinforcement: in accordance with Section 03 20 00 - Concrete Reinforcing.
- .2 Precast units
 - .1 Precast reinforced concrete manholes adjacent runways, taxiways and apron shall be an aircraft rated manhole with airport style top slab as indicated.
 - .2 Precast Type 'F' units shall not be used within aircraft travel areas where they will be subjected to aircraft loads.
 - .3 Precast reinforced concrete manhole sections shall confirm to ASTM C498.
 - .4 All concrete used in precast manholes shall use Type GU (General use cement) Portland cement.
 - .5 Reinforcing steel as indicated.
 - .6 Dimensions as indicated.

- .3 Precast units
 - .1 All concrete structures shall meet the details shown on the drawings and specifications to meet aircraft loading requirements.
 - .2 All dimensioning and reinforcing steel as per strength requirements.
 - .3 The contractor may provide the base as pre-cast, then cast in place the remaining sections and top portion, according to the design detail for strength requirements as shown on the drawings.
- .4 Joints: made watertight using:
 - .1 Gasket
 - 1. Rubber Gasket
 - 2. Rub'r-Mek National Coupling Kitchener, Ont.
 - 3. Ken Seal Hamilton Ken, Mississauga, Ont.
- .5 Cement Mortar:
 - .1 Portland cement to CSA A3000-03, Type HS.
 - .2 Sand to CSA A82.56.
 - .3 Mortar mix: 1 part by volume of cement to 3 parts sand.
 - .4 Masonry Cement: to CAN/CSA-A3002.
- .6 Ladder rungs: Aluminum conforming to CSA CAN3-S157.
 - .1 Rungs to be safety pattern (drop step type).
- .7 Adjusting rings: to ASTM C478M.
- .8 Concrete Brick: to CAN3-A165 Series.
- .9 Drop manhole pipe: same as sewer pipe.
- .10 Galvanized iron sheet: approximately 2 mm thick.
- .11 Steel gratings, I-beams and fasteners: as indicated.
- .12 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.
- .13 Granular bedding and backfill:
 - .1 Construct granular bedding where required in accordance with Section 31 05 16 - Aggregate Materials.

- .2 Compact granular bedding to a minimum of 100% of Modified Proctor Maximum Dry Density (ASTM D698).
- .3 Granular Bedding and Backfill shall be Type 2 as specified in Section 31 05 16 - Aggregates Materials.
- .14 Concrete mixes and materials:
 - .1 Perform concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
 - .2 Place reinforcing steel in accordance with Section 03 20 00 - Reinforcing Steel.
 - .3 Place inserts in accordance with dimensions and details indicated.
- .15 Unshrinkable fill: in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

PART 3 - EXECUTION

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.

2. EXCAVATION AND BACKFILL

- .1 Excavate and backfill in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling and as indicated.
- .2 Contractor shall provide a shoring system to restrain the vertical face adjacent to the manhole or catchbasin and the pavement structure. Removal of pavement on the runway, taxiway, or apron side of the manhole is prohibited.
- .3 Obtain approval of the Consultant before installing outfall structures, manholes or catch basins.

3. CONCRETE WORK

- .1 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .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.

4. INSTALLATION

- .1 Cast-in-place manhole bases shall be constructed on undisturbed material or approved backfill compacted to a minimum of 100% of Modified Proctor Maximum Dry Density (ASTM D698).

- .2 Construct units in accordance with details indicated, plumb and true to alignment and grade.
- .3 Complete units as pipe laying progresses.
 - .1 Maximum of three units behind point of pipe laying will be allowed.
- .4 Dewater excavation to approval of the Consultant and remove soft and foreign material before placing concrete base.
- .5 Cast-in-place manhole bases shall be constructed on undisturbed ground or approved backfill material compacted to a minimum of 100% of Modified Proctor Maximum Dry Density (ASTM D698).
- .6 Pre-cast manhole bases shall be installed on a granular bedding compacted to a minimum of 100% of Modified Proctor Maximum Dry Density (ASTM D698). The bedding shall be shaped to support the bottom of the base.
- .7 Precast units:
 - .1 Set bottom section of precast unit in bed of cement mortar and bond to concrete slab or base.
 - .2 Make each successive joint watertight with the Consultant's approved rubber ring gaskets, bituminous compound, cement mortar, epoxy resin cement, or combination of these materials.
 - .3 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.
 - .4 Plug lifting holes with precast concrete plugs set in cement mortar or mastic compound.
 - .5 Cast square top in place as shown on drawing details.
- .8 Place granular backfill a minimum of 300 mm around unit. Compact granular backfill to a minimum of 100 % of Modified Proctor Maximum Dry Density (ASTM D698).
- .9 Place unshrinkable backfill in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .10 Installing units in existing systems:
 - .1 Where new unit is installed in existing run of pipe, ensure full support of existing pipe during installation, and carefully remove that portion of existing pipe to dimensions required and install new unit as specified.
 - .2 Make joints watertight between new unit and existing pipe.
 - .3 Where deemed expedient to maintain service around existing pipes and when systems constructed under this project are ready for operation, complete installation with appropriate break-outs, removals, redirection of flows, blocking unused pipes or other necessary work.
- .11 Clean units of debris and foreign materials.
 - .1 Remove fins and sharp projections.
 - .2 Prevent debris from entering system.

- .3 At completion of project flush manholes and catch basins with water and remove resultant debris.
- .4 Remove all debris from area adjacent to manhole or catch basin.
- .12 Install safety platforms in manholes having depth of 2 m or greater, as indicated.
- .13 Finish Tolerances
 - .1 Manholes and catch basins shall be set so that the top elevation of steel frame shall be between a minimum of 10 mm and a maximum of 25 mm below projected cross slope of adjacent pavement grades.
 - .2 The manhole or catch basin top shall be within ± 10 mm of vertical plumb.
- .14 Pavement Restoration
 - .1 The pavement immediately adjacent to the manhole or catch basin shall be restored to the same condition as it previously existed prior to commencement of construction.

5. CONNECTION OF SUB-DRAIN, STORM, OR SEWER PIPE

- .1 Openings for connection of pipes to the manhole shall not be greater than the outer diameter of the pipe by more than 50 mm in any direction and shall be cored or cut.
- .2 The pipe entering the manhole shall be made flush with the inside manhole barrel and the openings shall be mortared flush with the pipe and inside manhole wall.

6. ADJUSTING TOPS OF EXISTING UNITS

- .1 Remove existing gratings, frames, and I beams (if applicable) and store for re-use at locations designated by the Consultant.
 - .1 Lower monolithic units with straight wall by removing concrete to elevation indicated for rebuilding.
 - .2 Drill and set reinforcing steel with epoxy or non-shrink grout as indicated.
 - .3 Construct concrete work in accordance with Section 03 30 00 - Cast In-Place Concrete.
 - .4 Install additional manhole ladder rungs in adjusted portion of units as required or as indicated.
 - .5 Re-use existing gratings, frames, and I-beams (if applicable) or construct new as indicated.
 - .6 Set pre-cast unit in place as indicated.
 - .1 Set unit in place to plumb and true to alignment and grade.
 - .2 Make each successive joint watertight with bituminous compound, cement mortar, epoxy resin cement or combination thereof.
 - .3 Plug lifting holes.

- .4 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.
- .7 Set pre-cast top unit in place as indicated.
- .8 Backfill in accordance with Section 31 23 33 - 01 Excavating, Trenching and Backfilling.
 - .5 Place backfill around unit as indicated.
 - .6 Place granular backfill a minimum of 300 mm around unit. Compact granular backfill to a minimum of 100% of Modified Proctor Maximum Dry Density (ASTM D698).
- .9 Restore pavement surface to same shape, size, and depth as pre-existed prior to construction.
- .2 Sectional units:
 - .1 Raise or lower straight walled sectional units by adding or removing precast sections as required.
 - .2 Raise or lower tapered units by removing cone section, adding, removing, or substituting riser sections to obtain required elevation, then replace cone section.
 - .1 When amount of raise is less than 600 mm use standard manhole brick, moduloc, or grade rings.

7. SEALING OVER EXISTING UNITS

- .1 Cut galvanized iron sheet to extend 50 mm beyond opening of existing manhole or catch basin grating.
 - .1 Center iron sheet over existing grating and spot or stitch weld to grating.
- .2 Fill with cast-in-place concrete or material approved by the Consultant.

8. 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 Remove fins and sharp objects.
- .4 On completion of project, flush manholes and catch basins with water and remove resultant debris.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 26 05 00 - Common Work Results – Electrical
- .2 Section 34 43 10 – Airfield Lighting – General

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 QUALITY ASSURANCE

- .1 Quality assurance submittals: submit following:
 - .1 Certificates: signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.
 - .2 Manufacturer's Instructions: for installation and special handling criteria, installation sequence, and cleaning procedures.

1.4 MEASUREMENT FOR PAYMENT

- .1 Trenching & Ducts
 - .1 The Contractor shall provide all trenching, backfilling, compaction and restoration as outlined in the drawings and Specifications. Where multiple circuits/ducts are installed along the same route, a common “joint-use” trench shall be provided.
 - .2 Payment for the installation of trenching of required depth, including backfill and compaction, shall be on the basis of lineal metre of trench measured in the field. Such unit prices shall include all excavation of trenching, fill (if required), supply and installation of all materials, conduit/duct, pull strings, removal and disposal of excess excavated material, and reconditioning of disturbed surface.
 - .3 Earth excavation includes removal of rock and/or boulders up to 0.5 m³.
 - .4 Native material shall be used for backfill except no rocks or stones greater than 50mm diameter are to be used.
 - .5 A 75 mm bedding of sand is to be provided at the bottom of all trenches, under the new electrical duct(s). A 75mm cover of sand is to be provided above all direct buried counterpoise cables, extending vertically to bedding sand.
 - .6 1 - #8 bare ground counterpoise wire shall be installed direct buried in trenches, and shall be included in the unit rate for the trenching. It shall be this contractor's responsibility to factor in all costs for all grounding connections and extra counterpoise wire needed for zig-zagging.

- .7 Pump excavation free of standing water and remove soft or foreign materials prior to placing bedding. Place bedding material to the full trench width and compact to minimum 95% Standard Proctor Maximum Dry Density.
- .8 Provide the size and number of ducts specified on the drawings, and layout as detailed.
- .9 Maintain 300mm separation between POWER and COMM ducts.

Part 2 Products

2.1 PVC DUCTS AND FITTINGS

- .1 Rigid PVC duct: CSA C22.2 No. 211.2, with moulded fittings, for direct burial, sizes as indicated.
- .2 Rigid PVC bends, couplings, reducers, bell end fittings, plugs, caps, and adaptors same product material as duct, to make a complete installation.
- .3 Rigid PVC 90 degrees, 45 degrees bends and 5 degrees angle couplings as required.

2.2 OTHER DUCTS

- .1 Polytube: 50mm, or size as indicated.

2.3 SOLVENT WELD COMPOUND

- .1 Solvent cement for PVC duct joints.

2.4 CABLE PULLING EQUIPMENT

- .1 6 mm stranded nylon pull rope tensile strength 5 kN.

2.5 WARNING TAPE

- .1 Standard 4-mil polyethylene 76 mm wide tape, yellow with black letters, imprinted with "CAUTION BURIED ELECTRIC CABLE BELOW".

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 INSTALLATION

- .1 Install duct in accordance with manufacturer's instructions and at elevations as indicated.

- .2 Clean inside of ducts before laying.
- .3 Ensure full, even support, every 1.5m throughout duct length.
- .4 Slope ducts with 1 to 400 minimum slope.
- .5 Ensure all duct joints are solvent welded.
- .6 Install plugs and cap both ends of ducts to prevent entrance of foreign materials during and after construction.
- .7 Pull through each duct a wooden mandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign material.
 - .1 Pull stiff bristle brush through each duct immediately before pulling-in cables.
- .8 Install a pull rope continuous throughout each duct run with 3 m spare rope at each end.
- .9 Place continuous strip of warning tape 300 mm above duct before backfilling trenches.
- .10 Install markers as required.
- .11 Install bell ends on all ducts in all pull boxes.
- .12 Notify the owner/consultant for field review upon completion of direct buried ducts and obtain acceptance prior to backfill.

3.3 DUCT DRAINAGE

- .1 Where possible, drain ducts into pull boxes. Otherwise make five 3/8" drill holes in a row at the bottom of each duct whenever duct turns upwards to enter a pull box. Cover holes with a plastic or galvanized steel mesh to prevent soil entering ducts.

3.4 CLEANING

- .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 – Common Work Results – Electrical
- .2 Section 34 43 10.01 – Illuminated Airport Guidance Signs
- .3 Section 34 43 13.16 – Airfield Runway and Taxiway Inset Lighting
- .4 Section 34 43 13.19 – Elevated Edge Lighting
- .5 Section 34 43 16.26 – Airfield Omni-Directional Approach Lighting Equipment
- .6 Section 34 43 16.34 – Airfield Medium Intensity Approach Lighting Equipment
- .7 Section 34 43 16.36 – Airfield Precision Approach Path Indicator
- .8 Section 34 43 26.23 – Airfield Lighting Regulator Assembly

1.2 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CSA C22.2 No.179-09, Airport Series Lighting Cables.
 - .2 CSA C22.2 No.180-FM1983(R2008), Series Isolating Transformers for Airport Lighting.
 - .3 CSA C22.1, Canadian Electrical Code, Part 1, latest edition
- .2 Transport Canada
 - .1 Aerodrome Standards and Recommended Practices, TP312E, 5th Edition

1.3 SYSTEM DESCRIPTION

- .1 Relocation and reinstallation of existing Runway Edge Lighting.
- .2 Supply and installation of new Medium Intensity Taxiway Edge Lighting.
- .3 Supply and installation of pullpits.
- .4 Supply and installation of new illuminated airfield sign.
- .5 Relocation and reinstallation of existing PAPI systems (2).
- .6 Supply and installation of new approach lighting systems (ODALS, MALS/MALSF/MALSR provisional)
- .7 Supply an installation of new Runway Guard Lights (RGLs) (Provisional)
- .8 Supply and installation of new aircraft receptacle kiosk.

- .9 Supply and installation of new Constant Current Regulators (CCRs) in FEC (scope and quantity TBD depending on approach lighting systems chosen).
- .10 Supply and installation of cables/conduit in trench as indicated on drawings.
- .11 Supply and installation of series isolating transformers, primary/secondary cabling, connector kits, and all other associated equipment and work.

1.4 SUBMITTALS

- .1 Provide written confirmation of compliance with CSA standards. Where CSA certified equipment/material is not available, equipment/material to be submitted to local inspection authority for special approval, before delivery to site, and copy of CSA special approval acceptance documentation is to be provided as a submittal.
- .2 Provide written confirmation of compliance with TP312, 5th Edition requirements, from a third party Independent Testing Agency (ITA).

1.5 MAINTENANCE MATERIALS

- .1 Provide all maintenance materials (manuals) and any special tools required.

1.6 MEASUREMENT FOR PAYMENT

- .1 New Pull Pit
 - .1 Payment at the tendered price shall be full compensation to complete the work including excavation, granular bedding, backfill, compaction, cable/duct entries, intercepting on existing cable/duct, galvanized steel checker plate lid, bell ends, ground rods, supply and installation using the pulpits as shown on the drawings and described in the specifications.
 - .2 Pulpits shall be paid on a per-unit basis, for each pullpit supplied and installed.
- .2 Replacement of Pullpit Lid
 - .1 Payment for this item shall be on a per-unit basis and shall include the replacement of existing pullpit lids (with hub for fixture) with pullpit lids without a hub.
 - .2 Existing pullpit lids to be returned to the owner.
- .3 Testing and Commissioning
 - .1 Payment at the tendered price shall be full compensation for all testing and commissioning activities required for all of the various new/modified systems and equipment, and shall include the following:
 - .2 Megger testing of all new/modified airfield series circuits in the presence of the owner/consultant, and indicating that the circuits meet all requirements of the drawings and specifications. The circuits shall be tested before any alterations to the system are made, and after completion of works on the system.

- .3 Functional testing of all airfield lighting equipment in the presence of the owner/consultant, and indicating that the new/modified equipment meets all operational requirements for brightness levels, start-up, proper operation, aiming/sequence, and are controllable by manual/remote control.
- .4 Submittal of megger test and functional test check sheets, documenting the tests undertaken, and the test results.

.4 Removals of Obsolete Electrical Equipment

- .1 Payment at the tendered price shall be full compensation for removals of electrical equipment made obsolete under this project, and shall include the following:
 - .1 Existing obsolete cables in ducts to be removed and disposed of off site.
 - .2 Existing direct buried obsolete cables to be abandoned in place. Cut and remove all portions of cable above ground.
 - .3 Existing obsolete pullpits to be removed and disposed of off site, with voids backfilled and compacted.
 - .4 Existing obsolete lighting fixtures, approach lighting, signs, illuminated windsocks, panels/enclosures, and transformers to be removed and returned to owner.
 - .5 Reference the project drawings for other removals requirements.

.5 Underground Locates

- .1 Payment for this item shall be on a lump sum basis and shall include all work and coordination to locate all existing underground utilities and facilities that are within the project limits, whether indicated on the project documents, or not. The contractor is advised that the project drawings may not be complete with respect to underground utilities and facilities.
- .2 Work under this item shall include providing all locate sketches and information to the airport, for reference and updates to the base plans.

.6 Provisions for Maintaining Airfield Lighting Operational During Construction

- .1 All temporary electrical works, relocation and maintenance of lighting equipment and fixtures, and all other electrical works required to keep existing electrical facilities/systems operational during construction shall be included in this item.
- .2 This items shall include, but not be limited to, temporary relocation of edge lighting / threshold/end lighting onto temporary mounting brackets, temporary cabling/conduit, removals/relocation/reinstallation of temporary lighting to facilitate construction activities, and maintaining relocated lighting operational.
- .3 Payment for this item shall be on a lump sum basis.

- .7 New Illuminated Windcone
 - .1 Payment for this item shall include the installation of the windcone as detailed on the drawings including the supply and installation of a foundation c/w steel mounting/transition plate, windcone support and windsock, secondary conduit and cable, grounding, all levelling / alignment / testing, and all other required accessories and work.
 - .2 Payment for this item shall be on a lump sum basis.
 - .3 Payment for associated pullpit shall be covered under a separate unit price item for pullpits.

- .8 New Aircraft Receptacle Kiosk
 - .1 The New Aircraft Receptacle shall be covered by a cash allowance.
 - .2 Once the requirements for this item have been ascertained, the contractor will be requested to price the propose works.
 - .3 Only work scope approved, if any, shall be charged to this payment item.

- .9 New RGL Unit (Provisional)
 - .1 Payment for this item shall include the installation of the RGL unit as detailed on the drawings including the supply and installation of a foundation c/w steel mounting/transition plate, secondary conduit and cable, grounding, all levelling / alignment / testing, and all other required accessories and work.
 - .2 Payment for this item shall be on a lump sum basis.
 - .3 Payment for associated pullpit shall be covered under a separate unit price item for pullpits.

1.7 QUALIFICATIONS

- .1 Airfield Lighting Systems are specialized high voltage electrical systems and work on these systems are to be undertaken by only those individuals with appropriate experience and qualifications in dealing with these systems.

- .2 The airfield electrical contractor/sub-contractor and assigned electrical site superintendent shall have a minimum 3 projects within last 5 years working on airport electrical system projects (construction, minimum electrical project values of \$100,000 each) and with the following airport lighting equipment / systems: constant current regulators, series circuit installation, navigational aids, elevated edge lighting, approach lighting.

- .3 The electrical contractor/sub-contractor shall submit a detailed airport experience project listing, outlining how all of the above requirements are met by their company/staff, along with the tender documents.

Part 2 Products

2.1 PRIMARY CABLE

- .1 Single conductor stranded soft drawn copper, #8 AWG, 5000 volt, combined cross linked polyethylene insulation and jacket: CSA C22.2 No.179.

2.2 PRIMARY PLUG RECEPTACLE CONNECTORS

- .1 Primary plug and receptacle connector kit, straight type, one male plug, one female plug, for use with isolating transformer or use for separable straight splice of #8 AWG primary cable. Splice only in pulpits.
- .2 Acceptable Product: Amerace Ltd. Model 54 Super Kit. (No Exceptions)

2.3 SECONDARY PLUG AND RECEPTACLE CONNECTORS

- .1 Secondary male plug connector kit; factory assembled secondary using 2 - #10 or 2 - #12 AWG type SOW secondary cable.
 - .1 Acceptable Product: Amerace Ltd. 95MPR8-G
- .2 Secondary female receptacle connector kit; factory assembled secondary using 2 - #10 or 2 - #12 AWG type SOW secondary cable.
 - .1 Acceptable Product: Amerace Ltd. 95MPR8-G
- .3 Factory or field assembled secondary extension, length as required, #12 AWG Type SOW, one - two conductor cable terminated with male connector on one end and female connector on other end, for long secondary runs between transformers and fixtures. Exact length to suit distance between light fixtures and transformer.

2.4 ISOLATING TRANSFORMER

- .1 CSA C22.2 No180, rating as required for applicable fixture. Use for 5000 volt series circuits.
- .2 Transformers and all connections to be completely waterproof and suitable for mounting in any type of pull pit.
- .3 Transformers must be designed to allow continuous operation with the secondary open circuited, short circuited, or with a lamp in place.
- .4 Transformers to be rubber encapsulated complete with factory-installed primary and secondary leads and shall conform to CSA C22.2 180-M. Ensure secondary lead is equipped with a Style 8 receptacle.
- .5 Connections shall conform to Transport Canada K-255 and shall be suitable for 5 kV non-screened cable and shall match the transformer manufacturer.
- .6 Transformer rating: as indicated, 6.6 A primary, 6.6 A secondary, sized to suit connected loads and as per below, 60 Hz.
- .7 Manufacturer: Amerace CTAG Series, sized to suit. No exception.

2.5 TRANSFORMER PULLPIT

- .1 Rigid polyethylene or PVC to Transport Canada specification K-303.
 - .1 508mm DIA x 450mm depth (WCE 380mm depth), minimum.
 - .2 Polyethylene c/w steel lid.

- .3 Approved Products: Century Plastics, Polyrama, West Coast Engineering (WCE)

2.6 GROUND COUNTERPOISE WIRE

- .1 Single conductor #8 AWG, soft drawn copper wire:
 - .1 Solid bare for direct burial as counterpoise for airfield lighting circuits in new trench.
 - .2 Stranded with green TW insulation for placing in duct or polytube as counterpoise for airfield lighting circuits buried beneath hard surfaces (or above ground), and for power circuit insulated bonding conductors.

2.7 GROUND ROD

- .1 Copper clad steel 19 mm x 3000 mm long complete with ground connector.
- .2 Remote antennae and antennae cable

2.8 AIRCRAFT RECEPTACLE KIOSK

- .1 Kiosk to be metal clad, weatherproof enclosure, complete with internal power distribution and individual breakers for each branch circuit / duplex receptacle.
- .2 Duplex receptacles to be GFCI, c/w weatherproof in-use cover.
- .3 Kiosk to be pad mounted in location as field determined with owner/consultant.
- .4 Kiosk to be fed from identified panel in ATB/FEC, c/w step down transformer, as required.

2.9 ELEVATED RUNWAY GUARD LIGHT (RGL)

- .1 Runway Guard Light (RGL) to screw anchor mounted, LED type, dual flashing light fixture, with 2" frangible coupling.
- .2 Unit to be supplied in a weatherproof metal enclosure.
- .3 Each unit shall be illuminated by LED, with yellow light output.
- .4 Flash rate of units to be 45-50 times per minutes.
- .5 Unit to have external isolating switch.
- .6 Stainless steel tether and anti-rotation locking plate to be provided.
- .7 To meet all requirements of TP312E, 5th Edition.
- .8 Acceptable products: ADB Safegate, Eaton Crouse-Hinds.

2.10 OTHER MATERIAL

- .1 Cable ties: nylon black, length as required.

- .2 Conductor markers: as detailed on drawings.
- .3 Conduit, rigid:
 - .1 PVC: size as indicated.

Part 3 Execution**3.1 GENERAL**

- .1 Install Airport Lighting underground circuitry in accordance with Canadian Electrical Code.
- .2 Install new pull pits and polytube as shown on the drawings.
- .3 Install the appropriate size isolating transformer(s) in each pull pit. Maximum 3 transformers per pull pit.
- .4 Where there is more than one transformer in a pulpit, provide new engraved lamicoïd cable tags secured with nylon cable ties for the secondary circuits. Label all cables as they enter and exit pull boxes.
- .5 Provide engraved lamicoïd cable tags secured with nylon cables ties on each isolating transformer secondary lead to indicate which light the transformer serves.

3.2 INSTALLATION ISOLATING TRANSFORMERS

- .1 Install isolating transformers in pullpits, at locations indicated:
 - .1 In transformer pulpits or enclosures:
 - .1 Place suitable transformer(s) in pullpits / enclosures.
 - .2 Make connections to:
 - .1 Primary cable.
 - .2 Airfield lighting secondary cable.
 - .3 Ground counterpoise.
 - .3 Place back cover.

3.3 INSTALLATION OF TRANSFORMER PULLPITS

- .1 Install transformer pullpits at locations indicated.
 - .1 Excavate to size and depth indicated.
 - .2 Cover bottom of excavation with layer of bedding material.
 - .3 Place pullpit so that cover is 50 mm below adjacent ground surface.
 - .4 Make holes in pullpit wall suitable for secondary tubing used (primary cable tubing shall enter through the bottom of the pullpit).
 - .5 Install incoming and outgoing tubing and/or conduit.
 - .6 Backfill (1/2 full) with sand (inside pulpit) and common backfill material around pullpit and compact to same level and density as adjacent ground.
 - .7 Place cover on pullpit and lock, insert bolt.

3.4 INSTALLATION OF AIRPORT LIGHTING PRIMARY U/G CABLES

- .1 Install airport lighting primary underground cables, as indicated on drawings.
 - .1 Pull in ducts.
 - .2 Run in conduits.
- .2 Make connections using approved connectors as indicated.
 - .1 Leave 1000 mm loop of loose cable at each connection, avoid mechanical tension on connector.
 - .2 Install connector in accordance with manufacturer's instructions.
- .3 Install markers on cable identifying circuit numbers in each pullpit.

3.5 INSTALLATION OF GROUND COUNTERPOISE

- .1 Install with runs of series lighting primary cables, in trench, duct and/or tubing at locations as indicated:
 - .1 Use 1 conductor #8 SDBC wire with cables directly buried in trench or in protective tubing:
 - .1 Place counterpoise wire on top of additional 75 mm layer of bedding material above cables or tubing.
 - .2 Run counterpoise wire in straight line or in zig-zag pattern as indicated.
 - .2 Use 1 conductor #8 stranded with TW green insulation, with cables pulled in ducts and/or tubing under pavement.
 - .3 Use appropriate ground connector and connect counterpoise wire to:
 - .1 Power supply system common ground.
 - .2 Each light unit anchor and isolating transformer.
 - .3 Each ground rod.
 - .4 Other ground wires in same trench.
 - .5 Pullpit covers (if metal).

3.6 INSTALLATION OF SECONDARY CABLES

- .1 Install as indicated:
 - .1 Run in conduits.
- .2 Make connections using approved connectors as indicated.
 - .1 In series lighting circuits, connect to isolating transformer secondary outlet.
 - .2 Leave 60 cm loop of loose cable at connection to transformer.
 - .3 Run loose cable end above ground to light unit location.
 - .4 Backfill as indicated and compact to same level and density as adjacent ground.

3.7 TESTING

- .1 Testing requirements:

- .1 Assign tests to qualified personnel only.
- .2 Provide necessary instruments and equipment to demonstrate that:
 - .1 Circuits are continuous, free of short circuits and unspecified grounds.
 - .2 Circuits are connected according to applicable wiring diagrams.
 - .3 Circuits perform designated functions in sequence and manner intended.
 - .4 Resistance to ground of leg of a new circuit, measured with 5 kV Megger is not less than 1 gig-ohms. Megger test using the following procedure:
 - .1 For each circuit, disconnect from source and separate the A + B legs.
 - .2 Discharge capacitance in the cabling both before and after testing.
 - .3 Megger each of the A + B legs of the circuit independently. Take reading after test voltage has been applied for a period of 1 minute.
 - .5 Circuits are operable by:
 - .1 Energizing and operating each circuit at each brightness not less than 10times.
 - .2 Energizing and operating each circuit at full load for continuous period of not less than eight hours.
- .2 Provide owner/consultant with list of test results indicating:
 - .1 Location at which test was made.
 - .2 Circuit number or designator of circuit tested.
 - .3 Individual test results.
 - .4 Submit at no cost to the Consultant, 2 copies of factory production test data as requested, with each shipment of material.
 - .1 Test reports shall show manufacturer's stock number, serial number, rating, quantity, manufacturer order number, date of manufacture, type of test, and duration.

END OF SECTION

Part 1 General

1.1 RELATED WORK

- .1 Electrical-General Provisions: Section 26 05 00 – Electrical - General Requirements
- .2 Airport lighting (General): Section 34 43 10 – Airport Lighting - General

1.2 WORK TO BE PERFORMED ON MATERIAL SUPPLIED BY OTHERS

- .1 Not applicable.

1.3 MEASUREMENT FOR PAYMENT

- .1 Installation of New Airfield Sign
 - .1 Payment for this item shall include the installation of the sign as detailed on the drawings including the supply and installation of sign, installation of mounting plate and foundation/base, secondary conduit and cable, grounding, all levelling / alignment / testing, and all other required accessories and work.
 - .2 Payment for associated pullpit shall be covered under a separate unit price item for pullpits.
 - .3 Payment for this item shall be on a per unit basis.

Part 2 Products

2.1 INTERNALLY ILLUMINATED SIGNS

- .1 Airside Guidance signs, meeting all requirements of TP312 – 5th Edition, types and colours, size, quantity, mounting arrangements, as indicated on the drawings. Number of lamps and wattage as indicated or per manufacturer’s requirements.
- .2 Mounting assembly: frangible couplings with base mounting flanges for mounting on concrete pad.
- .3 Back-lit illuminated from interior LED light sources.
- .4 Secondary lead assembly from the sign, external SOW 2/C #12 cab-tire and secondary male plug.
- .5 Sign message longer than 2.44 m requires two or more separate signs.
- .6 Signs shall be suitable for operation in temperatures of -40 to +55 degrees C.
- .7 Acceptable products: ADB Safegate, Eaton Crouse-Hinds, Empower Airport Systems.
- .8 Sign shall come complete with an external weatherproof disconnect switch.

2.2 OTHER MATERIALS

- .1 Primary cable, single conductor #8 AWG, to section 34 43 10 - Airfield Lighting - General.
- .2 Secondary cable to Section 34 43 10 - Airfield Lighting - General.
- .3 Ground rod to Section 34 43 10 - Airfield Lighting - General.
- .4 Ground counterpoise wire, bare copper, #8 AWG to Section 34 43 10 - Airfield Lighting - General.
- .5 Breakable coupling to Section 34 43 10 - Airfield Lighting - General.
- .6 Isolating transformer to Section 34 43 10 - Airfield Lighting - General.
- .7 Transformer pullpit to Section 34 43 10 - Airfield Lighting - General.

Part 3 Execution

3.1 INSTALLATION PRIMARY CABLE

- .1 Install airport lighting primary cable to Section 34 43 10 - Airfield Lighting - General as a loop circuit for power supply to isolating transformers as indicated.
 - .1 Place in duct, as indicated.

3.2 INSTALLATION OF AIRPORT LIGHTING ISOLATING TRANSFORMERS

- .1 Install suitable approved isolating transformer, sized per manufacturer's instructions, 6.6A/6.6A, per Section 34 43 10 - Airfield Lighting - General, at locations indicated, place in transformer housing as indicated.
- .2 Number of isolating transformers per sign per manufacturer's instructions.

3.3 INSTALLATION OF SIGNS

- .1 Mounting of signs, mount with flanges on concrete pad as indicated, ensure that the edges of the concrete pad are flush with finished grade.
- .2 Anti-seize compound to be used for all threaded connections.
- .3 Sign leg dimensions shall not be altered in order not to affect the withstand or frangibility characteristics of the sign.
- .4 Properly align and level signs to the satisfaction of the owner/consultant.
- .5 Install 2C #12 SOW cable and 1C #6 ground with green TW insulation in duct from transformer housing to sign location. Connect ground wire to ground conductor at the isolating transformer and to the sign grounding lug.

3.4 CONTROL OF SIGNS

- .1 Lighted signs shall be energized from respective runway or taxiway series lighting circuits as indicated.

3.5 CLEANING

- .1 Clean and trim areas disturbed by operations.
- .2 Touch up any damaged finishes.

3.6 FIELD CONTROL

- .1 Perform all tests as required to Section 34 43 10.

3.7 TEST RESULTS

- .1 Provide test results to section 34 43 10.

END OF SECTION

Part 1 General

1.1 RELATED WORK

- .1 Airport Lighting (General): Section 34 43 10 – Airport Lighting General
- .2 Duct, Conduit Installation: Section 33 65 76 – Direct Buried Underground Cable Ducts

1.2 MEASUREMENT FOR PAYMENT

- .1 Removal and Reinstallation of Existing Runway Edge & Threshold/End Light
 - .1 Payment for this item shall include the disconnection, removal, and protection for re-use of the elevated runway edge light fixture as detailed on the drawings including fixture, frangible coupling, column, and cable leads. Existing fixture is mounted on a hub on pullpit lid.
 - .2 The existing series isolating transformer shall remain in place, in existing pullpit, for re-use.
 - .3 Coring of asphalt shoulder, as required, for RGS conduit/stake complete with Set 45 and hot pour sealant around pipe support shall be included in the payment item for all re-installed light unit assemblies.
 - .4 Installation of new secondary cabling to be included in this payment item.
 - .5 Secondary trenching and duct, within old asphalt areas (old asphalt shoulders to be removed), to be included in this payment item.
 - .6 Supply/installation of new mounting stake / RGS conduit c/w threaded hub suitable for existing fixture shall be included.
 - .7 Payment for these items shall be on a per-unit installed basis.
- .2 Installation of New Taxiway Edge Light
 - .1 Payment for this item shall include the supply, installation, and connection of the edge light fixture as detailed on the drawings including fixture, frangible coupling, column, RGS conduit mount/stake, cable, grounding, all levelling / alignment / testing, and all other required accessories and work.
 - .2 As required, coring of new asphalt shoulder for RGS conduit and secondary duct complete with Set 45 and hot pour sealant around pipe support shall be included in the payment item for all new or re-installed light unit assemblies.
 - .3 Secondary trenching and duct, within asphalt areas, or outside of asphalt areas/in grass/soil areas to be included in this payment item for fixture reinstallation.
 - .4 Payment for these items shall be on a per-unit installed basis.
- .3 Replacement of Runway Edge Light Lens
 - .1 Payment for this item shall include the removal of the existing white (clear) lens on existing runway edge light fixture, and replacement with split white (clear) / yellow lens.
 - .2 Payment for this item shall be on a per-unit installed basis.

- .4 Installation of New Retro-Reflective Taxiway Edge Marker
 - .1 Payment for this item shall include the supply and installation of a new retro-reflective taxiway edge marker, along with anchoring/mounting.
 - .2 Payment for this item shall be on a per-unit installed basis.

Part 2 Products

2.1 MEDIUM INTENSITY ELEVATED LIGHT - SERIES CIRCUIT

- .1 Light units shall be stake mounted as shown on drawings, complete with #12 AWG type SOW connecting cable with factory assembled male plug connector (Amerace type 91), support column, and clips and screws or hold clip ring for attachment of lens.
- .2 Fixture shall be supplied complete with lens of photometric distribution to Transport Canada specifications and with 50 mm diameter frangible coupling. Fixture height as detailed on the drawings.
- .3 Taxiway Edgelight (LED) color: blue (symmetrical)
lamp: LED, 6.6A
- .4 Approved Manufacturers: ADB Safegate, Eaton Crouse-Hinds, Empower Airport Systems.
- .5 All fixtures on shall be equipped with a 600mm long orange retro-reflective marker rod c/w a spring loaded rust resistant heavy duty mounting bracket. Bracket shall be attached to frangible coupling with stainless steel hose clamps only.
- .6 Installation of fixtures shall include aiming, levelling and testing of all fixtures.

2.2 RUNWAY EDGE LIGHT

- .1 Existing runway edge and threshold/end lighting to be re-use and relocated.
- .2 Where new approach lighting systems requires, new medium intensity threshold/end GREEN/RED fixtures shall be supplied installed:
- .3 Threshold/End Lighting color: green/red
lamp: LED, 6.6A

Part 3 Execution

3.1 LIGHT UNIT INSTALLATION

- .1 Install at locations indicated or as directed by owner/consultant.
- .2 Install to Section 34 43 10 - Airfield Lighting - General and as indicated:
 - .1 Stake mounted, or as otherwise indicated.

- .3 Assemble in accordance with manufacturer's installation instructions. Connect isolating transformer secondary lead to light unit cord assembly by means of disconnecting plug and receptacle. Do not tape this connection.
- .4 Level as recommended by manufacturer.
- .5 Install lamp of proper rating as indicated.
- .6 Install colored filters as indicated.
- .7 Install lens as indicated.
- .8 Install day identification cone as indicated.

END OF SECTION

Part 1 General

1.1 RELATED WORK

- .1 Section 26 05 00 – Common Work Results – Electrical
- .2 Section 26 05 43.01 – Installation of Cable in Trenches and in Ducts
- .3 Section 34 43 10 – Airport Lighting General

1.2 PRODUCT/SYSTEM OPTIONS

- .1 Sequenced strobe lighting system as detailed in contract.
- .2 New Towers and Support Equipment c/w all accessories, equipment, and work, to be supplied and installed by the contractor, under this contract.

1.3 WORK TO BE PERFORMED ON MATERIALS SUPPLIED BY OTHERS

- .1 Not used.

1.4 MEASUREMENT FOR PAYMENT

- .1 ODALS
 - .1 Measurement will be on a lump sum basis for each type of equipment, per the contract unit price table.
 - .2 ODALS installation shall include installation of new bases for equipment, supply and installation of new Aluminum Lattice Towers, supply and installation of new ODALS flash equipment, and all other accessories and work to ensure a fully functional system.

Part 2 Products

2.1 OMNI-DIRECTIONAL APPROACH LIGHTING SYSTEM

- .1 Sequenced flashing system consisting of five lights on approach centreline plus two simultaneously flashing units collocated around the runway threshold for a total of seven power converter units for connection to secondaries of 6.6A isolation transformers, including special cable between light units and power converter units [2#14 sync].
- .2 Acceptable products: Flash Technology, Strobe Approach Lighting Technology (SALT).

2.2 ALUMINUM TOWERS

- .1 Towers to be Millard Towers meeting the requirements of Transport Canada Specification K372.

- .2 All towers to be “climb to service” type of various heights as shown in the profiles on the drawings.

2.3 AIRPORT LIGHTING SPECIALIZED MATERIAL FOR APPROACH LIGHTING SYSTEM

- .1 Sequence flashing control cable for connection between power converter units, 2/C #14, 600 V, MINUS 40, PVC jacket in duct (or per manufacturer requirements).
- .2 Primary cable, #8 AWG, 5000 V, to section 34 43 10 - Airfield Lighting - General.
- .3 Primary and secondary connectors to section 34 43 10 - Airfield Lighting - General.
- .4 Isolating transformers to section 34 43 10 - Airfield Lighting - General.
- .5 Ground rods to section 34 43 10 - Airfield Lighting - General.
- .6 Ground counterpoise wire to section 34 43 10 - Airfield Lighting - General.

Part 3 Execution

3.1 ODALS

- .1 ODAL Approach Lighting System Layout shall be as indicated on electrical drawings.

3.2 INSTALLATION OF ODALS SYSTEM

- .1 Install airport lighting primary cable in accordance with Section 34 43 10 - Airfield Lighting - General, as a feeder circuit, along the route indicated on site drawing layout.
 - .1 Pull in duct.
 - .2 Connect to circuit for ODALS system.
 - .3 Splice new feeder cables using approved connectors.
- .2 Install airport lighting primary cable in accordance with Section 34 43 10 - Airfield Lighting - General, as loop circuit for power supply to isolating transformers as shown on site lighting layout drawing.
- .3 Install approved isolating transformers, 300 W 6.6A/6.6A for sequenced flashing light units at locations indicated on layout drawings.
 - .1 Place in transformer pullpit as detailed.
- .4 Connect each power converter unit with a 2 conductor 312 SOW (cabtire) cable and terminate other cable end with male secondary connector per manufacturer’s instructions. Mate this connector with matching female connector unit:
 - .1 Factory moulded type on secondary lead of isolating transformer.
- .5 Install ODALS flash-head and power converter units on aluminum tower and connect with special 5/C cable in accordance with manufacturer’s instructions.

- .6 Install sequence flashing control cable, 2C#14 between power converter units located at each light unit location. Pull in duct to section 26 05 43.01- Installation of Cables in Trenches and in Ducts.

3.3 INSTALLATION OF GROUNDING

- .1 Install ground rods as indicated.
- .2 Install 1 conductor #8 SDBC wire (counterpoise) and make connections to ground rods, transformer lugs, column ground anchors, tower grounding lugs using suitable ground connectors.

3.4 ALIGNMENT OF ODALS UNITS

- .1 Align units to ensure their location and elevation are as per consultant's instructions and to meet TP312, 5th Edition requirements.
- .2 Set units as indicated on drawings.

3.5 FIELD QUALITY CONTROL

- .1 Perform tests to Section 34 43 10 - Airfield Lighting - General.

3.6 TEST RESULTS

- .1 Provide test results to Section 34 43 10 - Airfield Lighting - General.

END OF SECTION

Part 1 General

1.1 RELATED WORK

- .1 Section 34 43 10 – Airport Lighting General
- .2 Section 26 05 00 – Electrical General Provisions
- .3 Section 26 05 43.01 – Installation of Cables in Trenches and in Ducts

1.2 MEASUREMENT FOR PAYMENT

- .1 New MALS/MALSF/MALSR Approach Lighting Equipment
 - .1 Payment for this item shall include all work for a complete and fully operational system, including the supply and installation of all elevated approach lighting, Millard Towers and associated foundations, cross arms, service platforms, approach lighting fixtures, secondary cabling, polytube / duct, and all required accessories and work.
 - .2 Payment for this item shall include the supply, installation, mounting, and connection of all equipment, accessories and work for a complete installation.
 - .3 Payment for this item shall be on a lump sum basis.
 - .4 This item is a provisional item, and will only be undertaken if selected at the time of contract award, or by contract amendment.

Part 2 Products

2.1 AIRPORT LIGHTING SPECIALIZED EQUIPMENT FOR MEDIUM INTENSITY APPROACH LIGHTING SYSTEM

- .1 Light unit: steady burn white (Quartz), green (LED)
 - .1 Acceptable material: ADB Safegate, Eaton Crouse-Hinds, Empower Airport Systems
 - .2 Steady burning fixtures shall be supplied complete with lamps and lenses and shall produce photometric distribution output meeting Transport Canada specifications for medium intensity approach lights.
 - .3 Steady burning lights shall operate at three (3) intensity settings.
- .2 Sequenced Flash Strobes
 - .1 Supply and install 3 or 5 (MALSF – 3, MALSR – 5) uni-directional sequenced flashing capacitor discharge lights (or LED, optional pricing), complete with support structures
 - .2 Each flashing light unit shall be complete with a current powered power converter. Ensure the manufacturer accounts for the distance between the flash heads and the power converters. Approved manufacturer: Flash Technology, Strobe Approach Lighting Technology (SALT).
 - .3 Each flashing light shall be supplied with a suitable length of flash head cable.
 - .4 Each flashing light and its power converter shall be suitable for tower mounting as specified on the drawings.

- .5 Flashing lights shall comply with Transport Canada photometric output requirements and shall operate at three (3) intensity settings.
- .6 The flashing light units and their triggering circuitry shall be constructed so that the failure of one or more units will not effect the operation of the remaining units.
- .3 Aluminum tower and accessories: Millard Towers.

2.2 INSTALLATION OF MEDIUM INTENSITY APPROACH LIGHTING SYSTEM

- .1 Install airport lighting primary cable in accordance with Section 34 43 10 - Airfield Lighting - General, as feeder circuit, along route indicated on site lighting drawing layout.
 - .1 Pull in new polytube or duct.
 - .2 Minimize splices. Splice new feeder cables, using approved connectors.
- .2 Install airport lighting primary cable in accordance with Section 34 43 10 - Airfield Lighting - General, as loop circuit for power supply to isolating transformers as shown on site lighting layout.
- .3 Install approved isolating transformer, size per vendor recommendations, 6.6A in accordance with Section 34 43 10 - Airfield Lighting - General at locations shown on site lighting drawing.
 - .1 Place in transformer pullpit, pullbox, or tower mounted NEMA 4 box (if applicable).
- .4 Install medium intensity approach light units at locations shown on site lighting drawing, and as indicated at site by Consultant.
 - .1 Mount lighting units on light standards and/or structures to height, footing elevation and light centre elevation indicated in appropriate data tables on approach lighting site drawing layout.
 - .1 Install on breakable coupling (type II) using levelling bracket, and connect to isolating transformer secondary connector, using 2 conductor, #12 cabtire cable and approved secondary connector, as indicated.
 - .2 Install on aluminum column mounted on breakable coupling (type III) using levelling bracket, and connect to isolating transformer secondary connector, using 2 conductor #12 cabtire cable and approved secondary connector, as indicated.
 - .3 Install on aluminum tower and connect to isolating transformer secondary connector, using 2 conductor #12 cabtire cable and approved secondary connector, as indicated.
 - .4 Perform wiring of system in accordance with standard drawings and manufacturer's requirements.

2.3 INSTALLATION GROUNDING EQUIPMENT

- .1 Install 1 conductor #8 SDBC (in trench) or #8 insulated green (in polytube) wire and make proper connections to ground rods, transformer lugs, column ground anchors and tower grounding lugs using suitable ground connectors.

2.4 ALIGNMENT OF UNITS

- .1 Align units to ensure their location and elevation are as shown on site drawing layout.

2.5 FIELD QUALITY CONTROL

- .1 Perform field tests to Section 34 43 10 - Airfield Lighting - General.

2.6 TEST RESULTS

- .1 Provide test results to Section 34 43 10 - Airfield Lighting - General.

END OF SECTION

Part 1 General

1.1 RELATED WORK

- .1 Airport lighting Section 34 43 10 – Airfield Lighting – General

1.2 WORK TO BE PERFORMED ON MATERIAL SUPPLIED BY OTHERS

- .1 Existing PAPI equipment to be relocated / reinstalled.

1.3 MATERIALS TO BE SUPPLIED UNDER THIS SECTION BUT INSTALLED BY OTHERS

- .1 N/A

1.4 TEST REPORTS

- .1 Aim and calibrate PAPI equipment per manufacturer’s instructions. Record results (aiming angles) and provide to owner / consultant.

1.5 MEASUREMENT FOR PAYMENT

- .1 Installation of PAPI System and Bases
 - .1 Payment for this item, shall be on the basis of each system relocated and reinstalled, and shall include excavation, base preparation, foundation installation, installation of PAPI equipment at proposed location, conduit and cabling between PAPI units and pullpits (pullpits to be included under separate unit measurement for payment item), grounding, levelling / alignment / testing, and all other required accessories and work.

Part 2 Products

2.1 PAPI LIGHT UNITS

- .1 Existing PAPI equipment to be re-used / relocated.

2.2 OTHER MATERIALS

- .1 Anchor stake, rigid conduit, galvanized steel, 50.8 mm diameter.
- .2 Primary cable, single conductor #8 AWG, to Section 34 43 10 - Airfield Lighting – General.
- .3 Secondary cable, two conductor #12 AWG, to Section 34 43 10 - Airfield Lighting – General.
- .4 Ground counterpoise wire, bare copper, #8 AWG, to Section 34 43 10 - Airfield Lighting – General.
- .5 Ground rod to Section 34 43 10 - Airfield Lighting – General.

- .6 Conduit Coupling, galvanized steel, 50 mm to Section 34 43 10 - Airfield Lighting – General.
- .7 Isolating transformer, 200 W, 6.6A / 6.6A to Section 34 43 10 - Airfield Lighting – General.
- .8 Primary Connector, to Section 34 43 10 - Airfield Lighting – General.
- .9 Secondary fixture connector, to Section 34 43 10 - Airfield Lighting – General.
- .10 Secondary transformer connector, to Section 34 43 10 - Airfield Lighting – General.
- .11 Cable ties, to Section 34 43 10 - Airfield Lighting – General.

Part 3 Execution

3.1 INSTALLATION OF PRIMARY FEEDER CABLE

- .1 Install airport lighting primary cable to Section 34 43 10 - Airfield Lighting - General as a loop circuit for power supply to isolating transformers as indicated.

3.2 INSTALLATION OF AIRPORT LIGHTING ISOLATING TRANSFORMERS

- .1 Install approved isolating transformer, 200W, 6.6A / 6.6A, per Section 34 43 10 - Airfield Lighting – General, at locations indicated, place in transformer housing as indicated.

3.3 INSTALLATION OF PAPI UNITS

- .1 Locate PAPI units as indicated.
- .2 Install mounting plates, as indicated.
- .3 Cut legs to length required to provide indicated PAPI height above the ground.
- .4 Assemble units per manufacturers instructions.
- .5 Install secondary cables 2C #12 SOW from the isolating transformers as indicated.
- .6 Install ground rods as indicated. Make connections to ground rods and equipment housings using 1/C #8 SDBC wire and suitable ground connections.
- .7 Level units and adjust per manufacturer’s instructions and to the angular settings as indicated and as directed by the Consultant. Align each PAPI unit so that the aperture is horizontal and at the same elevation as the other units. Utilize equipment supplied or specified by PAPI manufacturer for levelling and angular adjustments.

END OF SECTION

Part 1 General

1.1 RELATED WORK

- .1 Airport lighting Section 34 43 10 - Airfield Lighting – General

1.2 WORK TO BE PERFORMED ON MATERIAL SUPPLIED BY OTHERS

- .1 N/A

1.3 MATERIALS BE SUPPLIED UNDER THIS SECTION, BUT INSTALLED BY OTHERS

- .1 N/A

1.4 MAINTENANCE AND OPERATIONAL DATA

- .1 Provide Operations & Maintenance Instructions and Materials.

1.5 WIRING DRAWINGS

- .1 For installations of regulator assembly, provide full size stable-base reproducible showing control wiring schematic.

1.6 SUBSTITUTIONS

- .1 Airport lighting specialized equipment and materials, identified in Part 2 as "approved products" or "approved manufacturers" have prior approval of Department of Transport, Professional and Technical Services Branch, AKPE, Ottawa, K1A 0N8, and no substitutions shall be made.

1.7 MEASUREMENT FOR PAYMENT

- .1 New Constant Current Regulator (Provisional)
 - .1 Payment for this item shall be on a per-unit basis, and shall include the supply, installation, connection (power and control), testing, and commissioning of each new Constant Current Regulator (CCR).
 - .2 All conduit/cabling to connect to existing electrical distribution panel in the FEC, along with any new breaker required, shall be included in the price for this item.
 - .3 All conduit/cabling to connect the controls to the existing airfield lighting control system / PLC, shall be included in price for this item.

Part 2 Products

2.1 REGULATOR ASSEMBLY

- .1 Indoor metal-clad regulator assembly, composed of power entrance, c.c. regulator, control, cubicles, input voltage 208V volts, to DOT specification No K290. Equipment rating shall be as indicated on drawings.

- .2 Units shall be stackable.
- .3 CCR to be Ferro type.
- .4 Approved manufacturer:
 - .1 ADB Safegate, Eaton Crouse-Hinds, Empower Airport Systems.

Part 3 Execution / Installation Regulator Assembly

- .1 Install in new FEC building.
- .2 Make all necessary electrical connections, of external wiring, as indicated.
- .3 Wire external control wiring to terminal blocks within control cubicle, as indicated.

3.2 WIRE IDENTIFICATION

- .1 Supply and install permanent wire markers for external control leads at termination points in control cubicle.
- .2 Use wire markings as indicated.

3.3 CARDS

- .1 Where equipment is furnished with cardholders, provide and insert cards with printed designations as indicated.

3.4 WIRING DIAGRAM

- .1 Install wiring diagrams showing final connections and markings, under glass in a wooden picture frame.
- .2 Mount framed diagram as directed by Consultant.

END OF SECTION

Appendix A – Plan of Construction Operations



Plan of Construction Operations

**RUNWAY 13-31, TAXIWAY A AND APRON I
REHABILITATION**

At

**Quesnel Regional Airport
Quesnel, BC**

Tetra Tech Project No. TRN.AIRP03389-02

Date: January 17, 2022

Site Name: Quesnel Regional Airport

Project: Runway 13-31, Taxiway A and Apron I Rehabilitation

Start Date: April 01, 2022 Finish Date: October 31, 2022

Originator: Name: Tommy Grant

Company City of Quesnel

Phone (250) 992-2208

E-mail tgrant@quesnel.ca

Other Contacts:

Name: Noah Dietrich

Company Tetra Tech Canada Inc.

Phone (778) 940-1302

E-mail Noah.Dietrich@tetrattech.com

Name: Alex Evans

Company Tetra Tech Canada Inc.

Phone (778) 945-5875

E-mail Alex.Evans@tetrattech.com

Name: YQZ Maintenance

Company City of Quesnel

Phone (250) 991-6361

Description of Work

The Plan of Construction Operations (PCO) addresses the airside construction works and operational constraints for the Runway 13-31, Taxiway A and Apron I Rehabilitation project at the Quesnel Airport (YQZ). The project involves rehabilitation of Runway 13-31, Taxiway A, and Apron I asphalt and concrete surfaces as well as an airfield electrical rehabilitation including:

- Removal of Runway 13-31 existing asphalt and concrete to decrease the width of Runway 13-31 from 61m to 45m;
- Removal of existing Runway 13-31 asphalt blastpads and either reconstruction with new base gravels and Hot Mix Asphalt Concrete (HMAC) or replacement of asphalt with topsoil and hydroseed;
- Hot-In-Pace-Recycling (HIPR) for Runway 13-31, followed by an HMAC overlay;
- Partial depth Portland Cement Concrete (PCC) repairs for select Runway 31 PCC panels followed by an HMAC overlay above the PCC;
- Partial depth PCC repairs for select Apron I PCC panels;
- Cold milling and paving new HMAC for Taxiway A and Apron I asphalt;
- Repairs to one damaged manhole;
- Raising of manhole grates to match new asphalt elevations;
- Painting temporary and permanent pavement markings;
- Installation of new runway approach lighting system;
- Installation of new windsocks and new airfield signage;
- Relocation of existing PAPI's and runway edge lighting;
- Clearing of existing trees that protrude through the approach/departure obstacle limitation surfaces.

The Contractor shall abide by this PCO and associated drawing(s) while performing work on airside.

All work airside will be performed under airside security escort.

All work on airside will conform to TP312E Transport Canada's *Aerodrome Standards and Recommended Practices* manual 5th Edition.

Work Sections / Operational Constraints

The work on this project is both airside and groundside. The project is shown as one airside section (Section 1) and one groundside section (Section 2) as noted on the PCO drawing(s). All hours of work are Local Time unless noted otherwise.

In order to not duplicate the notes here and on the drawings, please see the attached drawing(s) for specific requirements for the Sections of Work.

Stages/Phase/Areas of the Construction & Schedules:

Project Milestones

PCO to be in effect from April 01, 2022 through until Oct. 31, 2022.

The Following Milestones are envisioned in the preparation and execution of the Runway 13-31, Taxiway A and Apron I Rehabilitation project:

- Commence Construction: Estimate May 16, 2022
- Expected Completion Date: Estimate July 30, 2022

Proposed Work Plan

Construction traffic will be separated from the air traffic as described in the attached drawing(s).

Types & Frequency of Air Traffic:

See Annex 4 for Flight Schedule.

Disruptions to Air Traffic:

Runway 13-31, Taxiway A, and Apron I will be closed by NOTAM daily from:

- Monday to Thursday: 12:00 - 00:00 (local time)
- Friday: 17:00 – 23:59 (local time)
- Saturday: 12:00 - 23:59 (local time)
- Sunday: 17:00 - 23:59 (local time)

Contractor to pull back men and equipment for any aircraft emergency or medivac aircraft movements. Fixed wing medevac aircraft require 120 minutes prior notice. All airfield lighting, PAPI's, approach lighting, etc. will be turned off at the start of work shifts and turned on at the end of work shifts, 30 minutes prior to NOTAM expiry, or for emergency / medevac aircraft movements.

Position and height of equipment (Relative to Runways & Taxiways):

All equipment will pull back to be below the Obstacle Limitation Surface Transitional Surface for any aircraft movements. Contractor to pull back all

men and equipment at least 117m from the runway centreline and 26m from the taxiway centreline for any aircraft emergency or medivac aircraft that require use of the runway or taxiway.

Types of Equipment:

(Note: All heights are above ground level and exact height will vary depending on actual type of equipment)

- Excavator – Loaded Boom (approx. 6.7m or 22 ft)
- Excavator – Boom Extended (approx. 9.2m or 30 ft)
- Standard Dump Truck – truck box not extended (approx. 4m or 13 ft)
- Standard Dump Truck – truck box extended (approx. 6m or 20 ft)
- Loader - Bucket elevated (5.5m or 18 ft)
- Grader (3.2m or 11 ft)
- Access Vehicles (pick-up trucks)
- Roller (approx. 3.6m or 12 ft.)
- Paver (approx. 3.6m or 12 ft.)
- Milling machine (approx. 3.6m or 12 ft.)

Work Adjacent to Runways / Taxiways / Aprons:

Work adjacent to the runway, taxiways, and apron will be done in accordance with TP312E – Aerodrome Standards & Recommended Practices, 5th Edition, and Transport Canada Advisory Circular AC 302-003 with operational constraints as described above and on the PCO drawing(s). The Airside Escort will remain in contact with the Williams Lake FSS from 06:00 – 22:00 Local Time, monitor radio frequency MF 122.2, and advise the Contractor to pull back if and as required. The Contractor’s men and equipment shall respond immediately to Airside Escort’s commands. The Contract Administrator’s representative along with the Contractor, must perform a FOD check prior to re-opening any runway, taxiway, or apron and confirm that all airfield lighting is operational.

Unserviceability Markings, Barriers, Delineators and Lighting Provided:

Unserviceability delineators / red lights will be as detailed on the drawings and the attached Annex 5.

Runway and Taxiway closure X markings will not be utilized due to the nature of temporary closures and daily return to service requirements

Displaced and/or Relocated Thresholds:

No displaced and/or relocated thresholds are anticipated under this project however full runway, taxiway, and apron closures are required, see above.

Declared distances during all Phases/Areas:

The declared distances will NOT change during or after completion of this project.

NOTAM:

1. All NOTAMs issued for the project shall be issued in accordance with NAV CANADA's "Canadian NOTAM Procedures Manual".
2. Below is a sample NOTAM to reflect the current work schedule. The schedule may be adjusted to increase or decrease the closures depending on work progress.
 - A) CYQZ B) 2205162000 C) 2207300759
 - D) MON-THU 2000-0759Z (1200-2359L), FRI 0100-0759Z (1700-2359L), SAT 2000-0759Z (1200-2359L), SUN 0100-0759Z (1700-2359L)
 - E) RWY 13/31, TWY A, & APRON I CLSD DUE CONST, 120MINS PN MEDEVAC USE

Access Control, Vehicle Operations, Airside Escort, Covid-19 Proof of Vaccination and Access Passes:

Site Access

Airside access will be through security gate(s) as shown on PCO drawing(s).

See below for details of vehicle, personnel and access control requirements including access control guards and the Airside Escort.

Airside Escort

For all work on this project, control over construction men and equipment and the work crews will be provided by the Airside Escort. This person(s) fully comprehends Quesnel Regional Airport's airside safety procedures and regulations.

The Airside Escort will control the activities of the Contractor's men and equipment and the inspection staff by rigidly enforcing the airside regulations.

The Airside Escort will continuously monitor aircraft radio frequencies published in the Canadian Flight Supplement (CFS) for the work activities.

The Airside Escort must meet the following requirements:

- Possess an Airside Vehicle Operator's Permit for The Quesnel Regional Airport and a valid Restricted Radio Operator's Licence.
- Possess adequate knowledge of the airside environment and requirements.

The Contractor shall provide the Airside Escort(s). The Quesnel Airport shall provide training for these personnel as required at no cost to the Contractor.

Airside Escort Vehicle

The airside escort vehicle shall be equipped with a 360-degree flashing amber beacon, a 2-way radio complete with outside loudspeaker, and a VHF radio capable of receiving and transmitting on the CFS airport frequencies. This vehicle will require an airside vehicle permit. The operator of the vehicle must possess the same qualifications as the Airside Escort. The Airside Escort Vehicle shall be provided by the Contractor.

Access Control Guard (Gate Guard)

The Access Control Guard(s) will control access to the construction site. The Access Control Guard(s) must fully comprehend Quesnel Regional Airport's airside safety procedures and regulations.

The Contractor will provide Access Control Guard(s) for all access through all gates and for whenever airside gates are unlocked. Access Control Guard(s) shall control the gate(s) in order to ensure unauthorized personnel, animals, etc. do not enter the airside and that the gate(s) close behind vehicles. Access Control Guard(s) to confirm that each worker entering airside display a valid airside access pass. The Airport will provide training for the Contractor's personnel for this position at no cost to the Contractor.

Covid-19 Proof of Vaccination Requirements

All workers working on airside are required provide proof of Covid-19 vaccination.

Airside Access Passes

Airside Access Passes are required for this project. All workers working on airside must obtain an Airside Access Pass and display the pass whenever requested. The Airport will issue the individual Airside Access Pass to each worker upon completion of Contractor Orientation Form (Annex 3) and verification of proof of Covid-19 vaccination.

Movement Restrictions

Movement of Contractor's personnel and equipment is restricted to the construction area and controlled by the Airside Escort. Refer to Plan of Construction Operations drawing(s).

Vehicle Control Requirement

- .1 Airside Escort shall control all Contractor's personnel and equipment when on airside.
- .2 Airside Escort shall escort all Contractor's personnel and equipment to and from the work site.
- .3 Contractor's personnel must obey directions given by the Airside Escort at all times and without delay. ***Contractor personnel who disregard directions given to them by the Airside Escort will be subject to immediate removal from the site for the duration of the project.***

Communications Plan (Prior to Construction & During Construction):

See attached Lines of Communication Chart in Annex 2.

1. RESPONSIBILITIES

The following are the basic responsibilities of those directly involved in the project, during construction:

.1 AIRPORT AND TRANSIT SUPERVISOR (ATS)

The Operations Supervisor or designated representative is responsible for the following:

- .1 Advising aircraft operators of the construction schedule updates and operating procedures for the various Phase/Areas of work.
- .2 Providing NOTAMs advising of operational constraints including closure of the Runway and Taxiways to NAV Canada for issue at various times during the project.
- .3 Advising the Consultant of any operational, safety, or security concerns that arise during the project.
- .4 Advising NAV Canada of changes in the construction schedule which might impact on their primary responsibilities.

- .5 Participating in the acceptance of the completed work as the operational representative.
- .6 Meeting with Contractor and/or Consultant as required to inspect any surfaces being reopened and to review operational, safety, security concerns, and schedule for the following work shift.
- .7 Be in close contact with the Contractor and brief the Contractor on their obligation to report hazards under the airport's safety management system (SMS) program.
- .8 Designating a safety reviewer who will make periodic inspections of the entire job site and who will review in detail:
 - F.O.D. (foreign object damage) prevention,
 - Security,
 - Safety.
- .9 Advise Transport Canada of project completion.

.2 NAV CANADA

- .1 Ensuring operational directives issued by the Operations Supervisor are followed in accordance with Air Traffic Control (ATC)/Flight Service Station (FSS) operational procedures.
- .2 Issue NOTAMs provided by the Airport.
- .3 Advising air traffic of NOTAMs and voice advisories that are in effect.
- .4 Advising air traffic of operational restrictions and limitations regarding airport facilities.

.3 AIRPORT TENANTS

Provide current timetable of scheduled operations and advise Operations Supervisor of any revisions to scheduled operations.

.4 CONSULTANT

The Consultant will provide inspection duties, liaise with the ATS or designated representative, and is responsible for the following:

- .1 Co-ordinating the construction work through the Contractor.
- .2 Advising the Operations Supervisor of any problems, safety or security concerns related to the project.
- .3 Ensuring that operational directions provided by the Operations Supervisor are followed by all workers.

- .4 Ensuring the Airport is advised 48 hours prior for any approved NOTAM changes so that the Airport may advise NAV Canada – FSS Manager.
- .5 Ensuring that the Contractor complies with all airport safety, security, and operational requirements for the project at all times.
- .6 Monitoring construction progress, quantity and quality of construction materials, and inspection performance.
- .7 Implementing systems and procedures to ensure proper inspection and testing of the work.
- .8 Responsible for all other aspects of the construction project not specifically assigned.

.5 CONTRACTOR

The Contractor is responsible for the construction work on the project as specified in the Contract. The following requirements for the Contractor are mandatory and will be incorporated into the Contract Documents:

- .1 Contractor's personnel and subcontractors are restricted to the area perimeters shown on the PCO drawing.
- .2 Security regulations are to be followed.
- .3 Vehicular traffic regulations are to be followed.
- .4 Directions from the Airside Escort are to be followed.
- .5 All private vehicles, materials, and non-working equipment are to be located on Groundside in designated area.
- .6 Manoeuvring areas and public use areas to be kept clean and free of dust and debris.
- .7 All Contractor's vehicles permitted on airside as part of the work requirements must be equipped with a 360-degree flashing amber beacon.
- .8 Contractor to install, and maintain all necessary fencing, barricades, lights, delineators as noted on the drawings and/or directed by the Airport at no cost to the Airport.
- .9 Ensuring the Consultant is advised 48 hours prior for any approved NOTAM changes so that the Airport may advise NAV Canada – ATC/FSS Manager
- .10 Reporting hazards to the ATS under the airport's safety management system (SMS) program.
- .11 Proof of Covid-19 vaccination and copies of the Contractor's Orientation Forms signed by all personnel that will be accessing airside. Copies must be kept on site and available at all times during the project.

2. LINES OF COMMUNICATION

The following is a summary of communication procedures relating to the project implementation stage (see Annex 2). Only the Operations Supervisor or designate shall have communication with Transport Canada or NAV Canada.

.1 OPERATIONS SUPERVISOR

The Operations Supervisor will advise tenants and air operators of operational status of facilities and any scheduled interruptions. Requirements and concerns of tenants and air operators will be communicated to the Consultant.

The Operations Supervisor will liaise with the Consultant and Manager ATC/FSS to resolve operational or security concerns.

.2 CONSULTANT

The Consultant will respond to operational or safety concerns made known by the Operations Supervisor and will direct the Contractor. If there are problems he cannot resolve, he is to advise the Operations Supervisor.

The Consultant will liaise with the Operations Supervisor and will advise the Operations Supervisor of proposed changes to the work.

The Consultant will issue a weekly summary to YQZ Operations staff and Project Managers outlining shift activities, construction progress, irregularities, and upcoming shift activities and any operational changes required.

.3 CONTRACTOR

Safety and security are paramount at the airport site. The Contractor will assume full responsibility for all construction workers, including Sub-Contractors and advise them accordingly.

The Contractor shall, for the purposes of the Workers Compensation Act, and for the duration of this Contract, be the "Prime Contractor" for the "work site".

The Contractor is responsible for implementation of the construction Contract in accordance with all of its terms and conditions. The Contractor will inform the Consultant of any contractual, operational, or safety concerns.

.4 AIRLINE OPERATORS, TENANTS, AND MAJOR USERS

All airline operators, tenants and major users are to make their operational concerns known to the ATS.

.5 REPORTING SYSTEMS

.1 Site Instructions

The ATS is to issue Site Instructions to the Consultant verbally and confirmed in writing, to revise safety or operations procedures as required.

Security and Safety

All persons, equipment and vehicles permitted airside of the security fence by virtue of doing work under this project must remain within the delineated boundaries of the work area and access route(s). No private vehicles will be permitted airside of the security fence. No person will be permitted airside except during approved scheduled working hours without the specific authorization of the Operations Supervisor.

1. Security

Responsible Personnel

Contractor shall provide the Operations Supervisor with a list of Consultant and Contractor's responsible personnel who may be contacted after working hours in case of emergency.

2. Safety

YQZ will conduct a face-to-face briefing with the Contractor at the start of the work and ongoing at regular intervals throughout construction as a reminder to ongoing employees and to ensure that any new employees are briefed. It is the responsibility of the Contractor to ensure all personnel on site have been briefed on airside safety procedures.

Safety is a regular agenda item at construction meetings.

All vehicles operating Airside of the Quesnel Regional Airport must be equipped with a 360-degree flashing amber beacon. This beacon must be on when Airside.

All workers on airside shall wear high visibility clothing and personal protection equipment as required by WorkSafe BC.

The safety of aircraft, passengers, and the public must not be compromised during this project. Any operations that may jeopardize the safety of operations must be reported immediately to the ATS and Consultant.

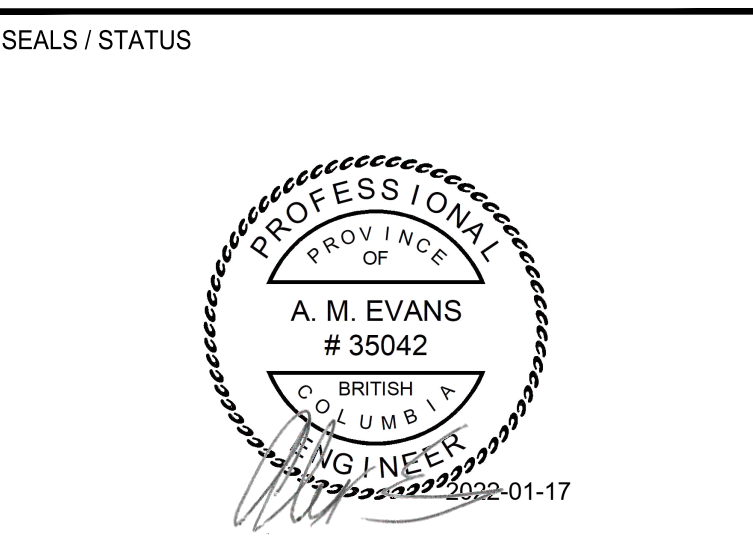
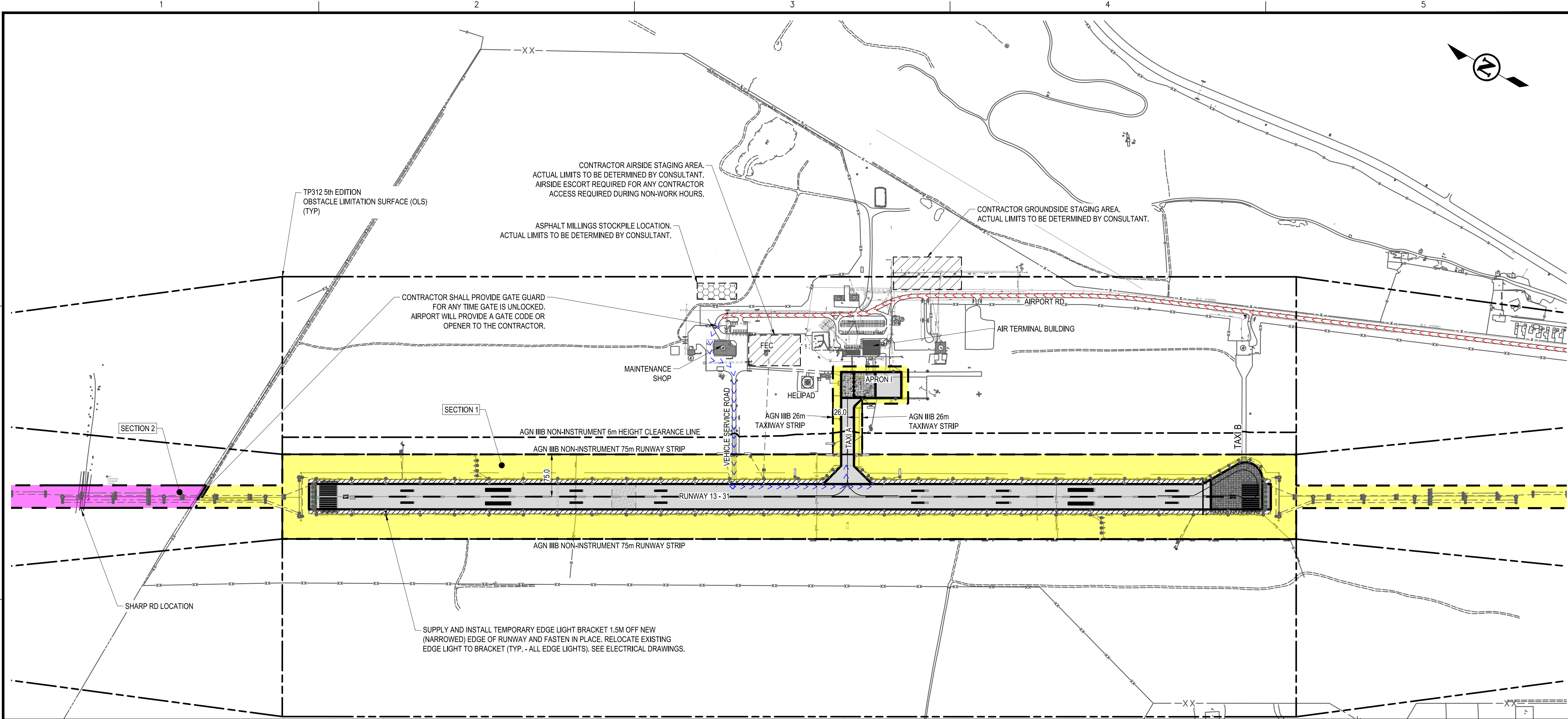
A report shall be made to Airport Operations by telephone or radio at the end of each work shift by the Contractor to confirm that the surfaces adjacent to the work area have been inspected by himself and the ATS representative and is in suitable condition for aircraft operations.

The ATS has the authority to issue a "Stop Work Order".

Annex 1

Plan of Construction Operations

See Drawings G-101 and G-102



**RUNWAY 13 - 31,
TAXIWAY A AND APRON I
REHABILITATION**

**QUESNEL REGIONAL AIRPORT
QUESNEL, BC**

ALL WORK SECTIONS - OPERATIONAL CONSTRAINTS

- MILESTONE SCHEDULE DATES ARE PROVIDED IN THE CONTRACT DOCUMENTS.
- WORK HOURS AS ACCEPTED BY THE AIRPORT REPRESENTATIVE BUT ANTICIPATED TO BE THE FOLLOWING DUE TO SCHEDULED FLIGHTS:
 - MONDAY TO THURSDAY: 12:00 - 00:00 LOCAL
 - FRIDAY: 17:00 - 23:59 LOCAL
 - SATURDAY: 12:00 - 23:59 LOCAL
 - SUNDAY: 17:00 - 23:59 LOCAL
- SCHEDULED FLIGHT TIMES ARE SUBJECT TO CHANGE. CONTRACTOR TO WORK WITHIN THE WORK HOURS PROVIDED AND NO ADDITIONAL PAYMENT WILL BE MADE DUE TO CHANGES IN THE FLIGHT SCHEDULE.
- CONTRACTOR MUST COMPLETE CONSTRUCTION, CLEAN-UP, INSPECTION BY THE CONSULTANT AND ANY FURTHER CLEAN-UP REQUIRED, WITHIN THE WORK HOURS SHOWN.
- CONSTRUCTION START TIMES MAY BE DEPENDENT ON THE LAST AIRCRAFT ARRIVAL OR DEPARTURE AND ANTICIPATED START TIMES MAY VARY UP TO 15 MINUTES. NO STANDBY TIME WILL BE PROVIDED FOR ANY START TIME DELAYS OF 15 MINUTES OR LESS. ALL EFFORTS WILL BE MADE TO MEET THE ANTICIPATE START TIMES.
- CONTRACTOR STAGING AREAS ARE SHOWN.
- TRANSPORT CANADA REQUIRES THAT ALL WORKERS WORKING AIRSIDE PROVIDE PROOF OF COVID-19 VACCINATION.
- ALL WORKERS WORKING ON AIRSIDE MUST OBTAIN AN AIRSIDE ACCESS PASS AND DISPLAY THE PASS WHENEVER REQUESTED. YOZ WILL ISSUE THE INDIVIDUAL AIRSIDE ACCESS PASS TO EACH WORKER UPON COMPLETION OF CONTRACTOR ORIENTATION FORM AND VERIFICATION OF PROOF OF COVID-19 VACCINATION.
- ESCORTED ACCESS ROUTE TO THE WORK AREA AND BACK TO GROUNDSIDE SHOWN. CONTRACTOR TO IMMEDIATELY SWEEP AND COLLECT ANY FOD ALONG ACCESS ROUTE. ONLY COMPANY VEHICLES AND EQUIPMENT WILL BE ALLOWED IN THE AIRSIDE CONSTRUCTION AREA.
- AIRSIDE ESCORT (A.E.) IS REQUIRED AT ALL TIMES CONTRACTOR'S PERSONNEL / SUBCONTRACTORS ARE ON AIRSIDE. A.E. TO MONITOR ALL ACTIVITY IN THE AIRSIDE CONSTRUCTION AREAS.
- CONTRACTOR SHALL CONTROL AND BE RESPONSIBLE FOR CONTRACTOR'S PERSONNEL / SUBCONTRACTORS.
- A.E.'S SHALL BE IN CONTINUOUS RADIO CONTACT WITH WILLIAMS LAKE F.S.S. WHICH IS OPERATIONAL FROM 06:00 - 22:00 LOCAL TIME. OUTSIDE OF THESE HOURS, A.E. TO MONITOR RADIO FREQUENCY MF 122.2.
- A.E.'S SHALL HAVE A VALID AIRSIDE VEHICLE OPERATORS PERMIT (AVOP) FOR THE QUESNEL REGIONAL AIRPORT AND A VALID RESTRICTED RADIO OPERATOR'S LICENSE. THE AIRPORT WILL PROVIDE TRAINING FOR THESE PERSONNEL AS REQUIRED AT NO COST TO THE CONTRACTOR.
- A.E.'S VEHICLE SHALL BE EQUIPPED WITH ROTATING AMBER BEACON AND RADIO ETC. AS NOTED IN THE ACCESS CONTROL, VEHICLE OPERATIONS, AND AIRSIDE ESCORT SECTIONS OF THE PCO DOCUMENT.
- CONTRACTOR WILL PROVIDE AN AIRSIDE ESCORT WITH VEHICLE FOR ALL TIMES THE CONTRACTOR'S PERSONNEL ARE AIRSIDE.
- AIRPORT WILL PROVIDE THE CONTRACTOR WITH A REMOTE GATE OPENER, KEYS, OR ACCESS CODE FOR GATES.
- CONTRACTOR WILL PROVIDE AN ACCESS CONTROL GUARD FOR ALL ACCESS THROUGH ALL GATES AND FOR WHENEVER AIRSIDE GATES ARE UNLOCKED. THE ACCESS CONTROL GUARD SHALL CONTROL THE GATE(S) IN ORDER TO ENSURE UNAUTHORIZED PERSONNEL, ANIMALS, ETC. DO NOT ENTER THE AIRSIDE AND THAT THE GATE(S) CLOSES BEHIND VEHICLES. ACCESS CONTROL GUARD TO CONFIRM THAT EACH WORKER ENTERING AIRSIDE DISPLAY A VALID AIRSIDE ACCESS PASS.
- AIRSIDE ESCORTS (A.E.) AND ACCESS CONTROL GUARD (A.C.G.) IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE AND SCHEDULE THE A.E. AND A.C.G.'S.
- THE CONTRACTOR SHALL FOLLOW ANY INSTRUCTIONS FROM THE AIRPORT OR THE CONSULTANT IN REGARD TO MEETING PLAN OF CONSTRUCTION OPERATIONS (PCO) REQUIREMENTS, SAFETY, COMPLIANCE ISSUES, AND AIRSIDE OPERATION PROCEDURES. FAILURE TO COMPLY WITH THESE INSTRUCTIONS CAN RESULT IN THE SHUTDOWN OF ALL CONSTRUCTION WORK.
- CONTRACTOR SHALL PERFORM WORK IN ACCORDANCE WITH ACCEPTABLE WORKER'S COMPENSATION BOARD HEALTH & SAFETY PRACTICES FOR THE PROVINCE OF BRITISH COLUMBIA.
- CONTRACTOR TO YIELD TO AIRPORT PASSENGERS AND TAKE EXTRA CARE WHEN DRIVING NEAR TERMINAL BUILDING.
- CONTRACTOR TO YIELD TO AIRPORT VEHICLES.
- CONTRACTOR SHALL PROVIDE AND MAINTAIN DUST CONTROL AS REQUIRED BY THE AIRPORT AT NO ADDITIONAL COST TO THE CONTRACTOR.
- ALL AIRPORT PAVEMENT SURFACES TO BE KEPT CLEAN OF CONSTRUCTION DEBRIS AND F.O.D. CONTRACTOR IS RESPONSIBLE TO MAINTAIN & PROVIDE CLEAN PAVEMENT SURFACES.
- ALL F.O.D. POTENTIAL ITEMS AND GARBAGE MUST BE CONTAINED TO PREVENT FLYAWAY AND THEN DISPOSED OFF-SITE AT THE END OF EACH WORK SHIFT.
- ALL TEMPORARY RUNWAY AND TAXIWAY PAINT MARKINGS MUST BE REINSTATE PRIOR TO THE END OF EVERY WORK SHIFT.
- RUNWAY / TAXIWAYS / APRON TO BE CLEANED AND SWEEP 30 MINUTES PRIOR TO NOTAM EXPIRY DAILY SO CONTRACTOR AND CONSULTANT CAN JOINTLY INSPECT THE AIRSIDE SURFACES PRIOR TO RE-OPENING. CONTRACTOR SHALL ATTEND TO ANY F.O.D. / ASPHALT RAMP ISSUES NOTED, AND MANOEUVRING SURFACES MUST BE RETURNED TO OPERATIONAL STATUS MINIMUM 15 MINUTES PRIOR TO NOTAM EXPIRY.
- CONTRACTOR AND CONSULTANT OR AIRPORT REPRESENTATIVE TO JOINTLY

WORK RESTRICTIONS

- CONSTRUCTION WORK AREAS ARE AIRSIDE AND SHALL BE SUBJECT TO THE RULES AND REGULATIONS FOR WORKING ON AIRSIDE AT AIRPORTS AS OUTLINED IN TP312E - AERODROME STANDARDS & RECOMMENDED PRACTICES, 5TH EDITION, AND TRANSPORT CANADA ADVISORY CIRCULAR AC 302-003.
- NO STOCKPILES SHALL REMAIN DURING NON-WORK HOURS. PILE HEIGHT RESTRICTED TO 1m HEIGHT DURING WORK HOURS AND MINIMUM 80m FROM RUNWAY AND 30m FROM TAXIWAY ASPHALT EDGES.
- NO OPEN TRENCHES OR OPEN EXCAVATIONS DURING NON-WORK HOURS. PRIOR TO THE END OF EACH WORK SHIFT AND/OR RE-OPENING OF RUNWAY 13-31 / TAXIWAY A AND B, OPEN EXCAVATIONS IN THE RUNWAY AND TAXIWAY STRIPS MUST BE BACKFILLED TO MATCH EXISTING OR DESIGN GRADES.
- CONTRACTOR TO PULL BACK MEN AND EQUIPMENT FOR ANY AIRCRAFT EMERGENCY OR MEDIVAC AIRCRAFT THAT REQUIRE USE OF THE RUNWAY, TAXIWAY, AND APRON. CONTRACTOR SHALL MAKE THE RUNWAY, TAXIWAY, AND APRON AS USABLE AS POSSIBLE IN THE TIME ALLOWED. CONTRACTOR TO PULL BACK ALL MEN AND EQUIPMENT AT LEAST 117m FROM THE RUNWAY CENTRELINE AND 26m FROM THE TAXIWAY CENTRELINE. STANDBY TIME WILL APPLY AS PROVIDED BY THE CONTRACTOR AND ACCEPTED BY THE CONSULTANT.
- FUEL TRUCK ACCESS TO FUELING FACILITIES SHALL BE MAINTAINED AT ALL TIMES.
- INSPECT AND VERIFY THAT ALL LIGHTING IS OPERATIONAL 30 MINUTES PRIOR TO NOTAM EXPIRATION.
- THE RUNWAY, TAXIWAYS, AND APRON WILL BE CONSIDERED OPERATIONAL ONLY WHEN THE FOLLOWING CONDITIONS ARE MET:
 - ANY TEMPORARY MARKINGS, LIGHTING OR BARRICADES REQUIRED TO DELINEATE UNSAFE AREAS ARE PLACED.
 - ALL MEN AND EQUIPMENT ARE REMOVED TO THE CONTRACTOR'S STAGING AREA.
 - TEMPORARY ASPHALT RAMPS INSTALLED FOR ALL ABRUPT CHANGES IN SURFACE ELEVATIONS HAVE BEEN ACCEPTED BY THE CONSULTANT OR AIRPORT REPRESENTATIVE.
 - ALL DEBRIS & MATERIAL HAS BEEN REMOVED FROM OPERATING SURFACES.
 - ALL LIGHTING IS OPERATIONAL.
- THE CONTRACTOR SHALL NOT LEAVE THE WORK SITE UNTIL THE PAVEMENT SURFACES, LIGHTING, AND ADJACENT AREAS HAVE BEEN ACCEPTED FOR USE BY THE CONSULTANT OR AIRPORT REPRESENTATIVE.
- REQUESTS FOR NOTAMS MUST BE SUBMITTED TO THE AIRPORT MANAGER MINIMUM 1 WEEK PRIOR AND CONFIRMED MINIMUM 48 HOURS PRIOR TO THE PLANNED WORK.
- CONTRACTOR MUST COORDINATE WITH THE AIRPORT'S ELECTRICAL CONTRACTOR IN ORDER TO SCHEDULE ANY ELECTRICAL CIRCUIT SHUTDOWNS AND START-UPS THAT MAY AFFECT ANY AIRPORT NAVIGATIONAL, ELECTRICAL, OR COMMUNICATION FACILITIES.
- CONTRACTOR SHALL SCHEDULE SHUT DOWN AND LOCKOUT ELECTRICAL SYSTEMS PRIOR TO ANY WORK WITHIN 5m OF AIRPORT ELECTRICAL INFRASTRUCTURE.
- ANY INTERRUPTION OF ELECTRICAL SYSTEMS OR NAVIGATIONAL AIDS REQUIRES A MINIMUM 72 HOURS PRIOR NOTICE AND A SPECIFIC NOTAM.
- ASPHALT MILLINGS TO BE DISPOSED ON-SITE AT DESIGNATED MILLINGS STOCKPILE. STOCKPILE TO BE MINIMUM 3m FROM AIRSIDE FENCE. CONTRACTOR TO IMMEDIATELY SWEEP AND COLLECT ANY FOD ALONG ACCESS ROUTE.
- CONTRACTOR TO PROVIDE SUFFICIENT MOBILE GEN SET LIGHTING TO ENSURE SAFETY OF ALL MEN AND EQUIPMENT.
- SMOKING AND THE USE OF E-CIGARETTES ARE NOT PERMITTED ON AIRSIDE, INCLUDING INSIDE VEHICLES.
- PLACEMENT OF ANY SAFETY BARRIERS OR CONSTRUCTION SIGNAGE PER TRANSPORT CANADA STANDARDS.
- ANY PERSONNEL WORKING FOR THE CONTRACTOR, SUB-CONTRACTORS, OR TRUCKING COMPANIES FOUND TO BE IN VIOLATION OF THE PLAN OF CONSTRUCTION OPERATIONS (PCO) AND RELATED AIRSIDE REGULATIONS SHALL BE REMOVED FROM THE AIRSIDE AND NOT ALLOWED TO RETURN.

SECTION 2 ADDITIONAL WORK RESTRICTIONS

- CONTRACTOR TO SCHEDULE WORK IN SECTION 2 SEPARATELY AND PROVIDE THE AIRPORT WITH MINIMUM 10 DAYS ADVANCE NOTICE PRIOR TO BEGINNING WORK IN THIS SECTION.
- WORK IN THIS SECTION IS TO BE COMPLETED IN AS SHORT A DURATION AS POSSIBLE TO MINIMIZE IMPACT TO LAND OWNER.
- SHARP ROAD TO REMAIN ACCESSIBLE TO LAND OWNER AT ALL TIMES.

AIRFIELD OPERATIONAL CHANGES

- RUNWAY 13-31, TAXIWAY ALPHA, TAXIWAY BRAVO, AND APRON I CLOSURES FROM:
 - MONDAY TO THURSDAY: 12:00 - 23:59 LOCAL
 - FRIDAY: 17:00 - 23:59 LOCAL
 - SATURDAY: 12:00 - 23:59 LOCAL
 - SUNDAY: 17:00 - 23:59 LOCAL
- FIXED WING MEDEVAC AIRCRAFT REQUIRE 120 MINUTES PRIOR NOTICE FOR USE OF RUNWAY 13-31, TAXIWAY A, TAXIWAY B, AND APRON I.
- ALL AIRFIELD LIGHTING, PAPI, APPROACH LIGHTING, ETC. WILL BE TURNED OFF AT THE START OF WORK SHIFTS AND TURNED ON AT THE END OF WORK SHIFTS OR FOR EMERGENCY / MEDEVAC AIRCRAFT.

LEGEND

- Denotes contractor escorted access route
- Denotes contractor provide extra care and attention when traveling past aircraft or equipment on airside
- Denotes contractor groundside access route



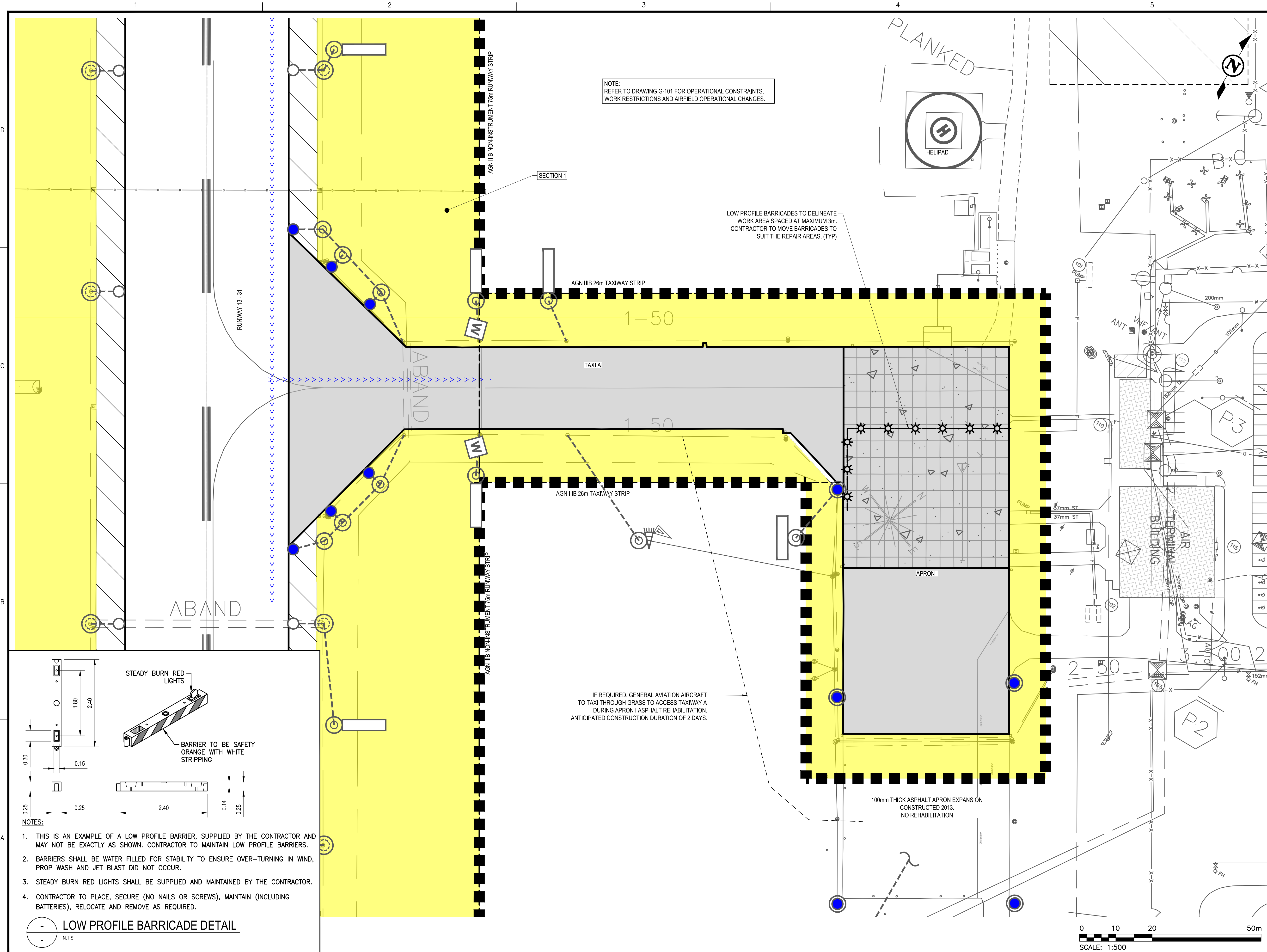
PLOT DATE: 2022/01/17 AT 14:02:04 PLOTTED BY: RUDNISKI, MIKE
CADD FILE: C:\P\WORKING\CAN\INFRA\DMST3440\G-101.DWG [G-101]

ISSUED FOR TENDER

DRAWING NUMBER
G-101

50 mm

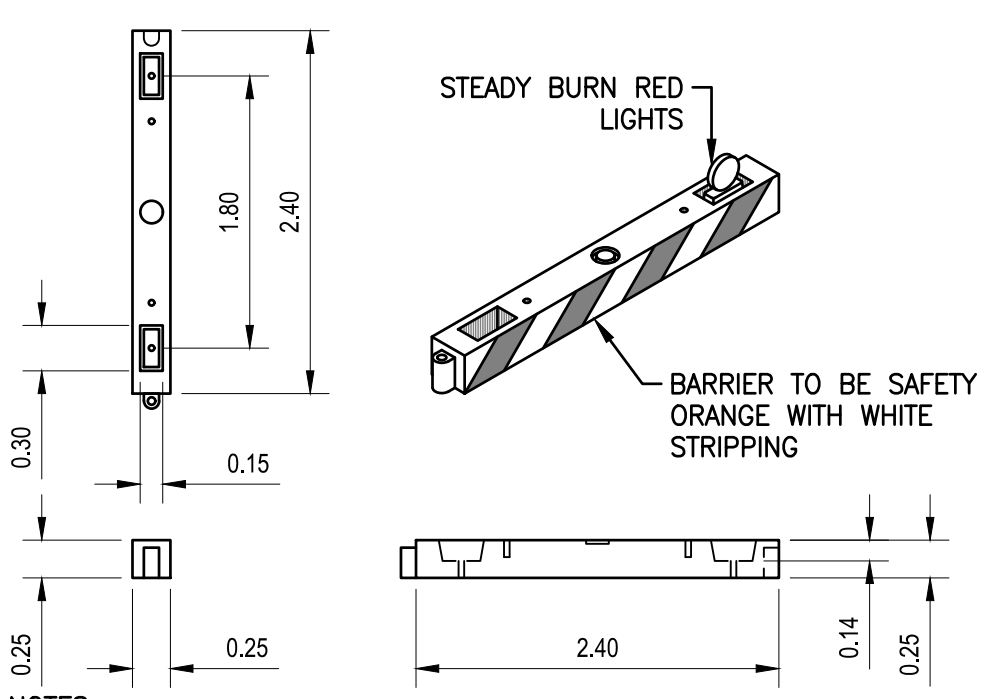
PLOT DATE: 2022/01/17 AT 14:02:30 PLOTTED BY: RUDNISKI, MIKE
 CADD FILE: C:\PWORKING\CAN_INFRA\MS13440\G-102.DWG [G-102]



NOTE:
 REFER TO DRAWING G-101 FOR OPERATIONAL CONSTRAINTS,
 WORK RESTRICTIONS AND AIRFIELD OPERATIONAL CHANGES.

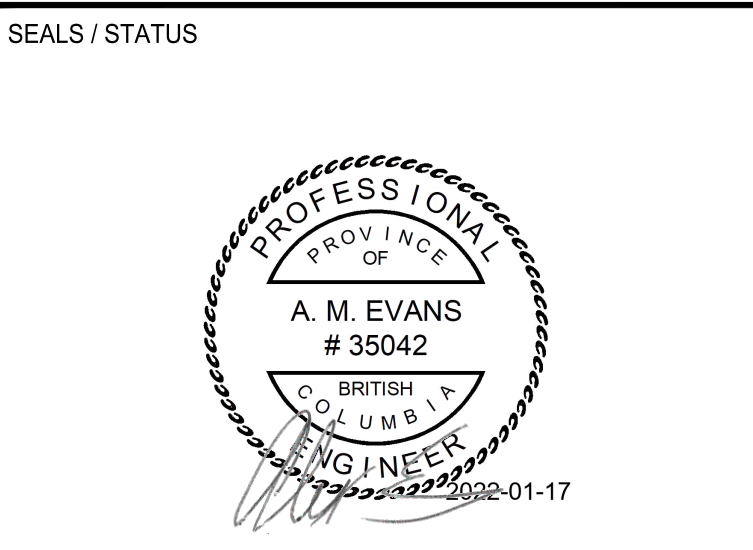
LOW PROFILE BARRICADES TO DELINEATE
 WORK AREA SPACED AT MAXIMUM 3m.
 CONTRACTOR TO MOVE BARRICADES TO
 SUIT THE REPAIR AREAS. (TYP)

IF REQUIRED, GENERAL AVIATION AIRCRAFT
 TO TAXI THROUGH GRASS TO ACCESS TAXIWAY A
 DURING APRON I ASPHALT REHABILITATION.
 ANTICIPATED CONSTRUCTION DURATION OF 2 DAYS.



- NOTES:**
1. THIS IS AN EXAMPLE OF A LOW PROFILE BARRIER, SUPPLIED BY THE CONTRACTOR AND MAY NOT BE EXACTLY AS SHOWN. CONTRACTOR TO MAINTAIN LOW PROFILE BARRIERS.
 2. BARRIERS SHALL BE WATER FILLED FOR STABILITY TO ENSURE OVER-TURNING IN WIND, PROP WASH AND JET BLAST DID NOT OCCUR.
 3. STEADY BURN RED LIGHTS SHALL BE SUPPLIED AND MAINTAINED BY THE CONTRACTOR.
 4. CONTRACTOR TO PLACE, SECURE (NO NAILS OR SCREWS), MAINTAIN (INCLUDING BATTERIES), RELOCATE AND REMOVE AS REQUIRED.

LOW PROFILE BARRICADE DETAIL
 N.T.S.



**RUNWAY 13 - 31,
 TAXIWAY A AND APRON I
 REHABILITATION**
 QUESNEL REGIONAL AIRPORT
 QUESNEL, BC

0	ISSUED FOR TENDER	2022/01/17	A.E.
MARK	DESCRIPTION	DATE	APP'D
PROJECT NO : TRN.AIRP03389-02			
CONTRACT NO :			
DRAFTING BY : M. RUDNISKI			
DESIGN BY : N. DIETRICH			
CHECKED BY : A. EVANS			

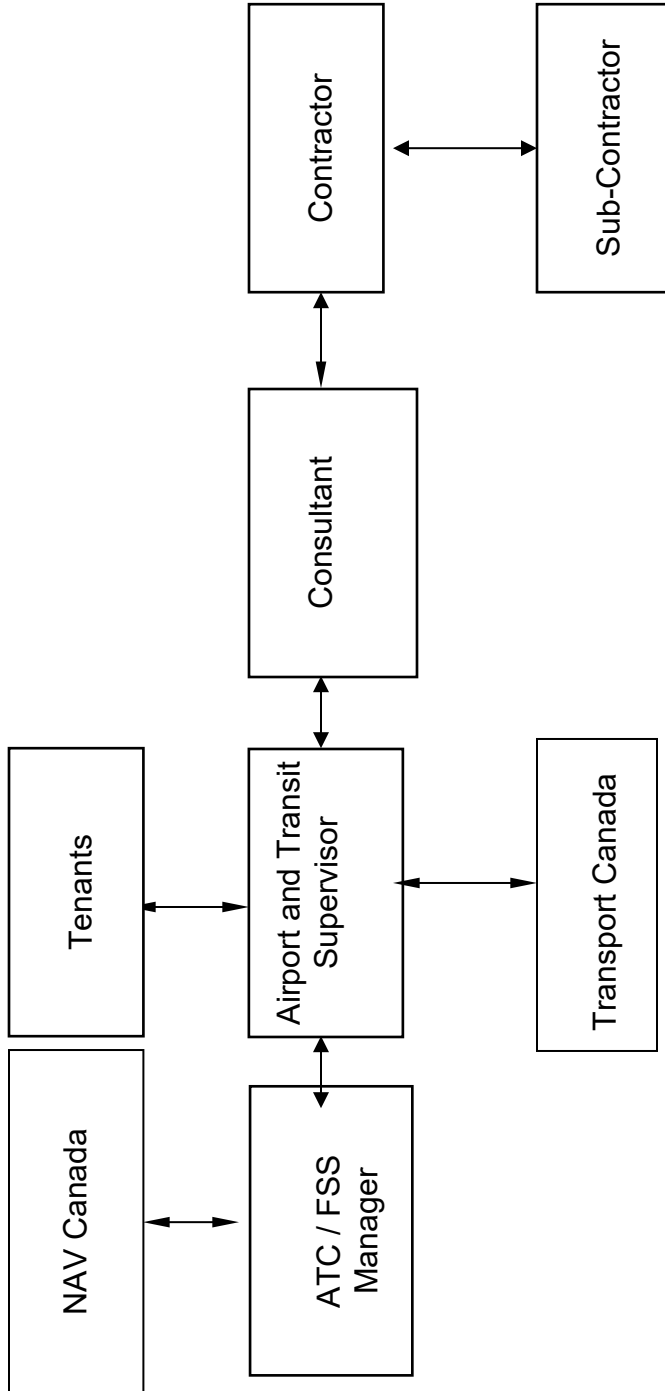
**TAXIWAY A AND APRON I
 PLAN OF CONSTRUCTION
 OPERATIONS**

DRAWING NUMBER
G-102

ISSUED FOR TENDER

50 mm

Annex 2



LINES OF COMMUNICATION
FOR
Runway 13-31, Taxiway A and Apron I Rehabilitation
AT QUESNEL REGIONAL AIRPORT, QUESNEL, BC

Name	Office	Cell	Email
CONTRACTOR TBD			

Tommy Grant (Airport and Transit Supervisor)	(250) 992-2208	(250) 255-5883	tgrant@quesnel.ca
Airport Maintenance		(250) 991-6361	
After hours Standby		(250)-992-0171	

Noah Dietrich (Project Manager)	(778) 940-1302	(250) 718-0134	noah.dietrich@tetrattech.com
Alex Evans (Project Manager)	(778) 945-5875	(604) 313-4574	alex.evans@tetrattech.com

EMERGENCIES – CALL 911

***(FSS and YQZ Operations must also be notified by Contractor /
Airside Escort)***

Annex 3

Contractor Airport Orientation

Geographic Orientation

Attached you will find a map of the Quesnel Regional Airport site. You should learn everything from it, with the following things in mind:

Boundaries

Two words that are new to you are "groundside" and "airside". These are self-explanatory and, at any airport, these two sides are well marked and physically divided by fences. On your airport map find the fences and note that they enclose the airside, the area used only for "activities directly related to the aircraft operation". Anything outside this area but still on the airport site is referred to as "groundside". Boundary and security functions of all restricted entrances to the airside must work together to prevent everything and everyone from animals and children to armed hijackers from gaining entry.

Security Gates

Gates are kept locked for security reasons and, unless manned by a Access Control person, the gate must be closed and locked behind you when you use it, no matter how soon you expect to return.

Airport Movement Areas

Runways

Runways are used for aircraft takeoffs and landings. If you add a "0" to the runway number, you will get its magnetic direction to the nearest 10° (i.e., Runway 13-31 has magnetic bearing 130° or 310°). You will be working on Runway 13-31. You must stay within the immediate work area unless given prior permission by the Airside Escort and are escorted by the Airside Escort.

Taxiways

Taxiways are for aircraft movements other than takeoffs and landings. You will be working on Taxiway Alpha. You must stay within the immediate work area unless given prior permission by the Airside Escort and are escorted by the Airside Escort.

Aprons

Aprons are for aircraft parking, loading and fuelling. You will be working on Apron I. You must stay within the immediate work area unless given prior permission by the Airside Escort and are escorted by the Airside Escort.

Identification of Taxiways and Aprons

When you speak of an apron, you use a number (Roman numerals), such as Apron I (pronounced "Apron One").

When you speak of a taxiway you use a letter, such as Taxiway "A". The letter is displayed on a sign to identify the particular taxiway. The taxiways are actually called Alpha, Bravo, Charlie, Delta and Echo because they are referred to by the phonetic alphabet.

Vehicle Traffic Regulations

All drivers of vehicles airside must hold a valid driver's licence issued by the Province of British Columbia. When on and off airport property, you are required to observe all municipal, provincial, and federal traffic regulations.

Foreign Object Debris (FOD)

FOD is any natural or man-made debris that may be ingested into an aircraft engine or that may damage other airside vehicles or equipment. If you notice FOD, pick it up and properly dispose of it. If you are unable to remove the FOD, or if it is creating a serious hazard, report the FOD to the ATS under the airport's safety management system (SMS) program.

Other Regulations

NO SMOKING INCLUDING THE USE OF E-CIGARETTES REGULATIONS ARE IN EFFECT IN ALL AIRSIDE CONSTRUCTION AREAS.

TRANSPORT CANADA REQUIRES THAT ALL WORKERS WORKING AIRSIDE PROVIDE PROOF OF COVID-19 VACCINATION.

FAILURE TO OBEY THE INSTRUCTIONS CONTAINED IN THIS FORM WILL RESULT IN THE PERSONS INVOLVED BEING REMOVED FROM THE WORK SITE.

I have reviewed the "Contractor Airport Orientation" and understand the contents of this form.

Foreman _____ Date _____

Employee _____ Date _____

ICAO Phonetic Alphabet and Pronunciation of Numbers

Always use the ICAO Phonetic Alphabet when phonetics are required for clarity in radiotelephone communications.

Letter	Word	Spoken as
A	ALFA	(Al fah)
B	BRAVO	(BRAH VOH)
C	CHARLIE	(CHAR lee)
D	DELTA	(DELL tah)
E	ECHO	(ECK oh)
F	FOXTROT	(TOKS trot)
G	GOLF	(GOLF)
H	HOTEL	(hoh TELL)
I	INDIA	(IN dee ah)
J	JULIET	(JEW lee ETT)
K	KILO	(KEY loh)
L	LIMA	(LEE mah)
M	MIKE	(MIKE)
N	NOVEMBER	(no VEM ber)
O	OSCAR	(OSS cah)
P	PAPA	(pah PAH)
Q	QUEBEC	(keh BECK)
R	ROMEO	(ROW me oh)
S	SIERRA	(see AIR rah)
T	TANGO	(TANG go)
U	UNIFORM	(YOU nee form)
V	VICTOR	(VIK tah)
W	WHISKEY	(WISS key)
X	X-RAY	(ECKS ray)
Y	YANKEE	(YANG key)
Z	ZULU	(ZOO loo)

Pronounce numbers as:

0	ZE-RO	5	FIFE
1	WUN	6	SIX
2	TOO	7	SEV-en
3	TREE	8	AIT
4	FOW-er	9	NIN-er

Note: Stress the syllables printed in CAPITAL letters. For example, give the two syllables in ZE-RO equal emphasis, but give the first syllable for FOW-er primary emphasis.

Annex 4
Flight Schedule

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
JANUARY						1
						NO FLIGHTS
2	3	4	5	6	7	8
564 YVR-YQZ 1530-1645	560 YVR-YQZ 0815-0935	560 YVR-YQZ 0815-0935		560 YVR-YQZ 0815-0935	564 YVR-YQZ 1530-1645	
565 YQZ-YVR 1710-1825	561 YQZ-YVR 0955-1115	561 YQZ-YVR 0955-1115	NO FLIGHTS	561 YQZ-YVR 0955-1115	565 YQZ-YVR 1710-1825	NO FLIGHTS
DH8						
		566 YVR-YQZ 1155-1315				
		567 YQZ-YVR 1340-1500				
9	10	11	12	13	14	15
564 YVR-YQZ 1530-1645	560 YVR-YQZ 0815-0935	560 YVR-YQZ 0815-0935	560 YVR-YQZ 0815-0935	560 YVR-YQZ 0815-0935	564 YVR-YQZ 1530-1645	
565 YQZ-YVR 1710-1825	561 YQZ-YVR 0955-1115	561 YQZ-YVR 0955-1115	561 YQZ-YVR 0955-1115	561 YQZ-YVR 0955-1115	565 YQZ-YVR 1710-1825	NO FLIGHTS
16	17	18	19	20	21	22
564 YVR-YQZ 1530-1645	560 YVR-YQZ 0815-0935		560 YVR-YQZ 0815-0935		564 YVR-YQZ 1530-1645	
565 YQZ-YVR 1710-1825	561 YQZ-YVR 0955-1115	NO FLIGHTS	561 YQZ-YVR 0955-1115	NO FLIGHTS	565 YQZ-YVR 1710-1825	NO FLIGHTS
23	24	25	26	27	28	29
564 YVR-YQZ 1530-1645	560 YVR-YQZ 0815-0935		560 YVR-YQZ 0815-0935		562 YVR-YQZ 0945-1105	
565 YQZ-YVR 1710-1825	561 YQZ-YVR 0955-1115	NO FLIGHTS	561 YQZ-YVR 0955-1115	NO FLIGHTS	563 YQZ-YVR 1130-1250	NO FLIGHTS
30	31					
564 YVR-YQZ 1530-1645	560 YVR-YQZ 0815-0935					
565 YQZ-YVR 1710-1825	561 YQZ-YVR 0955-1115					

Annex 5

TP312E 5th Edition – 5.5.6 Unserviceability / Closed Markers

5.5.6 Unserviceability/Closed Markers

Note: Unserviceability markers are used to warn pilots of a hole in a taxiway or apron pavement or to outline a portion of pavement, such as an apron, that is under repair. They are not suitable when a portion of a runway becomes unserviceable, nor are they suitable on a taxiway when the remaining taxiway width does not allow for aircraft operations. In such instances, the runway or taxiway is normally closed.

Application

5.5.6.1 Unserviceability markers are provided for a temporary closure during the day where:

- (a) a closed taxiway is intercepted by a usable runway or taxiway, or
- (b) a portion of a taxiway, taxiway safety area or apron is unusable but it is still possible for aircraft to bypass the area safely.

Location

5.5.6.2 Unserviceability markers are placed at intervals sufficiently close so as to delineate the unserviceable area and not allow the passage of an aircraft between the markers.

Characteristics

5.5.6.3 Unserviceability markers consist of conspicuous upstanding devices such as flags, cones or marker boards.

5.5.6.4 An unserviceability marker is red or international orange or any combination of these with white.

APPROVAL OF PLAN OF CONSTRUCTION OPERATIONS

PROJECT:

Runway 13-31, Taxiway A and Apron I Rehabilitation at Quesnel Regional Airport

AIRPORT NAME:

Quesnel Regional Airport

AIRPORT OPERATOR and CERTIFICATE HOLDER:

The City of Quesnel

AIRPORT MANAGER:

Tommy Grant

CERTIFICATE NUMBER:

TADB 5151-P155

DATE OF ISSUE:

December 5, 2011

I undertake to meet the obligations set out in this plan of construction; and I hereby certify that the information in this plan is complete and accurate and no relevant information has been omitted.

Date (Y-M-D)

Signature of Airport Manager/Certificate Holder

This Plan of Construction Operations Manual/Amendments is approved

Date (Y-M-D)

for Minister of Transport

Appendix B – Hot-In-Place Recycling (HIPR) Technical Memo

ISSUED FOR USE

To:	Noah Dietrich, B.A.Sc., EIT	Date:	January 17, 2022
c:		Memo No.:	01
From:	Qingfan Liu, Ph.D., P.Eng. Vipin Sharma, P.Eng. PMP	File:	704-TRN.AIRP03389-02

Subject: Quesnel Regional Airport (YQZ) – Runway 13-31
Runway Rehabilitation Evaluation with Hot-In-Place Recycling

1.0 INTRODUCTION

This technical memo presents the results of a pavement rehabilitation evaluation conducted by Tetra Tech Canada Inc. (Tetra Tech), for the City of Quesnel. This memo includes the evaluation of the feasibility of using Hot-In-Place Recycling (HIPR) for rehabilitation of the Runway 13-31 at the Quesnel Regional Airport (YQZ).

The scope of services associated with this evaluation included the following:

- Development of the asphalt pavement coring program to obtain cores for determining the feasibility of pavement for rehabilitation with HIPR;
- Laboratory testing of the cores to determine the properties of the existing asphalt mix;
- Analysis of the laboratory test results for feasibility of carrying out HIPR treatment; and
- Preparation of a Technical Memo with HIPR recommendations.

2.0 ASPHALT PAVEMENT CORING

A total of twenty-one 100 mm diameter cores were extracted from the Runway 13-31 at approximately 75 m spacing along the length of the runway. The cores were located across the entire width of the runway to have a uniform representation of the existing asphalt pavement. Core locations are summarized in Table 1. Plan map showing the core locations is included in Appendix A.

Table 1: Asphalt Core Location Summary

Core ID	Station (m)	Offset from Centre Line ^{1,2} (m)
11	0+002	2.0 (L)
12	0+081	2.0 (R)
13	0+160	6.0 (L)
14	0+235	6.0 (R)
15	0+310	11.0 (L)
16	0+385	11.0 (R)
17	0+460	20.0 (L)
18	0+535	20.0 (R)
19	0+610	2.0 (L)
20	0+685	2.0 (R)
21	0+760	6.0 (L)
22	0+835	6.0 (R)
23	0+910	11.0 (L)
24	0+985	11.0 (R)
25	1+060	20.0 (L)
26	1+135	20.0 (R)
27	1+210	2.0 (L)
28	1+285	2.0 (R)
29	1+360	6.0 (L)
30	1+439	6.0 (R)
31	1+518	11.0 (L)

¹ (L) = Left of centre line of runway
² (R) = Right of centre line of runway

3.0 LABORATORY TESTING

Top 50 mm lift of each core was trimmed and was tested to determine the Bulk Relative Density (density) of each core. The cores were then grouped into four sets based on their location along the runway. The cores included in each set are listed in Table 2. The asphalt mix from the cores from each set were combined and tested to determine the properties of the existing asphalt mix. The asphalt core analysis reports are attached in Appendix B.

The combined asphalt mix for each set was tested for Maximum Theoretical Relative Density (MTRD), Asphalt Cement (AC) Content, Absorption Recovered Penetration, Gradation, and Fracture Count of the recovered aggregates. The MTRD for the combined mix sample for each set was used to calculate the in-place air voids for each core. Detailed laboratory test results are presented in Table 2.

Table 2: Laboratory Test Results

Core Set No.	1	2	3	4	Average
Cores Tested	11,12,13,14,15	16,17,18,19,20	21,22,23,24,25	26,27,28,29,30,31	
Asphalt Content (% by Mix)	5.85	5.80	5.76	5.64	5.76
Fracture (% , 2+ faces)	97	96	96	94	96
Penetration (dmm)	60	59	75	43	59
In-Place Air Voids (Average, %)	3.2	3.1	3.3	4.1	3.4
MTRD (kg/m³)	2,457	2,465	2,464	2,463	2,462
Sieve Size (mm)	Percent Passing				
16.0	100	100	100	100	100
12.5	100	100	100	100	100
9.5	93	93	94	93	93
4.75	67	67	69	66	67
2.36	47	45	46	44	46
1.18	34	32	33	32	33
0.6	27	25	25	25	26
0.3	18	17	17	17	17
0.15	10	10	10.0	10.0	10.0
0.075	6.4	6.3	6.5	6.5	6.4

Review of the laboratory test results indicated that the properties of the asphalt mix were very similar among the four sets in terms of gradation, asphalt content, percent fracture and average in place air voids. However, penetration of the recovered asphalt cement ranged from 43 -75 dmm among the four sets.

The determined asphalt content for the existing asphalt pavement ranged from 5.64% to 5.85% by the weight of the total mix, which is higher than typically used around the province. Average in-place air voids were calculated as 3.4%, which are considered appropriate for rehabilitation with HIPR.

The measured penetration values of the recovered asphalt cement ranged from 43 – 75 dmm with the average of 59 dmm, making the existing pavement a suitable candidate for HIPR.

4.0 REHABILITATION RECOMMENDATIONS

Based on the review of the laboratory test results, it is concluded that HIPR is a suitable treatment for the project runway. In order to simplify construction, average properties of the four core sets have been used in the development of admix recommendations.

It is recommended that the HIPR treatment be completed to a target depth of 55 mm with the inclusion of 20% admix. Use of Surface Course mix as per Section 32 12 16 of City of Quesnel’s Standard Specifications is recommended for the admix. This will result in use of one mix type for admix and overlay, making the construction simpler.

It is estimated that approximately 1.5% fines would be generated during the recycling process. Therefore, 1.5% fines have been added to the average gradation of the existing asphalt mix in the admix recommendations. Suggested properties for the admix and the target gradations for the recycled mix are presented in Table 3.

Table 3: Suggested Properties for Admix and Target Recycled Mix

	Existing Mix		Admix		Target
	In-Place Average	Contribution to Total Mix (80%)	Proposed	Contribution to Total Mix (20%)	100%
Asphalt Content (% by Total Mix)	5.76	4.61	5.00	1.00	5.61 % + 0.1 % Cyclogen
Sieve Size (mm)	% Passing				Average
16	100	80	100	20	100
12.5	100	80	89	18	98
9.5	93	75	76	15	90
4.75	67	54	58	12	65
2.36	46	36	43	9	45
1.18	33	26	32	6	32
0.60	26	20	23	5	25
0.30	17	14	17	3	17
0.15	10	8	11	2	10
0.075	7.9*	6.3	5.0	1.0	7.3

* 1.5% of fines added to allow for additional fines generated during recycling process.

Based on the climate and asphalt mix properties of the existing mix, asphalt cement PG 64-34 is recommended for the admix. The use of PG 64-34 is recommended for the admix considering constructability and the fact that the HIPR layer will not be a wearing surface and will receive a hot mix asphalt overlay. It is also recommended that Cyclogen L or an equivalent rejuvenating agent at a rate of approximately 0.1 % (by weight of total mix) be used during the rehabilitation program.

It is further recommended that the contractor perform detailed mix designs prior to construction to establish the actual addition rates and compliance to the target mix properties. The contractor should also monitor the asphalt content of the admix and adjust the addition rate of the rejuvenating agent on an ongoing basis during construction.

5.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Quesnel Regional Airport and their agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Quesnel Regional Airport, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in the Appendix C or Contractual Terms and Conditions executed by both parties.

6.0 CLOSURE

We trust the information provided meets your present requirements. Should you have any questions of comments, please contact the undersigned at your convenience.

Respectfully submitted,
Tetra Tech Canada Inc.

FILE: 704-TRN.AIRP03389-02
FILE: 704-TRN.AIRP03389-02
FILE: 704-TRN.AIRP03389-02
FILE: 704-TRN.AIRP03389-02

Prepared by:
Qingfan Liu, Ph.D., P.Eng. (Alberta)
Pavements Engineer
Transportation Practice
Direct Line: 587.460.3556
Qingfan.Liu@tetrattech.com

Attachments:

- Appendix A - Plan Map Showing Core Locations
- Appendix B - Asphalt Core Analysis Reports
- Appendix C - Limitations on the Use of this Document



FILE: 704-TRN.AIRP03389-02
FILE: 704-TRN.AIRP03389-02
FILE: 704-TRN.AIRP03389-02
FILE: 704-TRN.AIRP03389-02
FILE: 704-TRN.AIRP03389-02

Reviewed by:
Vipin Sharma, P.Eng. PMP
Manager, Pavements Engineering
Transportation Practice
Direct Line: 604.608.8646
Vipin.Sharma@tetrattech.com

**PERMIT TO PRACTICE
TETRA TECH CANADA INC.
PERMIT NUMBER: 1001972**

APPENDIX A

PLAN MAP SHOWING CORE LOCATIONS

APPENDIX B

ASPHALT CORE ANALYSIS REPORTS

ASPHALT CORE ANALYSIS REPORT

Project: Quesnel Regional Airport (YQZ) – Runway 13-3
Project No.: 704-TRN.AIRP03389-02
Location: Runway 13-3
Client: Quesnel Regional Airport
Core Diameter: 100 mm

Set	Core	Station (m)	Location From Centre Line (m)	In-Situ Density (kg/m ³)	In-Situ Air Voids* (%)	Average Air Voids (%)
1	11	0+002	2.0 (L)	2,384	3.0	3.2
	12	0+081	2.0 (R)	2,347	4.5	
	13	0+160	6.0 (L)	2,377	3.3	
	14	0+235	6.0 (R)	2,417	1.6	
	15	0+310	11.0 (L)	2,369	3.6	
2	16	0+385	11.0 (R)	2,382	3.4	3.1
	17	0+460	20.0 (L)	2,346	4.8	
	18	0+535	20.0 (R)	2,424	1.7	
	19	0+610	2.0 (L)	2,407	2.4	
	20	0+685	2.0 (R)	2,381	3.4	

Remarks:

Asphalt cores were extracted top 100 mm lift of each core was retained for testing. The in-situ air voids were calculated for each core using the Maximum Theoretical Density of the combined mix.

Reviewed By: Vipin Sharma, P.Eng., PMP

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed by an Tetra Tech technician to recognized industry standards, unless otherwise noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.

ASPHALT CORE ANALYSIS REPORT

Project: Quesnel Regional Airport (YQZ) – Runway 13-3
Project No.: 704-TRN.AIRP03389-02
Location: Runway 13-3
Client: Quesnel Regional Airport
Core Diameter: 100 mm

Set	Core	Station (m)	Location From Centre Line (m)	In-Situ Density (kg/m ³)	In-Situ Air Voids* (%)	Average Air Voids (%)
3	21	0+760	6.0 (L)	2,381	3.4	3.3
	22	0+835	6.0 (R)	2,422	1.7	
	23	0+910	11.0 (L)	2,398	2.7	
	24	0+985	11.0 (R)	2,355	4.4	
	25	1+060	20.0 (L)	2,363	4.1	
4	26	1+135	20.0 (R)	2,358	4.3	4.1
	27	1+210	2.0 (L)	2,398	2.6	
	28	1+285	2.0 (R)	2,373	3.7	
	29	1+360	6.0 (L)	2,283	7.3	
	30	1+439	6.0 (R)	2,409	2.2	
	31	1+518	11.0 (L)	2,350	4.6	

Remarks:

Asphalt cores were extracted top 100 mm lift of each core was retained for testing. The in-situ air voids were calculated for each core using the Maximum Theoretical Density of the combined mix.

Reviewed By: Vipin Sharma, P.Eng., PMP

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed by an Tetra Tech technician to recognized industry standards, unless otherwise noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.

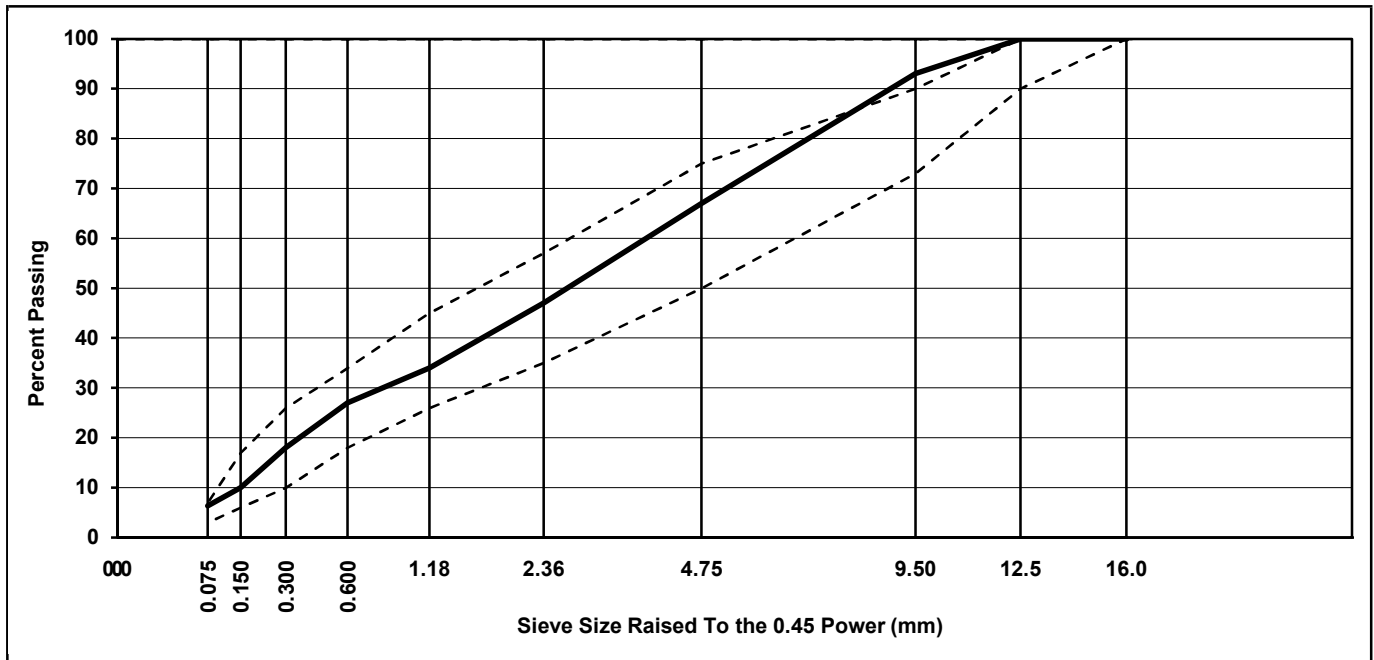
ASPHALT MIXTURE ANALYSIS REPORT

Project: <u>Quesnel Regional Airport (YQZ)</u> <u>Runway Hot-In-Place Recycling Project</u> Project No.: <u>704-TRN.AIRP03389-02</u> Client: <u>Quesnel Regional Airport</u> Location: <u>Rwy 13-3</u>	Sample Set Number: <u>Set 1</u> Cores in Sample Set: <u>Cores 11 to 15</u> Date Sampled: <u>Unknown</u> Sampled By: <u>Tetra Tech</u> Tested By: <u>SM</u>
--	--

Property	Test Value	Specified Tolerance	Property	Test Value	Specified Tolerance
AC Content (% by Mix):	5.85		Air Voids (In Place, %)	3.2	
Fracture (% 2+ faces):	97.0		V.M.A. (%)		
Bulk Relative Density (kg/m ³):			V.F.A. (%)		
Max. Relative Density (kg/m ³):	2457		Stability (kN)		
Penet. @ 25°C, 100 g, 5s (dmm):			Flow (0.25mm Units)		

Percent Passing Sieve Size

Sieve Size (mm)	16.0	12.5	9.5	4.75	2.36	1.18	0.600	0.300	0.150	0.075
Test Result	100	100	93	67	47	34	27	18	10	6.4



Remarks: _____ _____ Recovered binder penetration (dmm) = 60 _____ AC Content determined by solvent extraction method	Testing Lab: <u>115-200, Rivercrest Dr. SE, Calgary</u> Reviewed By: <u>Vipin Sharma, P.Eng., PMP</u> Date: <u>November 29, 2021</u>
--	---

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed by an Tetra Tech technician to recognized industry standards, unless otherwise noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.

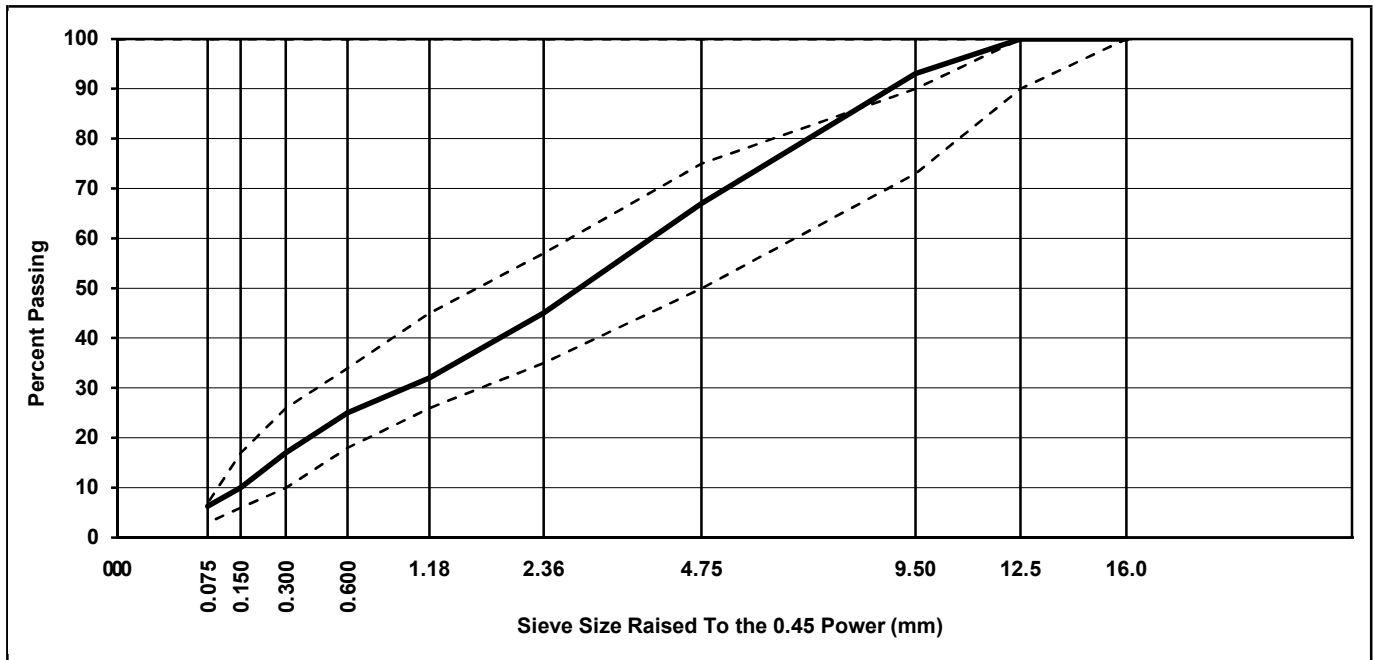
ASPHALT MIXTURE ANALYSIS REPORT

Project: <u>Quesnel Regional Airport (YQZ)</u> <u>Runway Hot-In-Place Recycling Project</u> Project No.: <u>704-TRN.AIRP03389-02</u> Client: <u>Quesnel Regional Airport</u> Location: <u>Rwy 13-3</u>	Sample Set Number: <u>Set 2</u> Cores in Sample Set: <u>Cores 16 to 20</u> Date Sampled: <u>Unknown</u> Sampled By: <u>Tetra Tech</u> Tested By: <u>SM</u>
--	--

Property	Test Value	Specified Tolerance	Property	Test Value	Specified Tolerance
AC Content (% by Mix):	5.80		Air Voids (In Place, %)	3.1	
Fracture (% 2+ faces):	96.0		V.M.A. (%)		
Bulk Relative Density (kg/m ³):			V.F.A. (%)		
Max. Relative Density (kg/m ³):	2,465		Stability (kN)		
Penet. @ 25°C, 100 g, 5s (dmm):			Flow (0.25mm Units)		

Percent Passing Sieve Size

Sieve Size (mm)	16.0	12.5	9.5	4.75	2.36	1.18	0.600	0.300	0.150	0.075
Test Result	100	100	93	67	45	32	25	17	10.0	6.3



Remarks: _____ _____ Recovered binder penetration (dmm) = 59 _____ AC Content determined by solvent extraction method	Testing Lab: <u>115-200, Rivercrest Dr. SE, Calgary</u> Reviewed By: <u>Vipin Sharma, P.Eng., PMP</u> Date: <u>November 30, 2021</u>
--	---

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed by an Tetra Tech technician to recognized industry standards, unless otherwise noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it up



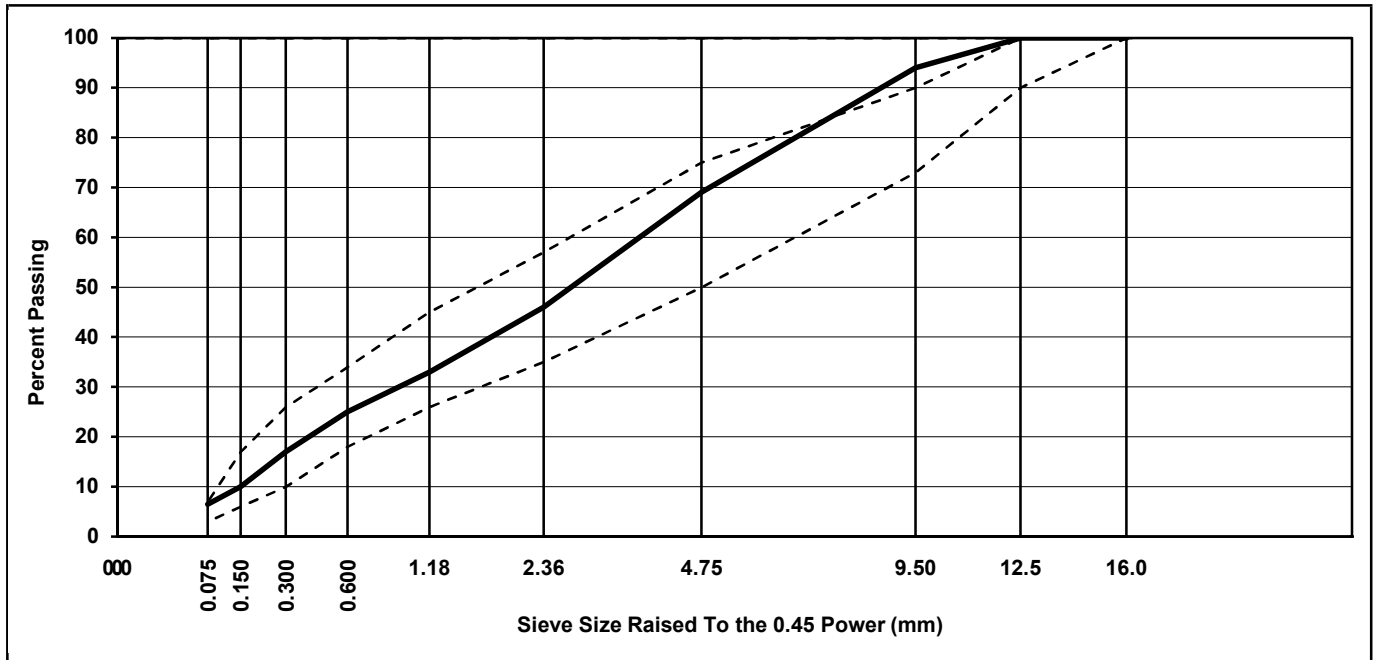
ASPHALT MIXTURE ANALYSIS REPORT

Project: <u>Quesnel Regional Airport (YQZ)</u> <u>Runway Hot-In-Place Recycling Project</u> Project No.: <u>704-TRN.AIRP03389-02</u> Client: <u>Quesnel Regional Airport</u> Location: <u>Rwy 13-3</u>	Sample Set Number: <u>Set 3</u> Cores in Sample Set: <u>Cores 21 to 25</u> Date Sampled: <u>Unknown</u> Sampled By: <u>Tetra Tech</u> Tested By: <u>SM</u>
--	--

Property	Test Value	Specified Tolerance	Property	Test Value	Specified Tolerance
AC Content (% by Mix):	5.76		Air Voids (In Place, %)	3.3	
Fracture (% , 2+ faces):	96.0		V.M.A. (%)		
Bulk Relative Density (kg/m ³):			V.F.A. (%)		
Max. Relative Density (kg/m ³):	2,464		Stability (kN)		
Penet. @ 25°C, 100 g, 5s (dmm):			Flow (0.25mm Units)		

Percent Passing Sieve Size

Sieve Size (mm)	16.0	12.5	9.5	4.75	2.36	1.18	0.600	0.300	0.150	0.075
Test Result	100	100	94	69	46	33	25	17	10.0	6.5



Remarks: _____ _____ Recovered binder penetration (dmm) = 75 _____ AC Content determined by solvent extraction method	Testing Lab: <u>115-200, Rivercrest Dr. SE, Calgary</u> Reviewed By: <u>Vipin Sharma, P.Eng., PMP</u> Date: <u>November 30, 2021</u>
--	---

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed by an Tetra Tech technician to recognized industry standards, unless otherwise noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.

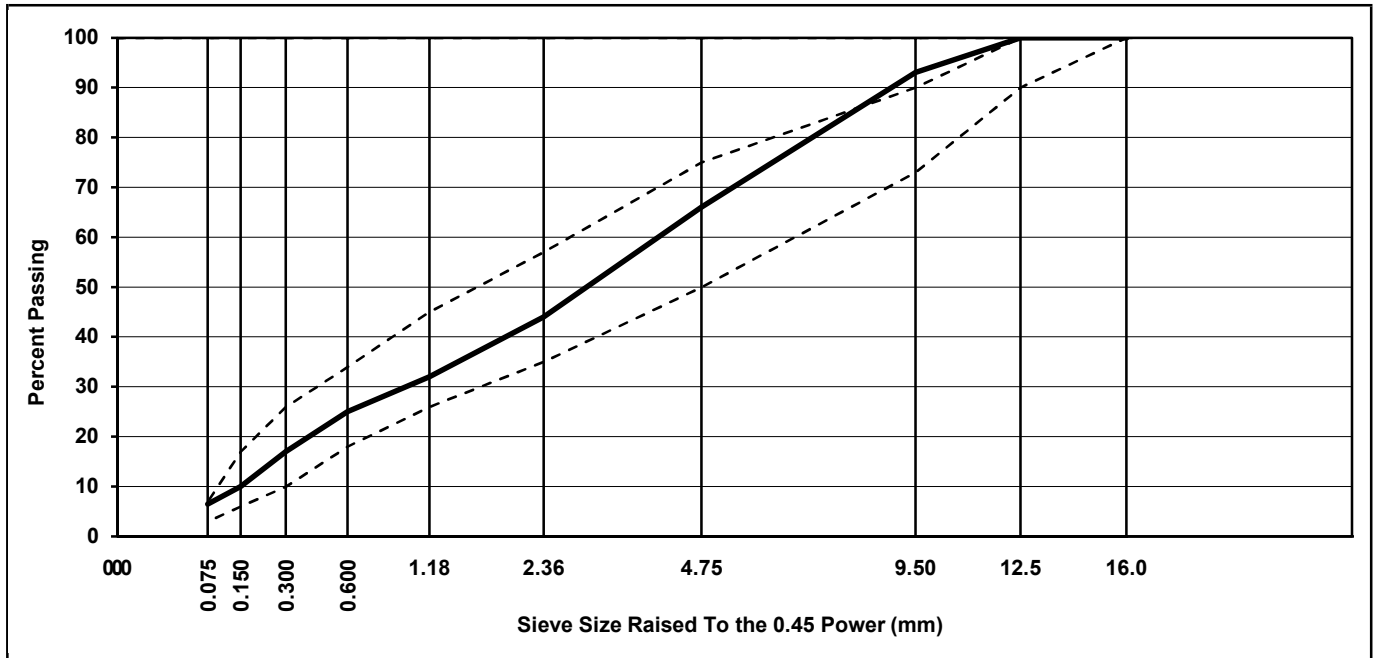
ASPHALT MIXTURE ANALYSIS REPORT

Project: <u>Quesnel Regional Airport (YQZ)</u> <u>Runway Hot-In-Place Recycling Project</u> Project No.: <u>704-TRN.AIRP03389-02</u> Client: <u>Quesnel Regional Airport</u> Location: <u>Rwy 13-3</u>	Sample Set Number: <u>Set 4</u> Cores in Sample Set: <u>Cores 26 to 31</u> Date Sampled: <u>Unknown</u> Sampled By: <u>Tetra Tech</u> Tested By: <u>SM</u>
--	--

Property	Test Value	Specified Tolerance	Property	Test Value	Specified Tolerance
AC Content (% by Mix):	5.64		Air Voids (In Place, %)	4.1	
Fracture (% 2+ faces):	94.0		V.M.A. (%)		
Bulk Relative Density (kg/m ³):			V.F.A. (%)		
Max. Relative Density (kg/m ³):	2,463		Stability (kN)		
Penet. @ 25°C, 100 g, 5s (dmm):			Flow (0.25mm Units)		

Percent Passing Sieve Size

Sieve Size (mm)	16.0	12.5	9.5	4.75	2.36	1.18	0.600	0.300	0.150	0.075
Test Result	100	100	93	66	44	32	25	17	10.0	6.5



Remarks: _____ _____ Recovered binder penetration (dmm) = 43 _____ AC Content determined by solvent extraction method	Testing Lab: <u>115-200, Rivercrest Dr. SE, Calgary</u> Reviewed By: <u>Vipin Sharma, P.Eng., PMP</u> Date: <u>December 1, 2021</u>
--	--

Data presented hereon is for the sole use of the stipulated client. Tetra Tech is not responsible, nor can be held liable, for use made of this report by any other party, with or without the knowledge of Tetra Tech. The testing services reported herein have been performed by an Tetra Tech technician to recognized industry standards, unless otherwise noted. No other warranty is made. These data do not include or represent any interpretation or opinion of specification compliance or material suitability. Should engineering interpretation be required, Tetra Tech will provide it upon written request.

APPENDIX C

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

DESIGN REPORT

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

The Professional Document is intended for the sole use of TETRA TECH's Client (the "Client") as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the "Contract" herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

Any unauthorized use of the Professional Document is at the sole risk of the user. TETRA TECH accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, is in fact, caused by the unauthorized use of the Professional Document.

Where TETRA TECH has expressly authorized the use of the Professional Document by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these Limitations on Use of this Document as well as any limitations on liability contained in the Contract with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these Limitations on Use of this Document and the Contract prior to making any use of the Professional Document. Any use made of the Professional Document by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

The Professional Document and any other form or type of data or documents generated by TETRA TECH during the performance of the work are TETRA TECH's professional work product and shall remain the copyright property of TETRA TECH.

The Professional Document is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of TETRA TECH. Additional copies of the Document, if required, may be obtained upon request.

1.2 ALTERNATIVE DOCUMENT FORMAT

Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by third parties other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this report, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 ENVIRONMENTAL AND REGULATORY ISSUES

Unless so stipulated in the Design Report, TETRA TECH was not retained to investigate, address or consider, and has not investigated, addressed or considered any environmental or regulatory issues associated with the project specific design.

1.8 CALCULATIONS AND DESIGNS

TETRA TECH may have undertaken design calculations and prepared project specific designs in accordance with terms of reference that were previously set out in consultation with, and agreement of, TETRA TECH's client. These designs have been prepared to a standard that is consistent with current industry practice. Notwithstanding, if any error or omission is detected by TETRA TECH's Client or any party that is

authorized to use the Design Report, the error or omission should be immediately drawn to the attention of TETRA TECH.

1.9 GEOTECHNICAL CONDITIONS

A Geotechnical Report is commonly the basis upon which the specific project design has been completed. It is incumbent upon TETRA TECH's Client, and any other authorized party, to be knowledgeable of the level of risk that has been incorporated into the project design, in consideration of the level of the geotechnical information that was reasonably acquired to facilitate completion of the design.

If a Geotechnical Report was prepared for the project by TETRA TECH, it may be included in the Design Report as appropriate. The Geotechnical Report contains Limitations that should be read in conjunction with these Limitations for the Design Report.