



# Public Works and Government Services Canada

Requisition No. EZ899-171075/A

Buy and Sell I.D. No. \_\_\_\_\_

## SPECIFICATIONS

for

Airside Apron 1 Restoration  
Sandspit, BC

Project No. R.077013.001  
March, 2016

## APPROVED BY:

  
Regional Manager, AES

2016-06-23  
Date

  
Construction Safety Coordinator

2016-06-23  
Date

## TENDER:

  
Project Manager

27 JUN 16  
Date

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1. WORK COVERED BY CONTRACT DOCUMENTS
- .1 Work of this Contract comprises the furnishing of all labour, materials, equipment and supervision required for Selected Apron # 1 PCC slabs asphalt restoration and related work as specified and/or indicated, at Sandspit Airport, Sandspit, British Columbia.
2. TIME OF COMPLETION
- .1 Work under this contract is to be performed in a timely manner. Commence planning and preparatory work immediately upon receipt of official notification of acceptance of Contract and complete the work within time stipulated in the Contract.
- .2 The work shall be completed no longer than 8 weeks after Contract Award. Staging and Schedule shall conform to the Plan of Construction Operations in Appendix 2.
3. INTERPRETATION OF DOCUMENTS
- .1 In the event of discrepancies or conflicts in interpreting the Plans (drawings) and Specifications:
- .1 Section 01 00 00 General Requirements takes precedence over technical specification sections in other Divisions;
- .2 Specifications take precedence over drawings bound with specifications;
- .3 Drawings and specifications are complementary. When work is shown or mentioned on the drawings but is not indicated in the specifications, or when work is indicated in the specifications but is not shown or mentioned on the drawings, it shall nevertheless be included in the Contract.
- .4 The sub-division of the Specification into sections, identified by title and number, is for convenience only and does not modify the singularity of the document, nor does it operate to make or imply that the Departmental Representative is an arbiter to establish the limits or extent of contract between Contractor and Subcontractors or to determine the limits or to determine the limits or extents of work that may be decided by trade unions or contractors' organizations. Extras to the Contract will not be considered on the grounds of differences in interpretation of the Specification and/or Drawings as to which trade performs the work.
4. DEFINITIONS
- .1 The word "provide" means "supply and install".
- .2 For purposes of this contract, "Departmental Representative", "Architect/Engineer" and "Engineer" shall have the same meaning.

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|--|---|
| <u>5. USE OF SITE</u>                    | <ul style="list-style-type: none"><li>.1 Contractor use of site is restricted to work area.</li><li>.2 Do not unreasonably encumber the site with materials and equipment.</li><li>.3 Assume full responsibility for protection and safekeeping of products under this Contract</li><li>.4 Move stored products or equipment which interfere with operations of Department or other contractors.</li></ul>  |
| <u>6. INTERRUPTION OF SERVICES</u>       | <ul style="list-style-type: none"><li>.1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.</li><li>.2 Where Work involves breaking into or connecting to existing services affecting other facilities on site, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions at times directed by Departmental Representative.</li><li>.3 Provide access for vehicular and air traffic. Do not disrupt parking lot, pedestrian and traffic flow except as specified and/or as permitted by Departmental Representative.</li></ul> |
| <u>7. CONTRACTOR'S SUPERINTENDENT</u>    | <ul style="list-style-type: none"><li>.1 The contractor's Superintendent shall be on site each and every working day for the duration of the project.</li></ul>   |
| <u>8. SUPPLEMENTARY PROGRESS PAYMENT</u> | <ul style="list-style-type: none"><li>.1 Submit to Departmental Representative, at least 14 days before first application for payment, cost breakdown, in detail as directed, and on form provided, by Departmental Representative, for parts of Work, aggregating total amount of Contract Price, so as to facilitate evaluation of applications for payment. After approval by Departmental Representative, cost breakdown will be used as basis for progress payments.</li></ul>   |
| <u>9. SCHEDULES REQUIRED</u>             | <ul style="list-style-type: none"><li>.1 Submit Construction Progress Schedule in form of a horizontal Gantt bar chart within 5 working days after award of Contract.</li><li>.2 After review, revise and resubmit schedule to comply with revised project schedule.</li><li>.3 During progress of Work revise and resubmit as directed by Departmental Representative.</li></ul>   |

- .4 Submit schedule by PDF and submit one paper copy to be retained by Departmental Representative.
- .5 Distribute copies of revised schedule to:
  - .1 Job site office.
  - .2 Subcontractors.
  - .3 Other concerned parties.
- .6 Instruct recipients to report to Contractor within 2 days, any problems anticipated by timetable shown in schedule

#### 10. SPECIAL REQUIREMENTS

- .1 Departmental Representative may furnish additional drawings for clarification. These additional drawings have same meaning and intent as if they were included with plans referred to in Contract documents.
- .2 When additional drawings and instructions are required by the Contractor, provide reasonable notice in writing to the Departmental Representative in advance of the date they are required.

#### 11. SITE MEETINGS

- .1 Work sequence:
  - .1 Work under this contract is to be performed in a timely manner.
- .2 Before work is undertaken, ensure that all materials and trades required are available to finish work in as short as period as possible

#### 12. SITE MEETINGS

- .1 Departmental Representative will arrange project meetings, set the agenda, assume responsibility for setting times. Contractor will be responsible for recording and distributing minutes.
- .2 Notify Subcontractors and other participants as required.

#### 13. ON-SITE DOCUMENTS

- .1 Maintain at job site, one copy each of the following:
  - .1 Contract drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Reviewed shop drawings.
  - .5 Change orders.
  - .6 Other modifications to Contract.
  - .7 Field test reports.
  - .8 Copy of approved Work schedule.
  - .9 Manufacturers' installation and application instructions.
  - .10 Permits.
  - .11 Project Record Documents (for "as-built" purposes).

14. SUBMITTALS AND  
SAMPLES

- .1 Submit to Departmental Representative submittals listed for review in PDF format. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Work affected by submittal shall not proceed until review is complete.
- .3 Allow 5 days for Departmental Representative's review of each submission.
- .4 Contractor's responsibilities:
  - .1 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract documents stating reasons for deviations.
  - .2 After Departmental Representative's review, make any changes which Representative may require consistent with contract documents. When resubmitting notify Representative in writing of any revisions other than those requested.
- .5 Distribute samples as directed.

15 PERMITS AND BY-LAW

- .1 Comply with all laws and regulations relating to the work, whether federal, provincial or municipal and pay for all permits and certificates required with respect to the execution of the work.
- .2 .Submit applications, documents and obtain and pay for all permits and certificates required in respect to the execution of the work, including building, occupancy and other permits from local authority having jurisdiction.

16 CONSTRUCTION SAFETY  
MEASURES

- .1 Without restricting other provisions or requirements of the Contract, observe construction safety measures of National Building Code 2005 Part 8, National Fire Code Section 5.6, Provincial Government, Workers'/Workmen's Compensation Board and municipal authority provided that in any case of conflict or discrepancy more stringent requirements shall apply.
- .2 Comply with requirements of FCC No. 301 Standard for Construction Operations, June 1982.
- .3 Comply with requirements of FCC No. 302 Standard for Welding and Cutting, June 1982.

17. REFERENCES AND  
CODES

- .1 Perform Work in accordance with National Building Code of Canada (NBC) including all amendments up to tender closing date, the Canada Labour Code and Related Regulations, and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Meet or exceed requirements of:
  - .1 Contract documents.
  - .2 Specified standards, codes and referenced documents.

18 HAZARDOUS MATERIAL

- .1 Workplace Hazardous Materials Information System (WHMIS):
  - .1 A Canada-wide system designed to give employers and workers information about hazardous materials used in the workplace. Under WHMIS, information on hazardous materials is to be provided on container labels, material safety data sheets (MSDS), and worker education programs. WHMIS is put into effect by a combination of federal and provincial laws.
- .2 Submit to Departmental Representative current Material Safety Data Sheet (MSDS) for each hazardous material required prior to bringing hazardous material on site.

19. CONSTRUCTION FILES

- .1 Provide construction facilities in order to execute work expeditiously.
- .2 Remove from site all such work after use or when directed by the Departmental Representative.
- .3 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .4 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.
- .5 Parking will be permitted on site provided it does not disrupt performance of Work.
- .6 Electrical power source for office use only and water source will be provided, but no connections or extensions, will be made available. Electrical power beyond office use will be provided by the Contractor.
  - .1 Sanitary Facilities:
  - .2 Provide sanitary facilities for work force in accordance with governing regulations and ordinances post notices and take such

precautions as required by local health authorities. Keep area and premises in sanitary condition.

- .7 Make own arrangements for telephone. No airside photographs will be taken without Departmental Representative's permission.

## 20. Temporary Controls

- .1 Provide temporary controls in order to execute work expeditiously.
- .2 Remove from site all such work after use.
- .3 Protection for off-site and public property:
  - .1 Protect surrounding private and public property from damage during performance of Work.
  - .2 Provide necessary screens, covers, and hoardings.
  - .3 Be responsible for damage incurred.

## 21. FIRES

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

## 22. DISPOSAL OF WASTE

- .1 Do not bury rubbish and waste materials on site unless approved by Departmental Representative.
- .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

## 23. DRAINAGE

- .1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
- .2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.
- .3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

## 24 MATERIALS

- .1 Store cementitious products clear of earth or concrete floors, and away from walls.
- .2 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
- .3 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.



- .4 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.
- 25 PROTECTION OF WORK IN PROGRESS
- .1 Adequately protect all construction material. Material damaged or defaced due to failure in providing such protection is to be removed and replaced, as directed by Departmental Representative, at no increase in Contract Price or Contract Time.
- 26 CLEANING
- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris.
  - .2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative.
  - .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
  - .4 Provide on-site dump containers for collection of waste materials and debris.
  - .5 Remove waste material and debris from site and deposit in waste container at end of each working day.
  - .6 Dispose of asphaltic, concrete and waste materials and debris at designated dumping areas off site as directed by Departmental Representative. Select clean granular soils may be accepted by the Departmental Representative for re-use (by others) on site at an approved location in stock pile.
27. FINAL CLEANING
- .1 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
  - .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
  - .3 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
28. RECORD DOCUMENTS
- .1 In addition to requirements in General Conditions, maintain one copy of the following for record drawing purposes:
    - .1 One set of white prints of Contract drawings.
    - .2 Specifications.

- .3 Addenda.
  - .4 Change orders and other modifications to the Contract.
  - .5 Reviewed shop drawings, product data and samples.
  - .6 Field test records.
  - .7 Inspection certificates.
  - .8 Construction progress schedule.
- 
- .2 Store Record Documents in field office apart from documents used for construction. Provide files, racks and secure storage. Do not use Record Documents for construction purposes.
  - .3 Keep Record Documents and samples available for inspection by Departmental Representative.

-----END OF SECTION-----

1. CODES .1 Perform work to CURRENT Codes, Construction Standards and Bylaws, including Amendments up to the TENDER closing date.
2. DESCRIPTION OF WORK .1 Work under this Contract comprises general construction for the rehabilitation of 2 areas on the Airside Apron # 1. The work includes removal of existing asphaltic pavement surface, common excavation of existing materials, compacting subgrade, placement and compaction of sub base and base gravels, placing a concrete apron surface at 2 locations, and placing hot mix asphaltic concrete pavement on the perimeter of the concrete aprons to tie in to existing
- .2 All work shall be completed in conformance with the Plan of Construction Operations as attached in Appendix 1.
- .3 Work to be performed under this Contract includes, but is not limited to, the following items covered further in the Contract documents:
- .1 Complete site restoration to match existing conditions as a minimum.
  - .2 All elevations are geodetic and are referenced to existing integrated survey monuments.
  - .3 The contractor shall expose and verify the location and elevation of all existing services in the field prior to construction and notify the site representative of any discrepancies, conflicts or omissions prior to construction.
  - .4 Figured dimensions shall govern over scaled dimensions.
  - .5 The contractor shall repair or replace any existing pavements, services, utilities, or any other improvements that may be damaged as a result of construction.
  - .6 The contractor shall ensure that the work area and adjacent surface are kept clean and free of equipment and materials at all times when construction activity is not underway.
  - .7 All testing of materials, subgrade and compaction shall be performed by an independent testing agency retained by the contractor.
  - .8 A traffic and safety control plan shall be submitted by the contractor prior to the pre-construction meeting.
  - .9 Department representative to review and approve all proposed materials prior to use.
  - .10 Compact all granular material layers in maximum 0.3 meter lifts to 98% corrected maximum dry density, unless otherwise

		directed in writing by the department representative.
	.11	All proposed grading shall meet existing adjacent asphalt surface elevations unless otherwise noted. Any defects shall be corrected immediately at the contractor's expense.
	.12	All sub-base road and granular base materials shall be compacted to 98% corrected maximum dry density.
	.13	All new concrete pavements shall be graded so that no ponding forms. The maximum cross slope on any new concrete apron surface shall be 1%.
	.14	Contractor to restore airside non-traveled surfaces by hand seeding with select grasses approved by department representative in advance. Contractor to maintain and re-apply hand seeding until established.
<u>3. EXISTING SYSTEM DESCRIPTIONS</u>	.1	The existing apron construction and soils conditions are defined in the geotechnical report provided in Appendix 1 by exp Services Inc., dated March 17. 2016
<u>4. CONTRACT DOCUMENTS</u>	.1	The Contract documents, drawings and specifications are intended to complement each other, and to provide for and include everything necessary for the completion of the work.
	.2	Drawings are, in general, diagrammatic and are intended to indicate the scope and general arrangement of the work.
<u>5. DIVISION OF SPECIFICATIONS</u>	.1	The specifications are subdivided in accordance with the current 6-digit National Master Specifications System.
	.2	A division may consist of the work of more than 1 subcontractor. Responsibility for determining which subcontractor provides the labour, material, equipment and services required to complete the work rests solely with the Contractor.
	.3	In the event of discrepancies or conflicts when interpreting the drawings and specifications, the specifications govern.
<u>6. TIME OF COMPLETION</u>	.1	Total completion of the work, including all reconstruction shall be no later than 8 weeks from contract award date.
<u>7. HOURS OF WORK</u>	.1	Hours of work are limited to 0800 to 1630 hours for this contract.

8. WORK SCHEDULE
- .1 Carry on work as follows:
    - .1 Within 5 working days after Contract award, provide a schedule showing anticipated progress stages and final completion of the work within the time period required by the Contract documents. Indicate the following:
      - .1 Submission of shop drawings, product data, MSDS sheets and samples.
      - .2 Commencement and completion of work of each section of the specifications or trade for each phase as outlined.
      - .3 Final completion date within the time period required by the Contract documents.
    - .2 Do not change approved Schedule without notifying Departmental Representative.
    - .3 Interim reviews of work progress based on work schedule will be conducted as decided by Departmental Representative and schedule updated by Contractor in conjunction with and to approval of Departmental Representative.
9. COST BREAKDOWN
- .1 Before submitting the first progress claim, submit a breakdown of the Contract lump sum prices in detail as directed by the Departmental Representative and aggregating Contract price. The breakdown shall indicate mobilization and demobilization as separate values.
10. CODES, BYLAWS, STANDARDS
- .1 Perform work in accordance with the TP 312 (4) Aerodrome Standards of Recommended Practices and AK-68-12 Manual of Pavement Structural Design, and other indicated Codes, Construction Standards and/or any other Code or Bylaw of local application.
  - .2 Comply with applicable local bylaws, rules and regulations enforced at the location concerned.
  - .3 Meet or exceed requirements of Contract documents, specified standards, codes and referenced documents.
  - .4 In any case of conflict or discrepancy, the most stringent requirements shall apply.
  - .5 All work shall be completed in accordance to the Geotechnical Investigation Reports by exp Engineering Consultants. See Appendix 1 for a copy of the geotechnical report, dated March 17, 2016.
11. DOCUMENTS REQUIRED
- .1 Maintain 1 copy each of the following at the job site:
    - .1 Contract drawings.
    - .2 Contract specifications.

- .3 Addenda to Contract documents.
- .4 Copy of approved work schedule.
- .5 Reviewed/approved shop drawings.
- .6 Change orders.
- .7 Other modifications to Contract.
- .8 Field test reports.
- .9 Reviewed/approved samples.
- .10 Manufacturers' installation and application instructions.
- .11 One set of record drawings and specifications for "as-built" purposes.

12. REGULATORY REQUIREMENTS

- .1 Obtain and pay for - Certificates, Licenses and other permits required by regulatory authorities to complete the work.
- .2 Provide inspection authorities with plans and information required for issue of acceptance certificates.
- .3 Furnish inspection certificates in evidence that the work installed conforms with the requirements of the authority having jurisdiction.

13. CONTRACTOR'S USE OF SITE

- .1 Site located on Airside Apron at Sandspit Airport, BC. All work to conform to requirements of approved Plan of Construction Operations. See Appendix 2
- .2 Use of site:
  - .1 Assume responsibilities for work areas for performance of this work.
  - .2 Be responsible for coordination of all work activities on site, including the work of other contractors engaged by the Departmental Representative.
  - .3 Perform work in accordance with Contract documents. Ensure work is carried out in accordance with indicated phasing.
  - .4 Do not unreasonably encumber site with material or equipment
  - .5 Accept liability for damage, safety of equipment and overloading of existing equipment.

14. EXAMINATION

- .1 Examine site and be familiar and conversant with existing conditions likely to affect work.
- .2 Provide photographs of existing conditions, objects and structures prior to the start of the project.

15. EXISTING SERVICES

- .1 Notify, Departmental Representative 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 Departmental Representative 24 hours notice for necessary interruption throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian, vehicular traffic and tenant operations.

- .3 Provide alternative routes for personnel and pedestrian and vehicular traffic as applicable.
- .4 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.
- .5 Submit schedule to and obtain approval from Departmental Representative 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.
- .6 Provide temporary services when directed by Departmental Representative to maintain critical buildings and tenant systems.
- .7 Provide adequate bridging over trenches which cross traveled areas to permit normal traffic.
- .8 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .10 Record locations of maintained, re-routed and abandoned service lines.

#### 16. LOCATION OF EQUIPMENT AND FIXTURES

- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space, and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Departmental Representative of impending installation and obtain his approval for actual location.
- .4 Submit field drawings or shop drawings to indicate

the relative position of various services and equipment when required by the Departmental Representative and/or as specified.

17. SETTING OUT OF WORK .1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.
- .2 Provide devices needed to lay out and construct work.
- .3 Supply such devices as templates required to facilitate Departmental Representative's inspection of work.
- .4 Provide as built documentation of location and elevation for each of the design elevations indicated for each PCC slab.
18. QUALITY OF WORK .1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.
- .2 In cases of dispute, decisions as to standard or quality of work rest solely with the Departmental Representative, whose decision is final.
19. WORKS COORDINATION .1 Coordinate work of sub-trades:
- .1 Designate one person to be responsible for review of contract documents and shop drawings and managing coordination of Work.
- .2 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.
- .2 Provide each subcontractor with complete plans and specifications for Contract, to assist them in planning and carrying out their respective work.
- .3 Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.
- .4 Work cooperation:
- .1 Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.
- .2 Ensure that each trade provides all other trades reasonable opportunity for completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed work.
- .3 Ensure disputes between subcontractors are resolved.



- .5 Departmental Representative is not responsible for, or accountable for extra costs incurred as a result of Contractor's failure to coordinate Work.
  - .6 Maintain efficient and continuous supervision.
20. APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
- .1 In accordance with Section 01 33 00, submit the requested shop drawings, product data, MSDS sheets and samples indicated in each of the technical Sections.
  - .2 Allow sufficient time for the following:
    - .1 Review of product data.
    - .2 Approval of shop drawings.
    - .3 Review of re-submission.
21. PROJECT MEETINGS
- .1 Departmental Representative will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.
22. TESTING AND INSPECTIONS
- .1 The Contractor will appoint and pay for the services of testing agency or testing laboratory as specified, and where required for quality control and the following:
    - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
    - .2 Inspection and testing performed exclusively for Owner 's convenience
    - .3 Certificates of compliance.
    - .4 Tests specified to be carried out by Contractor under the Departmental Representative's supervision.
  - .2 Where tests or inspections by Contractor's designated testing laboratory reveal work is not in accordance with the Contract requirements, Contractor shall pay costs for additional tests or inspections as the Departmental Representative may require to verify acceptability of corrected work.
  - .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
  - .4 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Departmental Representative.
  - .5 The Departmental Representative may require, and pay for, additional inspection and testing services to ensure quality assurance of the work.

- .6 Provide Departmental Representative with copies of testing laboratory reports as soon as they are available.
23. AS-BUILT DOCUMENTS .1 The Departmental Representative will provide 2 sets of drawings, 2 sets of specifications, and 2 copies of the original AutoCAD files for "as-built" purposes.
- .2 As work progresses, maintain accurate records to show all deviations from the Contract documents. Note on as-built specifications, drawings and shop drawings as changes occur.
- .3 Closeout submittals in accordance with Section 01 78 00.
24. CLEANING .1 Daily conduct cleaning and disposal operations. Comply with local ordinances and anti-pollution laws.
- .2 Ensure cleanup of the work areas each day after completion of work.
25. ENVIRONMENTAL PROTECTION .1 Implement the Erosion and Sediment Control Plan and provide maintenance as per Section 01 35 43 - ENVIRONMENTAL PROCEDURES
- .2 Do not dispose of waste or volatile materials into water courses, storm or sanitary sewers.
- .3 Ensure proper disposal procedures in accordance with all applicable territorial regulations.
26. ADDITIONAL DRAWINGS .1 The Departmental Representative may furnish additional drawings for clarification. These additional drawings have the same meaning and intent as if they were included with plans referred to in the Contract documents.
27. SYSTEM OF MEASUREMENT .1 The metric system of measurement (SI) will be employed on this Contract.
28. SUBMISSION OF TENDER .1 Submission of a tender is deemed to be confirmation of the fact that the Tenderer has analyzed the Contract documents and is fully conversant with all conditions.

-----END OF SECTION-----

PART 1 - GENERAL

1.1 ADMINISTRATIVE

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, and samples in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Departmental Representative. 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.
- .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are coordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative.
- .10 Keep one reviewed copy of each submission on site.

1.2 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 5 days for Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative 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 Departmental Representative's review, distribute copies.
- .10 Submit one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .11 Submit one electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .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 3 years of date of contract award for project.
- .13 Submit one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
- .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 If upon review by Departmental Representative, 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.

- .15 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.
  - .1 This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
  - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

### 1.3 SAMPLES

- .1 Submit for review samples in as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Departmental Representative's business address.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

### 1.4 PROGRESS PHOTOGRAPHS

- .1 Submit progress photographs as requested by the Departmental Representative.

### 1.5 CERTIFICATES AND TRANSCRIPTS

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

-----END OF SECTION-----

## PART 1 - GENERAL

- 1.1 SUMMARY .1 Section Includes:
- .1 Movement of equipment and other special procedures that must be considered when construction is being carried out while the airport facility is in use.
- 1.2 GENERAL PROTECTION .1 Do not disrupt airport business except as permitted by Departmental Representative.
- .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 secure barricades where directed, with reflective tape, lighted by night and during poor visibility with red steady burn lights to prevent personnel inadvertently crossing into operational areas.
- 1.3 MOVEMENT OF EQUIPMENT AND PERSONNEL .1 There is no work required in areas of airport not closed to aircraft traffic. If in emergency or otherwise directed by Departmental Representative to work or cross these areas, follow these directions:
- .1 Obtain Departmental Representative's approval on scheduling of Work
  - .2 Control movements of equipment and personnel as directed by Departmental Representative.
  - .3 Provide qualified field personnel at locations designated by Departmental Representative to relay signals to contractor's employees from escort designated by Departmental Representative.
  - .4 Obey signals from Sandspit Airport Personnel instantly.
- 1.4 COORDINATION MOVEMENTS IN OPERATIONAL AREAS .1 Brief Departmental Representative no later than 1400 hours every day on next day's planned work and proposed construction equipment and vehicular traffic activities prior to starting work in area adjacent to aerodrome facilities.
- 1.5 FLIGHT SAFETY .1 There is no work required in areas of airport not closed to aircraft traffic. If in emergency or otherwise directed by Departmental Representative to work or cross these areas, follow these directions:
- .1 Prior to starting work obtain necessary closure of adjacent facilities.
  - .2 All Contractor's vehicles used on the

airfield must be equipped with an orange rotary beacon and must be escorted by an escort designated by Departmental Representative.

- .3 Foreign Object Damage (FOD)  
control procedures will be enforced by the Departmental Representative at all times in the construction and operational area.
- .4 The contractor shall maintain at the construction site an Departmental Representative approved, sufficiently sized and powered, tractor, or similar vehicle, fitted with a non-metallic motorized rotary sweeper broom, minimum width 2.4m, for FOD control and clean-up of adjacent operational surfaces affected by construction activities. Site FOD sweeps shall be conducted at the end of each working day and when directed by the Departmental Representative.

#### 1.6 CONSTRUCTION EQUIPMENT

- .1 It is essential that all power tools, internal combustion engines, and equipment used for work in this project, be equipped with suppressors to eliminate interference with airfield radio, and telecommunications equipment.

#### 1.7 RESTRICTED OR SECURE AREA

- .1 Any area on airport property to which access is restricted by sign and/or monitored is a secure or restricted area.

#### 1.8 CONTRACTORS RESPONSIBILITY

- .1 Be responsible for construction, personnel and vehicles employed on project and requiring access to restricted areas.

#### 1.9 CONTRACTOR PERSONNEL

- .1 Provide Departmental Representative and site personnel with list of responsible personnel complete with phone numbers, and those of sub-contractors, who may be contacted after working hours in case of an emergency.
- .2 The Contractor will be responsible for personnel and vehicles employed by the Contractor as well as personnel and vehicles of a sub-contractor and suppliers of materials or services requiring access to restricted areas.

#### 1.10 EVACUATION

- .1 In the unlikely event of a declared emergency by Airport Authorities the Contractor may be required to abandon and evacuate the work sites as directed. Evacuate to locations as directed.



1.11 VEHICLES

- .1 There is no work required in areas of airport not closed to aircraft traffic. If in emergency or otherwise directed by Departmental Representative to work or cross these areas, follow these directions:
- .2 Vehicles and equipment required to be in a restricted area must be equipped with 360° rotating amber beacons.
- .3 Operators of the vehicles to be escorted by an escort Designated by Departmental Representative and guided by requirements of the Transport Canada Manual of Airport Traffic Directive for the Operation of vehicles on Airport Movement Areas.

1.12 STAGING AND  
STORAGE AREAS

- .1 Security of any and all materials, equipment, and vehicles in storage or staging areas will be the sole responsibility of the Contractor.
- .2 There will be no Entry to a restricted area through a storage or staging area.

1.13 DAILY SECURITY

- .1 Ensure that access to restricted area is secured at end of each work day.

1.14 HAUL ROUTES

- .1 The cost of construction, maintenance and dust control of all haul routes will be incidental to the work.
- .2 The Departmental Representative will identify the haul routes on airport property. All Contractors' vehicles must follow the designated haul routes.
- .3 The contractor will be responsible to ensure that all personnel are familiar with the haul routes prior to use.
- .4 The contractor will supply and install signs and markings to clearly identify the haul routes to be used to the satisfaction of the Departmental Representative.
- .5 Vehicles and drivers not following designated haul routes will be removed and permanently barred from the site.
- .6 Maintain all haul routes in good condition at all times during construction. Provide dust control as directed by the Departmental Representative.
- .7 Any mud or debris tracked onto the active aircraft operating surface by the Contract must be removed immediately.
- .8 The contractor will be responsible to restore all

haul routes, to the conditions which existed prior  
to construction, upon completion of the Work to  
the satisfaction of the Departmental  
Representative.

-----END OF SECTION-----

## PART 1 - GENERAL

### 1.1 REFERENCES

- .1 Government of Canada.
  - .1 Canada Labour Code - Part II
  - .2 Canada Occupational Health and Safety Regulations.
- .2 National Building Code of Canada (NBC):
  - .1 Part 8, Safety Measures at Construction and Demolition Sites.
- .3 Canadian Standards Association (CSA) as amended:
  - .1 CSA Z797-2009 Code of Practice for Access Scaffold
  - .2 CSA S269.1-1975 (R2003) Falsework for Construction Purposes
  - .3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures
- .4 Fire Protection Engineering Services, HRSDC:
  - .1 FCC No. 301, Standard for Construction Operations.
  - .2 FCC No. 302, Standard for Welding and Cutting.
- .5 Province of British Columbia:
  - .1 Workers Compensation Act Part 3-Occupational Health and Safety.
  - .2 Occupational Health and Safety Regulation

### 1.2 WORKERS' COMPENSATION BOARD COVERAGE

- .1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.
- .2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

### 1.3 COMPLIANCE WITH REGULATIONS

- .1 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- .2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

### 1.4 SUBMITTALS

- .1 Work effected by submittal shall not proceed until review is complete.
- .2 Submit the following:

- .1 Health and Safety Plan.
  - .2 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
  - .3 Copies of incident and accident reports.
  - .4 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
  - .5 Emergency Procedures.
- .3 The Departmental Representative will review the Contractor's site-specific project Health and Safety Plan and emergency procedures, and provide comments to the Contractor within 5 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.
- .4 Submission of the Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:
- .1 Be construed to imply approval by the Departmental Representative.
  - .2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
  - .3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

#### 1.5 RESPONSIBILITY

- .1 Assume responsibility as the Prime Contractor for work under this contract.
- .2 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable Federal, Provincial, Territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

#### 1.6 GENERAL CONDITIONS

- .1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrians.
- .2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.

- .1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.
  - .2 Secure site at night time as deemed necessary to protect site against entry.
- 1.7 REGULATORY REQUIREMENTS
  - .1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.
  - .2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.
- 1.8 WORK PERMITS
  - .1 Obtain specialty permit[s] related to project before start of work.
- 1.9 FILING OF NOTICE
  - .1 The Departmental Representative is to complete and submit a Notice of Project as required by Provincial Territorial authorities.
  - .2 Provide copies of all notices to the Departmental Representative.
- 1.10 HEALTH AND SAFETY PLAN
  - .1 Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.
  - .2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:
    - .1 Primary Requirements:
      - .1 Contractor's safety policy.
      - .2 Identification of applicable compliance obligations.
      - .3 Definition of responsibilities for project safety/organization chart for project.
      - .4 General safety rules for project.
      - .5 Job-specific safe work, procedures.
      - .6 Inspection policy and procedures.
      - .7 Incident reporting and investigation policy and procedures.
      - .8 Occupational Health and Safety Committee/Representative procedures.
      - .9 Occupational Health and Safety meetings.
      - .10 Occupational Health and Safety communications and record keeping procedures.

- .2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.
  - .3 List hazardous materials to be brought on site as required by work.
  - .4 Indicate Engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
  - .5 Identify personal protective equipment (PPE) to be used by workers.
  - .6 Identify personnel and alternates responsible for site safety and health.
  - .7 Identify personnel training requirements and training plan, including site orientation for new workers.
- 
- .3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.
  - .4 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.
  - .5 Departmental Representative's review: the review of Health and Safety Plan by Public Works and Government Services Canada (PWGSC) shall not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.
- 
- 1.11 EMERGENCY  
PROCEDURES
- .1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:
    - .1 Designated personnel from own company.
    - .2 Regulatory agencies applicable to work and as per legislated regulations.
    - .3 Local emergency resources.
    - .4 Departmental Representative and site staff]
  - .2 Include the following provisions in the emergency procedures:
    - .1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
    - .2 Evacuate all workers safely.
    - .3 Check and confirm the safe evacuation of all workers.
    - .4 Notify the fire department or other

- emergency responders.
    - .5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
    - .6 Notify Departmental Representative and site staff.
  - .3 Provide written rescue/evacuation procedures as required for, but not limited to:
    - .1 Work with hazardous substances.
    - .2 Underground work.
    - .3 Work on, over, under and adjacent to water.
    - .4 Workplaces where there are persons who require physical assistance to be moved.
  - .4 Design and mark emergency exit routes to provide quick and unimpeded exit.
  - .5 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.
- 1.12 HAZARDOUS PRODUCTS .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.
  - .2 Where use of hazardous and toxic products cannot be avoided:
    - .1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents.
- 1.13 AMMONIA GAS HAZARD .1 Excavation activities in areas adjacent to aprons and taxiways of certain airports have resulted in encounters with ammonia gas.
  - .1 Ammonia gas results from decomposition of urea, used for de-icing purposes, which seeps through surface pavement joints and cracks to become trapped in sometimes heavily concentrated pockets in underlying and adjacent soil.
  - .2 Advise all workers, before any such excavation work, that should the smell of ammonia be detected at any time when working in excavations, then the workers must immediately leave the excavation area until such time as the volume of ammonia can be measured and appropriate safety measures are taken.

- .3 Ensure that all workers are aware that, at certain levels of concentration, unprotected exposure to ammonia can result in nose and throat irritation, breathing difficulty, and eye and skin irritation. Prolonged exposure without adequate protection could result in serious and permanent damage to personal health.
  - .4 Notify Departmental Representative immediately upon detection of ammonia.
  - .5 The Departmental Representative will act to have the ammonia gas concentration measured immediately and, depending upon the results, will direct procedures to be adopted for the safety of all personnel in adjacent areas.
- 1.14 ELECTRICAL SAFETY REQUIREMENTS
- .1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.
    - .1 Before undertaking any work, coordinate required prelocation and protection of existing circuits with Departmental Representative.
    - .2 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.
- 1.15 OVERLOADING
- .1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.
- 1.16 FALSEWORK
- .1 Design and construct falsework in accordance with CSA S269.1-1975 (R2003).
- 1.17 POWDER ACTUATED DEVICES
- .1 Use power-actuated devices in accordance with the ANSI A10.3 only after written permission from the Departmental Representative.
- 1.18 CONFINED SPACES
- .1 Carry out work in confined spaces in compliance with provincial regulations.
- 1.19 FIRE SAFETY REQUIREMENTS
- .1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
  - .2 Handle, store, use and dispose of flammable and combustible materials in accordance with the



National Fire Code of Canada.

- 1.20 FIRE PROTECTION AND ALARM SYSTEM
- .1 Fire protection and alarm systems shall not be:
    - .1 Obstructed.
    - .2 Shut off.
    - .3 Left inactive at the end of a working day or shift.
  - .2 Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.
  - .3 Be responsible/liable for costs incurred from the fire department, the building Departmental Representative and the tenants, resulting from false alarms.
- 1.21 UNFORESEEN HAZARDS
- .1 Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work, immediately stop work and advise the Departmental Representative verbally and in writing.
- 1.22 POSTED DOCUMENTS
- .1 Post legible versions of the following documents on site:
    - .1 Health and Safety Plan.
    - .2 Sequence of work.
    - .3 Emergency procedures.
    - .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
    - .5 Notice of Project.
    - .6 Floor plans or site plans.
    - .7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.
    - .8 Workplace Hazardous Materials Information System (WHMIS) documents.
    - .9 Material Safety Data Sheets (MSDS).
    - .10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.
  - .2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.
  - .3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

- |  |    |  |
|--|----|--|
| <u>1.23 MEETINGS</u>                     | .1 | Attend health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.   |
| <u>1.24 CORRECTION OF NON-COMPLIANCE</u> | .1 | Immediately address health and safety non-compliance issues identified by the Departmental Representative.   |
|  | .2 | Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.  |
|  | .3 | The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time. The Contractor will be responsible for any costs arising from such a "stop work order". |

-----END OF SECTION-----

## PART 1 - GENERAL

- |  |   |
|--|---|
| <u>1.1 DEFINITIONS</u>                             | <ul style="list-style-type: none"><li>.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.</li><li>.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.</li></ul> |
| <u>1.2 SUBMITTALS</u>                              | <ul style="list-style-type: none"><li>.1 The contractor shall implement an Erosion and Sediment Control Plan.</li></ul>   |
| <u>1.3 FIRES</u>                                   | <ul style="list-style-type: none"><li>.1 Fires and burning of rubbish on site not permitted.</li></ul>  |
| <u>1.4 DISPOSAL OF WASTES</u>                      | <ul style="list-style-type: none"><li>.1 Do not bury rubbish and waste materials on site.</li><li>.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.</li><li>.3 Safely dispose of wet concrete and pipe grout off-site in accordance with Municipal, Provincial and Federal authorities' requirements.</li></ul>   |
| <u>1.5 EROSION AND SEDIMENT CONTROL / DRAINAGE</u> | <ul style="list-style-type: none"><li>.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust that complies with the most stringent requirements of the authorities having jurisdiction.</li><li>.2 The Contractor shall inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.</li><li>.3 All work shall be undertaken and completed in such a manner as to prevent the release of sediment, silt, or sediment laden water, concrete or concrete leachate or any other deleterious substance into any ditch or water course.</li></ul>  |

- .4 Do not pump water containing suspended materials into waterways, sewer or drainage systems.
- .5 The Contractor shall keep all portions of the work drained during construction until completion. Where necessary, catch water ditch shall be constructed along the tops of excavations or fill slopes to prevent water flowing into or over the excavated or filled area. The Contractor will be responsible for the repair for the damage, directly resulting for their operations and for the removal or dirt or debris from existing system, which may be caused by or which may result from water backing up or overflowing through, from, or along any part of the work or adjacent properties. The Contractor shall bear all costs associated with these repairs until works are complete and accepted by the Departmental Representative.
- .6 The Contractor shall modify and/or provide additional silt control measures as necessary to accommodate construction activities and satisfy the requirements of the plan provided.
- .7 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.
- .8 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

#### 1.6 NOTIFICATION

- .1 Departmental Representative 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 Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

-----END OF SECTION-----

PART 1 - GENERAL

1.1 MEASUREMENT  
PROCEDURES

- .1 No separate payment will be made for quality control testing.

1.2 DEFINITIONS

- .1 Quality Assurance (QA): Inspection, sampling, testing and reporting activities conducted by Departmental Representative to determine the acceptability of the work.
- .2 Quality control (QC): Inspection, sampling, testing and reporting activities conducted by Contractor to control the quality of the work.

1.3 INSPECTION

- .1 Allow Departmental Representative 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 approvals by Departmental Representative instructions, or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative may 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, remove and reconstruct at Contractor's cost.

1.4 INDEPENDENT  
INSPECTION AGENCIES

- .1 Departmental Representative will appoint and pay for services of testing laboratory for quality assurance(QA) .
- .2 Contractor will furnish labour, equipment, and facilities to provide Quality Control(QC) testing by an approved testing laboratory in accordance with the following specification section and with the following minimum frequency of testing.

<u>Work Phase</u>	<u>Testing</u>	<u>Frequency</u>
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Base and Sub-base Material (Layer)

Gradation	2
Crush Count	2
Atterberg Limits	2

Moisture-Density Relationship	2
Field In Place density	12/layer

Portland Cement Concrete

Mix Production Gradation	2
Crush count	2
Concrete Testing	1/100 cu.m. and 1 day per minimum (Includes slump, air, temperature and casting cylinders and beams)
Compression Strength	3 per test
Flexure Strength	2 per test
Placing	Straight edge 2/slab

- .3 Provide equipment required for executing inspection and testing by appointed agencies. Provide and ship appropriate samples for QA testing.
- .4 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .5 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 Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.
- .6 Comply fully with testing requirements defined in the geotechnical report in Appendix 2.

1.5 ACCESS TO WORK

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

1.6 PROCEDURES

- .1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient

space to store test samples.

1.7 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 Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

1.8 REPORTS

- .1 Submit by email in PDF format inspection and test reports to Departmental Representative within 24 hours of inspection and completion of each test. Provide paper copy within five working days.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

-----END OF SECTION-----

PART 1 - GENERAL

- |   |    |  |
|---|----|--|
| <u>1.1 REFERENCES</u>                           | .1 | 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.   |
|   | .2 | Canadian Standards Association (CSA International)   |
|   | .1 | CSA-O121-M1978(R2003), Douglas Fir Plywood.  |
| <u>1.2 MEASUREMENT PROCEDURES</u>               | .1 | No separate payment will be made for temporary barriers  |
| <u>1.3 INSTALLATION AND REMOVAL</u>             | .1 | Provide temporary controls in order to execute work expeditiously.   |
|   | .2 | Remove from site all such work after use.  |
| <u>1.4 GUARD RAILS AND BARRICADES</u>           | .1 | Provide secure, rigid guard rails and barricades.  |
| <u>1.5 ACCESS TO SITE</u>                       | .1 | Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work. |
| <u>1.6 PUBLIC TRAFFIC FLOW</u>                  | .1 | Provide and maintain traffic FLOW barricades and flares, lights, or lanterns as required to perform Work and protect public. |
| <u>1.7 FIRE ROUTES</u>                          | .1 | Maintain access to property including overhead clearances for use by emergency response vehicles.                            |
| <u>1.8 PROTECTION FOR OFF SITE AND PROPERTY</u> | .1 | Protect surrounding private and public OFF-SITE AND property from damage during performance of PROPERTY Work.                |
|   | .2 | Be responsible for damage incurred.  |

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

-----END OF SECTION-----



PART 1 - GENERAL

<u>1.1 RESTRICTED OR SECURE AREA</u>	.1	Any area on airport property to which access Secure Area is restricted by sign and/or monitored is a secure or restricted area.
<u>1.2 CONTRACTOR'S RESPONSIBILITY</u>	.1	Be responsible for construction, personnel Responsibility and vehicles employed on project and requiring access to restricted areas. Provide two radio equipped traffic control personnel.
<u>1.3 MEASUREMENT FOR PAYMENT</u>	.1	No separate measurement will be made for Payment security.
<u>1.4 CONTRACTOR PERSONNEL</u>	.1	Provide Airport Manager with list of all proposed personnel
	.2	The Contractor will be responsible for personnel and vehicles employed by the Contractor as well as personnel and vehicles of any sub-contractor and suppliers of materials or services requiring access to restricted areas.
<u>1.5 DAILY SECURITY</u>	.1	Ensure that access to restricted area is secured at end of each work day.
<u>1.6 VEHICLES</u>	.1	Vehicles and equipment required to be in a restricted area must be equipped with 360° rotating amber beacons.
	.2	Operators of the vehicles to be guided by requirements of the Transport Canada Manual of Airport Traffic Directive for the Operation of vehicles on Airport Movement Areas.
	.3	Company vehicles will be removed from the construction site when not actually in use. If company vehicles are left at the airport they are to be stored in a location directed by Departmental Representative.
<u>1.7 EVACUATION</u>	.1	The Contractor shall be required to abandon and evacuate the work sites as directed, should an emergency situation be declared by Airport Authorities.
<u>1.8 STAGING/STORAGE AREAS</u>	.1	Any storage or staging area that may be established by the Contractor shall be fully enclosed and lockable.

- .2 Security of any and all materials in storage or staging areas will be the sole responsibility of the Contractor.

-----END OF SECTION-----

PART 1 - GENERAL

1.1 PROJECT  
CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Departmental Representative or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times. Do not burn waste materials on site.
- .3 Clear snow and ice from site to provide a safe working areas.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Dispose of waste materials and debris off site.
- .7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

1.2 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris other than that caused by Departmental Representative or other Contractors.
- .5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .6 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .7 Remove dirt and other disfiguration from exterior surfaces.

.8 Sweep and wash clean paved areas.

-----END OF SECTION-----

## PART 1 - GENERAL

### 1.1 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Copy will be returned after final inspection with Departmental Representative comments.
- .3 Revise content of documents as required prior to final submittal.
- .4 Furnish evidence, for type, source and quality of products provided.
- .5 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .6 Pay costs of transportation.
- .7 Submit to Departmental Representative, final copies of all test reports completed for this project including compaction tests, granular material gradations, granular subbase and granular base densities, asphalt mix gradation, thickness and densities and concrete mix gradation, properties and strengths a minimum 2 weeks prior to Substantial Performance of the Work.

### 1.2 FORMAT

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings. 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 process flow, 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. Bind in with text; fold larger drawings to size of text pages.

1.3 CONTENTS - EACH  
VOLUME

- .1 Table of Contents: provide title of project;
  - .1 Date of submission; names.
  - .2 Addresses, and telephone numbers of Consultant and 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. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.4 AS-BUILTS

- .1 Maintain, in addition to requirements in General Conditions, 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.
- .2 Store record documents in field office apart from documents used for construction. Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

1.5 RECORDING  
ACTUAL SITE  
CONDITIONS

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- .5 Keep record documents and samples available for inspection by Departmental Representative.
- .1 Record information on set of blue line, opaque drawings, and in copy of Project Manual, provided by Departmental Representative.
- .2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
  - .1 Measured depths of elements of foundation in relation to finish first floor datum.
  - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
  - .4 Field changes of dimension and detail.
  - .5 Changes made by change orders.
  - .6 Details not on original Contract Drawings.
  - .7 References to related shop drawings and modifications.
- .5 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.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections to provide certification that all works have been completed as specified and that works are ready for tie-in.

-----END OF SECTION-----

## PART 1 - GENERAL

- 1.1 MEASUREMENT PROCEDURES
- .1 No measurement will be made under this Section.  
Payment will be included in the lump sum price bid.
- 1.2 REFERENCES
- .1 Canadian Standards Association (CSA International)
- .1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
- .3 CSA O121-M1978(R2003), Douglas Fir Plywood.
- .4 CSA O151-04, Canadian Softwood Plywood.
- .5 CSA O153-M1980(R2003), Poplar Plywood.
- .6 CAN/CSA-O325.0-92(R2003), Construction Sheathing.
- .7 CSA O437 Series-93(R2006), Standards for OSB and Waferboard.
- .8 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
- .9 CAN/CSA-S269.3-M92(R2003), Concrete Formwork, National Standard of Canada
- .2 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- 1.3 SHOP DRAWINGS
- .1 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.
- .2 Each shop drawing submission shall bear stamp and signature of qualified professional engineer registered or licensed in Province of British Columbia, Canada.
- 1.4 WASTE MANAGEMENT AND DISPOSAL
- .1 Place materials defined as hazardous or toxic Management and waste in designated containers.
- .2 Ensure emptied containers are sealed and stored safely for disposal away from children.
- .3 Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOC's.

## PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Formwork materials:



- .1 Use wood and wood product formwork materials to CSA-0121 CAN/CSA-086 CSA 0437 Series CSA-0153.
- .2 Form ties:
  - .1 Use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
- .3 Form release agent: non-toxic, biodegradable, low VOC.
- .4 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 70 and 110s Saybolt Universal 15 to 24 mm<sup>2</sup> /s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.
- .5 Falsework materials: to CSA-S269.1.

### PART 3 - EXECUTION

#### 3.1 FABRICATION AND ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Fabricate and erect falsework in accordance with CSA S269.1 and COFI Exterior Plywood for Concrete Formwork.
- .3 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.
- .4 Align form joints and make watertight.
  - .1 Keep form joints to minimum.
- .5 Form expansion and control joints to match existing.
- .6 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

#### 3.2 REMOVAL AND RESHORING

- .1 Remove formwork when concrete has reached 70 % of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .2 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during

construction as required.

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

-----END OF SECTION-----

## PART 1 - GENERAL

- |                                       |  |
|---------------------------------------|--|
| <u>1.1 MEASUREMENT<br/>PROCEDURES</u> | <ul style="list-style-type: none"><li>.1 No measurement will be made under this Section.<ul style="list-style-type: none"><li>.1 Payment will be included in the lump sum provided.</li></ul></li></ul>  |
| <u>1.2 REFERENCES</u>                 | <ul style="list-style-type: none"><li>.1 American Concrete Institute (ACI)<ul style="list-style-type: none"><li>.1 SP-66-04, ACI Detailing Manual 2004.<ul style="list-style-type: none"><li>.1 ACI 315-99, Details and Detailing of Concrete Reinforcement.</li><li>.2 ACI 315R-04, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.</li></ul></li></ul></li><li>.2 American Society for Testing and Materials International (ASTM)<ul style="list-style-type: none"><li>.1 ASTM A 185/A 185M-05a, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.</li><li>.2 ASTM A 497/A 497M-05a, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.</li><li>.3 ASTM A 775/A 775M-04a, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.</li></ul></li><li>.3 Canadian Standards Association (CSA International)<ul style="list-style-type: none"><li>.1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.</li><li>.2 CSA-A23.3-04, Design of Concrete Structures.</li><li>.3 CAN/CSA-G30.18-M92(R2002), Billet-Steel Bars for Concrete Reinforcement, A National Standard of Canada.</li><li>.4 CSA W186-M1990(R2002), Welding of Reinforcing Bars in Reinforced Concrete Construction.</li></ul></li><li>.4 Reinforcing Steel Institute of Canada (RSIC)<ul style="list-style-type: none"><li>.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.</li></ul></li></ul> |
| <u>1.3 SOURCE QUALITY<br/>CONTROL</u> | <ul style="list-style-type: none"><li>.1 Upon request, provide Engineer with certified of mill test report of reinforcing steel, showing physical and chemical analysis.</li></ul>   |

## PART 2 - PRODUCTS

- |                      |  |
|----------------------|--|
| <u>2.1 MATERIALS</u> | <ul style="list-style-type: none"><li>.1 Substitute different size bars only if permitted in writing by Departmental Representative.</li><li>.2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.</li></ul> |
|----------------------|--|

- .3 Cold-drawn annealed steel wire ties: to ASTM A 497/A 497M.
- .4 Welded steel wire fabric: to ASTM A 185/A 185M.
  - .1 Provide in flat sheets only.
- .5 Welded deformed steel wire fabric: to ASTM A 497/A 497M.
  - .1 Provide in flat sheets only.
- .6 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .7 Plain round bars: to CSA-G40.20/G40.21.

### PART 3 - EXECUTION

#### 3.1 FIELD BENDING

- .1 Replace bars, which develop cracks or splits.

#### 3.2 PLACING REINFORCEMENT

- .1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.
- .2 Tie reinforcement where spacing in each direction is:
  - .1 Less than 300 mm: tie at alternate intersection.
  - .2 300 mm or more tie at each intersection.
- .3 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.
- .4 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .5 Ensure cover to reinforcement is maintained during concrete pour.
- .6 Protect epoxy and paint coated portions of bars with covering during transportation and handling.

#### 3.3 CLEANING

- .1 Clean reinforcing before placing concrete.

#### 3.4 INSPECTION

- .1 Do not place concrete until Departmental Representative has inspected and approved reinforcement work in place.

-----END OF SECTION-----

## PART 1 - GENERAL

- 1.1 MEASUREMENT PROCEDURES .1 Portland Cement Concrete (PCC) slabs, new reinforcement and joint sealing, will be included in the lump sum provided.
- 1.2 REFERENCES .1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C 260-01, Standard Specification for Air-Entraining Admixtures for Concrete.
  - .2 ASTM C 309-03, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  - .3 ASTM C 494/C 494M-05, Standard Specification for Chemical Admixtures for Concrete.
  - .4 ASTM C 1017/C 1017M-03, Standard Specification for Chemical Admixtures for use in Producing Flowing Concrete.
- .2 Canadian Standards Association (CSA International)
- .1 CSA-A23.1/A23.2-2004, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA A283-00(R2003), Qualification Code for Concrete Testing Laboratories.
- .3 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
- 1.3 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 MS or MSb - Moderate sulphate-resistant cement.
  - .3 Type MH or MHb - Moderate heat of hydration cement.
  - .4 Type HE or Heb - High early-strength cement.
  - .5 Type LH or LHb - Low heat of hydration cement.
  - .6 Type HS or HSb - High sulphate-resistant cement.
- .2 Fly ash:
- .1 Type F - with CaO content less than 8%.
  - .2 Type CI - with CaO content ranging from 8 to 20%.
  - .3 Type CH - with CaO greater than 20%.
- .3 GGBFS - Ground, granulated blast-furnace slag.
- 1.4 DESIGN REQUIREMENTS .1 Alternative 1 - Performance: in accordance with CSA-A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

- .2 Comply with design parameters provided by geotechnical engineer in Appendix 1.
- 1.5 SUBMITTALS
- .1 Submit testing inspection results and reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.
  - .2 Concrete pours: submit accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken.
  - .3 Concrete hauling time: submit for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.
  - .4 Submit schedule and details for trial batch placement on site in advance of concrete pours. Submit testing inspection results and reports for review by Departmental Representative. Don not proceed further without written approval.
- 1.6 QUALITY ASSURANCE
- .1 Quality Assurance: in accordance with Section 45 00 - Quality Control.
- 1.7 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 120 minutes after Batching to be confirmed by Contractor's trial batches to establish mix set time.
    - .1 Modifications to maximum time limit must be agreed to Departmental Representative laboratory representative and concrete producer as described in CSA A23.1/A23.2.
    - .2 Deviations to be submitted for review by Departmental Representative.
  - .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.
    - .2 Divert unused concrete materials from landfill to local quarry or facility approved by Departmental Representative.
    - .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 Departmental Representative.

- .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 wash down water from tools and equipment, and admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal. Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Cement: to CAN/CSA-A3001, Type GU.
- .2 Water: to CSA-A23.1.
- .3 Aggregates: to CAN/CSA-A23.1/A23.2 ASTM C 330.
- .4 Admixtures:
  - .1 Air entraining admixture: to ASTM C 260.
  - .2 Chemical admixture: to ASTM C 494 ASTM C 1017. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .5 Curing compound shall conform to the requirements of ASTM C309 Type 2 (white pigmented), Class A or B.
- .6 Sheet material for curing or for protection from rain: to ASTM C 171, waterproof paper plastic sheets.
- .7 Burlap mats for curing: to ASTM C 171.
- .8 Cold pour and applied, jet fuel resistant, joint sealant shall conform to the requirements of CAN/CGSB-19.20.
- .9 Joint sealant shall be suitable for the geometry indicated on drawings and fuel resistant.
- .10 The following low modulus silicone sealants specifically manufactured for concrete pavements will also be acceptable:
  - .1 Dow Corning 888 Silicone Highway Joint Sealant; and
  - .2 Crafco Roadsaver Silicone Sealant.

- .11 Sikaflex 2C, a polyurethane-based elastomeric sealant, will also be acceptable.
- .12 Joint sealant, hot poured. Bond breaker to Departmental Representative's approval.
- .13 Paper masking tape or teflon tape shall be used as a bond breaker.
- .14 Preformed expansion joint filler: to ASTM D 1752.
- .15 Reinforcing steel shall be deformed bars conforming to the requirements of CAN/CSA-G30.18 Grade 400.
- .16 Deformed steel tie bars shall be epoxy coated or have equivalent corrosion resistance in accordance with ASTM A 775M.
- .17 Protective covers and insulation for cold weather concreting: to CAN/CSA-A23.1.
- .18 Premoulded joint fillers:
  - .1 Bituminous impregnated fiber board: to ASTM D 1751

## 2.2 MIXES

- .1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative 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 Provide concrete mix to meet following plastic state requirements:
    - .1 Uniformity
    - .2 Placeability
    - .3 Workability: free of surface blemishes  
loss of mortar colour variations  
segregation.
  - .3 Provide concrete mix to meet following requirements:
    - .1 Durability and class of exposure:  
Concrete Pavement: C1
    - .2 Minimum flexural strength at 28 days:  
concrete pavement 5.0 MPa
    - .3 PCC to be 375 mm for PLR = 12 with k =  
60 MPa/m and S = 60 KN
  - .4 Minimum cement content: 340 kg/m<sup>3</sup> of concrete.
  - .5 Maximum size of coarse aggregate: 28 mm.
  - .6 Slump at time and point of discharge:  
Concrete Pavement: 80mm + 30mm;
  - .7 Air content: 5 to 8 %.



- .8 Maximum water concentration: concrete pavement: 0.37
- .9 Provide a correlation of compressive strength to flexural strength.
- .10 Concrete and aggregate to meet CSA A23.1/2-09 requirements and free of alkali reaction.
- .11 Rigid pavement subgrade bearing modulus - k, and subgrade strength - S defined above.

### PART 3 - EXECUTION

#### 3.1 EQUIPMENT GENERAL REQUIREMENTS

- .1 All equipment shall be available for general inspection by the Departmental Representative Requirements before operations commence.
- .2 The Departmental Representative shall have access, at all times, to all parts of the equipment for purposes pertaining to the Contract such as: checking adequacy of equipment; inspecting operations; verifying weights, proportions and material properties; and checking line, grade and thickness tolerances.
- .3 Where fixed form paving is used provide equipment with following features:
  - .1 Mechanical self-propelled spreader capable of moving concrete forward and laterally.
  - .2 Vibrator locations and spacings whether surface or internal shall be installed as per manufacturer's specifications or as directed by the Departmental Representative.
  - .3 Mechanical, self-propelled finisher with two independently operated transverse screeds.
  - .4 Float to be aluminum or magnesium, straight, smooth, sufficiently light to avoid sinking into concrete surface, operated mechanically or manually from edge to edge while advancing longitudinally.
- .4 The Contractor shall provide concrete saws adequate in number of units and power to complete the sawing to the required dimensions and at the required rate on the work site before concrete placement is started. The Contractor will also maintain an ample supply of suitable spare saw blades and one standby concrete saw.

#### 3.2 FORMWORK

- .1 Install in accordance with Section 03 10 00 - Concrete Forming and Accessories and to following requirements:
  - .1 For fixed form paving:
    - .1 Provide steel forms of sufficient strength to support and keep alignment under weight of spreading and finishing

machines.

- .2 Use of wood forms for fillet areas to be approved by Departmental Representative.
- .3 Set forms true to line and grade, join neatly and tightly and stake securely to resist concrete pressure and impact from tampers without springing.
- .4 Clean and oil forms before each use.
- .5 Obtain Departmental Representative's approval of forms before placing concrete.

### 3.3 PREPARATION

- .1 Obtain Departmental Representative's approval before placing concrete.
  - .1 Provide 24 hours notice prior to placing of concrete.
  - .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .4 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather
- .5 Do not place load upon new concrete until authorized by Departmental Representative.

### 3.4 CONSTRUCTION

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

### 3.5 CONCRETE CONSOLIDATION

- .1 Concrete consolidation shall conform to the requirements of Clause 19 of CAN/CSA-A23.1 and the following:
  - .1 Use hand operated vibrator(s) on small formed panels inaccessible to frame mounted units. Do not operate vibrator in one location longer than 5 seconds.
- .2 Ensure that concrete adjacent to edge forms or previously constructed panels is thoroughly vibrated.

### 3.6 CONCRETE FINISHING

- .1 Concrete finishing after consolidation by Finishing vibration shall be in conformance with the requirements of Clause 22 of CAN/CSA-A23.1 and the following:
  - .1 Where joints are formed rather than sawn, form longitudinal and transverse joints after final pass of finishing machine.
- .2 Finish edges of slabs with edging tool to form

smooth squared

### 3.7 CONCRETE SURFACE TEXTURING

- .1 The surface texturing of concrete, Surface Texturing immediately after float finishing, shall conform to the requirements of Clause 22 of CAN/CSA-A23.1 and the following:
  - .1 Create a stiff bristled broom effect to produce a suitable non-slip concrete surface finish with a fine granular or sandy texture of 1 mm relief free from disfigurations.
  - .2 The texturing is to be straight, precise, transverse to the direction of traffic and shall not damage the pavement edges.
- .2 Avoid over finishing efforts particularly within 450 mm of the Free Edge to minimize slumping and sloughing.

### 3.8 CURING

- .1 Cure for minimum 7 days by one of following methods by following method:
  - .1 Curing compound:
    - .1 Apply membrane curing compound in two coats to form a complete and unbroken membrane on the surface of the concrete.
    - .2 Apply the first coat as soon as any excess water has evaporated from the surface of the concrete. Apply the second coat of curing compound immediately behind the first coat.
    - .3 Apply each coat at the manufacturer's recommended application rate.
    - .4 Spray slab edges within 1 hour of placement.
    - .5 Curing compound shall be applied to each saw cut joint after saw cutting and power washing has been completed.
    - .6 Protect formed or sawed joints from evaporation during the curing period.
    - .7 Re-spray any areas where the membrane is damaged during the curing period.
  - .2 Burlap or cotton mats:
    - .1 As soon as concrete surface has been finished and can bear weight without marking, carefully cover with burlap or cotton mats.
    - .2 Place mats to overlap each other by 300 mm or more and to overlap concrete slab by 300 mm or more at each side secured by a continuous bank of sand and gravel.
    - .3 Cover sides and ends of slab with mats as soon as forms are removed.
    - .4 Thoroughly wet mats before placing them on concrete and keep saturated during

curing period with water spray sufficiently fine to avoid damaging concrete surface, avoiding wet/dry cycles.

- .3 Sheet material:
  - .1 Cover slab with waterproof sheet material as soon as concrete has set sufficiently to bear weight without marking, sheet shall be in full contact with concrete surface during curing process.
  - .2 On leading slabs place sheet material at least 1 m wider than slab and after removal of side form fold down edges of sheet and bank with soil, sand or gravel to prevent air circulation.
  - .3 Batten down sheet to prevent free access of air.
  - .4 Keep sheet in place during curing period and promptly repair tears and pinholes.
- .4 Cure and protect concrete in accordance with CSA A23.1-00/A23.2-00, except that curing compounds shall not be used where bond is required by subsequent topping or coating.

### 3.9 CONCRETE PROTECTION .1

- The protection of concrete shall conform to Protection the requirements of Clause 21 of CAN/CSA-A23.1 And the following:
- .1 The concrete pavement shall not be opened up to construction equipment or traffic until the concrete reaches 70 percent of the specified flexural strength.
  - .2 When placing concrete in lanes adjacent to existing concrete, operate the placing equipment on rubber wheels or pads to prevent damage to the existing surface(s).

### 3.10 TOLERANCES

- .1 The finished concrete pavement surface grade shall be within 5 mm of design elevation, but not uniformly high or low.
- .2 The finished concrete pavement surface shall not have vertical irregularity exceeding 5 mm when checked with a 4.5 metre straightedge placed in any direction at any location.
- .3 Horizontal deviations of slab joints and edges from alignment of pavement shall not exceed 10 mm.
- .4 Keyway cross sections formed on slab edges shall be within 5 mm of dimensions indicated on Contract Drawings.

### 3.11 JOINTS

- .1 General:
  - .1 Joints in the concrete pavement shall be

- constructed to meet the location, dimensional requirements, and details indicated in the Contract Drawings.
- .2 Joints shall conform to the requirements of Clause 20 of CAN/CSA-A23.1.
- .3 Construct joints plumb, straight and square.
- .4 Construct joints to coincide with those in adjacent pavement, unless indicated otherwise on Contract Drawings or directed by the Departmental Representative.
- .5 Install isolation joints around structures and features that project through, into or against pavement.
- .2 Sawing Joints:
  - .1 Ensure the joints are straight. Mark the joint alignment with a chalk line or other suitable guide. Install end stakes to ensure straight joint alignment across paved area.
  - .2 Saw the joints using suitable methods to produce the joint dimensions indicated on the Contract Drawings.
  - .3 Use sufficient workers and equipment, including standby equipment, to maintain a satisfactory sawing schedule.
  - .4 Schedule sawing operations on a 24 hour basis and be consistent with concrete placing.
  - .5 Make initial saw cuts in a progressive manner and as soon as possible without causing raveling and before shrinkage cracks occurs.
  - .6 If a crack occurs ahead of a saw cut, stop cutting immediately. Move ahead a minimum of two (2) joints and cut one (1) to two (2) joints before returning to saw intermediate joints. Where cracking persists, make a 1 metre saw cut from one edge and complete sawing from opposite edge. Adjust the sawing schedule accordingly.
  - .7 When uncontrolled cracking or other surface damage results from inadequate, delayed, or improper sawing techniques, the Departmental Representative shall order a cease in concrete placement operations. The Departmental Representative will not accept delay of work Claims based on stop work orders resulting from uncontrolled cracking. Work shall be permitted to resume only after panels that have experienced uncontrolled cracking have been completely removed and replaced at the Contractor's expense.
  - .8 Flush off sawcutting laitance immediately after each sawcutting operation.
  - .9 Traffic or equipment shall not be allowed on sawn joints until they are sealed.
- .3 Sealing Joints:

- .1 Seal joints with materials as indicated on the Contract Drawings.
- .2 The sealant manufacturer's instructions for application are to be followed, but the manufacturer's requirements shall, under no circumstance, override the joint dimensions indicated on the Contract Drawings.
- .3 Just prior to sealing joint, flush the joint with high pressure water to remove laitance, curing compound and protrusions of hardened concrete. Clean and dry joint by compressed air and then vacuum to remove any loose or foreign material.
- .4 Do not apply joint sealant during rainy weather, when the ambient temperature (shade) is less than 4°C, or when not recommended by the sealant manufacturer.
- .5 Prepare sealant for application using equipment and methods in accordance with sealant manufacturer's recommendations.
- .6 Insert bond breaking material in joint prior to applying sealant, then fill joint from bottom up with sealant to avoid trapping air.
- .7 The sealant shall be applied in accordance with the sealant manufacturer's recommendations, but under no circumstance shall the joint dimensions indicated on the Contract Drawings be altered. Pay special attention to maintain the cleanliness of the concrete to be bonded during sealing operations.
- .8 On completion of the first application of the sealant, return and top up any under filled areas.
- .9 Replace any sealant that fails to bond to the concrete or fails to cure properly.

### 3.12 OPERATIONAL CONSTRAINTS

- .1 The Contractor shall observe the following Constraints operational constraints:
  - .1 Do not place concrete on a frozen surface. The underlying base course shall be entirely free of frost when concrete is placed. The use of chemicals to eliminate frost is not permitted.
  - .2 Stop paving operations if rain is intense enough to separate the cement paste from the surface of the concrete mix or to hinder finishing operations. Immediately protect freshly placed concrete from damage by rain. Use suitable protective covering materials such as burlap, cotton mats, curing paper or plastic sheeting. Extend protective coverings over concrete to be protected, and arrange coverings to not bear on Free Edges.
  - .3 Discontinue concrete mixing and placing

- operations during cold weather.
- .4 During hot and windy conditions, to protect concrete from rapid surface moisture evaporation, the air above the concrete should be fog sprayed after finishing operations have been completed.
- .5 During periods of hot weather or large temperature fluctuations take the following precautions:
  - .1 Sprinkle forms and base course grade with water immediately before Placing concrete.
  - .2 Place the concrete at the coolest concrete temperature practicable, and in no case with the concrete temperature exceeding 30°C. Cool the aggregates and/or mixing water as necessary to maintain the concrete placement temperature less than 30°C.
  - .3 Supplement the curing of the concrete with thoroughly wet burlap.
  - .4 Cease paving operations when the temperature difference between the centre and the surface of the concrete is more than 20°C to prevent thermal shock.
  - .6 Do not mix, place or finish concrete when the natural light is insufficient, unless an artificial lighting system approved by the Departmental Representative is operated.

### 3.13 FIELD QUALITY CONTROL

- .1 Inspection and testing of concrete and CONTROL concrete materials will be carried out by Contractor by testing laboratory approved by Departmental Representative's in accordance with CSA-A23.1/A23.2
  - .1 Ensure testing laboratory is certified in accordance with CSA A283.
- .2 Departmental Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .3 Inspection or testing by Departmental Representative for Quality Assurance will not augment or replace Contractor quality control nor relieve him of his contractual responsibility. All quality control testing shall be by Contractor

### 3.14 VERIFICATION

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established in PART 2 - Products, by Departmental Representative and provide verification of

compliance.

3.15 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 more than 0.50 Mpa below the specified minimum 28 day flexural strength.
- .6 Standard deviation of 28 day strength test results exceeds CSA A23.1 clause 17.6.7.1 requirements.

3.16 REPAIR/RESTORATION .1

Repair of defective concrete work:

- .1 Where defective concrete is identified by Departmental Representative during plastic condition, repair using methods approved by Departmental Representative.
- .2 Grind off high surface variations where directed by Departmental Representative.
- .2 Remove and replace defective concrete where directed by Departmental Representative.
  - .1 Remove minimum 3 m of pavement by sawing through concrete across full lane width.
  - .2 Replace with new concrete to this specification.
  - .3 Construct contraction joint at boundary between sawn face of existing concrete and new concrete.

3.17 PROTECTION

- .1 Keep vehicular traffic off newly paved areas until paving has properly cured and joints have been sealed.

3.18 CLEANING

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

-----END OF SECTION-----



## PART 1 - GENERAL

- 1.1 SUMMARY .1 This section defines correction to maximum dry density to take into account aggregate particles larger than 4.75 mm.
- 1.2 REFERENCES .1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C 127-04, Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
  - .2 ASTM D 698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m<sup>3</sup>).
  - .3 ASTM D 1557-02a, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m<sup>3</sup>).
  - .4 ASTM D 4253-00, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
- 1.3 DEFINITIONS .1 Corrected maximum dry density is defined as:
- .1  $D = F1 \times D1 + 0.9 \times D2 \times F2$
  - .2 Where: D = corrected maximum dry density kg/m<sup>3</sup>. F1 = fraction (decimal) of total field sample passing ASTM 4.75 mm sieve. F2 = fraction (decimal) of total field sample retained on ASTM 4.75 mm sieve. D1 = maximum dry density, kg/m<sup>3</sup> of material passing ASTM 4.75 mm sieve determined in accordance with Method A of ASTM D 1557-91 (regardless of %oversize fraction F2) for granular base, subbase and backfill material and to ASTM D 698-00a for clay subgrades and backfill materials. D2 = bulk density, kg/m<sup>3</sup> of material retained on ASTM 4.75 mm sieve, equal to 1000 G where G is bulk specific gravity (dry basis) of material when tested to ASTM C 127-88(1993)a.

## PART 2 - PRODUCTS

Not Used

## PART 3 - EXECUTION

Not Used

-----END OF SECTION-----

## PART 1 - GENERAL

- |  |   |
|--|---|
| <u>1.1 REFERENCES</u>                    | .1 American Society for Testing and Materials (ASTM)<br>.1 ASTM D 4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.                   |
| <u>1.2 WASTE MANAGEMENT AND DISPOSAL</u> | 1. Divert unused granular materials to landfill or to local airport site as approved by DISPOSAL Departmental Representative. No material removed from excavations will be accepted for re-use in this project. |

## PART 2 - PRODUCTS

- |                      |  |
|----------------------|--|
| <u>2.1 MATERIALS</u> | .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.<br><br>.2 Flat and elongated particles of coarse aggregate: to ASTM D 4791.<br>.1 Greatest dimension to exceed five times least dimension.<br><br>.3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:<br>.1 Natural sand.<br>.2 Manufactured sand.<br>.3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.<br><br>.4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:<br>.1 Crushed rock.<br>.2 Gravel and crushed gravel composed of naturally formed particles of stone.<br>.3 Light weight aggregate, including slag and expanded shale. |
|----------------------|--|

## PART 3 - EXECUTION

- |                        |  |
|------------------------|--|
| <u>3.1 PREPARATION</u> | .1 Processing:<br>.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.<br>.2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Departmental Representative. |
|------------------------|--|

- .3 Wash aggregates, if required to meet specifications. Use only equipment approved by Departmental Representative.
- .4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.
- .2 Handling
  - .1 Handle and transport aggregates to avoid segregation, contamination and degradation.
- .3 Stockpiling
  - .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces.
  - .2 Stockpile aggregates in sufficient quantities to meet Project schedules.
  - .3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
  - .4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate.
  - .5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
  - .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 h of rejection.
  - .7 Stockpile materials in uniform layers of Max 1.5 m of thickness.
  - .8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
  - .9 Stockpiles height to be under 1:7 (Vertical: Horizontal) Transition Slope line from the edge of runway strips.
  - .10 Do not cone piles or spill material over edges of piles.
  - .11 Do not use conveying stackers.
  - .12 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

### 3.2 CLEANING

- .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .2 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.

- .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

- 1.1 MEASUREMENT PROCEDURES
- .1 Common Excavation. No Payment measurement will be provided. Payment shall be included in the lump sum price bid.
- 1.2 REFERENCES
- .1 American Society for Testing and Materials International, (ASTM).
    - .1 ASTM C117-04, Test Method for Materials Finer Than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.
    - .2 ASTM C136-06, Test Method for Sieve Analysis of Fine and Coarse Aggregates.
    - .3 ASTM D422-63(1998), Method for Particle-Size Analysis of Soils.
    - .4 ASTM D4318-05, Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
  - .2 Canadian General Standards Board (CGSB).
    - .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- 1.3 DEFINITIONS
- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
    - .1 Rock Excavation: excavation of material from solid masses of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders or rock fragments having individual volume in excess of 1 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.
  - .2 Compaction classes: one class of soil is recognized for compaction purposes; cohesionless soil:
    - .1 Subgrade materials to be in general conformance with PWGSC/Transport Canada Specifications and/or equivalent BC Ministry of Transportation and Infrastructure specifications as detailed by the geotechnical report in Appendix 1.
  - .3 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
  - .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 Pavement structure: combination of layers of unbound or stabilized granular sub-base, base, and asphalt or concrete surfacing.
- .7 Subgrade elevation: elevation immediately below pavement structure.
- .8 Unsuitable materials:
  - .1 Weak and compressible materials under pavement areas.
  - .2 Frost susceptible materials under pavement areas.
  - .3 Frost susceptible materials:
    - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D 4318, and gradation within limits specified when tested to ASTM D422 and ASTM C 136: Sieve sizes to CAN/CGSB-8.1.

Sieve Designation	% passing
2.00 mm	100
0.10 mm	45-100
0.02 mm	10-80
0.005 mm	0-45
    - .2 Coarse grained soils containing more than 20 % by mass passing 0.075 mm

#### 1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials.
- .2 Dispose of removed soil, concrete, asphalt, unused topsoil and rock to location off site as indicated or as directed by Departmental Representative off site. Select granular material from excavations may be accepted by the Departmental Representative placed in stockpile for use by others on the site.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- .1 Fill materials: to approval of Departmental Representative.

### PART 3 - EXECUTION

#### 3.1 EXCAVATING

- .1 General:
  - .1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.
  - .2 Do not excavate if rain is forecast that

will make subgrade too wet. Excavate only length and areas that can be compacted and filled with base material or other materials in reasonable time to prevent rain water soaking and damaging the subgrade strength. If these precaution are not taken, contractor will correct the damage at their own cost.

- .3 Excavate to lines, grades, elevations and dimensions as indicated
- .4 Ensure drainage of excavated areas and maintain crowns and cross slopes to provide surface drainage.
- .5 Notify Departmental Representative whenever unsuitable materials are encountered in cut sections, remove unsuitable materials as directed and replace with material approved by Departmental Representative to depth and extent as directed.
- .6 Dispose of waste material as directed by Departmental Representative off project limits.

.2 Rock excavation:

- .1 During excavation: when material appearing to conform to classification for rock is encountered, notify Departmental Representative in sufficient time to enable measurements to be made to determine volume of rock.
- .2 Provide drainage to ditches, leaving no undrained pockets in foundation.

.3 Common excavation:

- .1 Excavate to subgrade depths required below finish grade elevation of work area.
- .2 Stockpile, in locations as directed by Departmental Representative.

- .4 Do not disturb foundation materials of adjacent pavements or structures which are to remain in place.

3.2 SUBGRADE COMPACTION .1  
IN PAVEMENT AREAS

Scarify and mix pavement subgrade surface, after grading has been completed, to required depth of subgrade compaction.

- .2 Compact top 150 mm of subgrade soils minimum 95 % of corrected maximum dry density.
- .3 Compact only when soil is near its optimum moisture content. Use equipment of size type and weight that will not damage the existing subgrade soil conditions.

- .4 Break soil down to sizes suitable for compaction and mix for uniform moisture and soil conditions to full depth of layer.
- .5 Bring moisture content of soil to level required to achieve specified compaction. Add water or aerate as required.
- .6 Shape subgrade to required cross section and grade.
- .7 Remove upper portion to depth necessary, when subgrade preparation and compaction can not be achieved to requirement in single layer, to achieve requirement. Remove, replace and compact such materials at no extra cost to Departmental Representative.

### 3.3 FINISHING AND TOLERANCES

- .1 Blade finished surfaces in cut and fill areas free from ruts, depressions, rocks in excess of mm and debris.
- .2 Roll finished surfaces to tight dense condition.
- .3 Finish pavement subgrade within 25 mm of design elevations, but not uniformly high or low.
- .4 Surfaces free from depressions exceeding 30 mm in 5 m.

### 3.4 MAINTENANCE

- .1 Maintain finished surfaces in a condition in accordance with this Section until succeeding material is applied or until acceptance by Departmental Representative.

-----END OF SECTION-----



## PART 1 - GENERAL

### 1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
  - 1. ASTM C 117, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
  - 2. ASTM C 131, Standard Test Method for Resistance to Degradation of Small-Size Course Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - 3. ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - 4. ASTM D 422, Standard Test Method for Particle-Size Analysis of Soils.
  - 5. ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/m<sup>3</sup>).
  - 6. ASTM D 1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700kN-m/m<sup>3</sup>).
  - 7. ASTM D 1883, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - 8. ASTM D 4318, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2 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.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Material for road subbase to be:
    - 1. 75 mm minus select granular subbase as defined in the geotechnical report, and as follows:
      - 1. Crushed, pit run or screened stone, gravel or sand. Gradations to be within limits specified when tested to [ASTM C 136] and [ASTM C 117]. Sieve sizes to [CAN/CGSB-8.2].
- | Sieve Designation | % Passing |
|-------------------|-----------|
| 75 mm             | [100]     |
| 50 mm             | -         |
| 37.5 mm           | -         |
| 25 mm             | -         |
| 19 mm             | 15-100    |
| 12.5 mm           | -         |
| 9.5 mm            | 0-100     |
| 4.75 mm           | -         |

2.36 mm	-
0.600 mm	0-100
0.300 mm	0-15
0.075 mm	0-5

2. Other properties as follows:
  - .1 Liquid Limit: to ASTM D 4318, Maximum 25.
  - .2 Plasticity Index: to ASTM D 4318, Maximum 6.
  - .3 Los Angeles degradation: to ASTM C 131. Max % Loss by mass: [40]
  - .4 Particles smaller than 0.02 mm: to ASTM D 422, Maximum 3%
  - .5 Soaked CBR: to ASTM D 1883, Min[40] when compacted to 100% of ASTM D 1557.

3. Refer to Section 31 05 16-Aggregate Materials for material specifications.

### PART 3 - EXECUTION

#### 3.1 INSPECTION OF UNDERLYING SUBGRADE SURFACE

- .1 Ensure underlying subgrade surface true to cross-section and grade and compacted to specified density. Departmental Representative may accept satisfactory proof rolling as evidence of acceptable compaction of undisturbed native subgrade. Do not place granular subbase until subgrade is inspected and approved by Departmental Representative.

#### 3.2 PLACING

1. Place material only on clean unfrozen surface, properly shaped and compacted and free from snow or ice.
2. Begin spreading sub-base material on crown line or high side of one-way slope.
3. Place granular sub-base materials using methods which do not lead to segregation or degradation.
4. Place material to full width in uniform layers not exceeding 150mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
5. Shape each layer to smooth contour and compact to the specified density before succeeding layer is placed.
6. Remove and replace portion of layer in which material has become segregated during spreading.

### 3.3 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density of not less than 98% Dry Modified Maximum Density.
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .4 Apply water as necessary during compaction to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is suitable for compaction.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.

### 3.4 SITE TOLERANCES

1. Ensure finished subbase within plus or minus 15 mm of specified grade and cross-section but not uniformly high or low.
2. Ensure finished subbase surface has no irregularities exceeding 15 mm when checked with a 3 m straight edge placed in any direction.
3. Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

### 3.5 PROOF ROLLING

1. For proof rolling use fully loaded single or dual axle dump truck.
2. Departmental Representative may authorize use of other acceptable proof rolling equipment.
3. Proof roll at level in subbase as required. If alternative proof rolling equipment is authorized, Departmental Representative will 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 area of unsuitable subgrade:
  1. Remove subbase and subgrade material to depth and extent as directed by Departmental Representative.
  2. Backfill excavated subgrade with approved embankment material and compact in accordance with Section 31 24 13-Apron

Embankments.

3. Replace subbase material and compact in accordance with this section.
6. Where proof rolling reveals areas of unsuitable subbase, remove unsuitable materials to depth and extent directed by Departmental Representative and replace with new materials in accordance with this section at no extra cost.

### 3.6 MAINTENANCE

- .1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by Departmental Representative.

-----END OF SECTION-----

## PART 1 - GENERAL

- 1.1 MEASUREMENT .1 No separate measurement of payment will be made. Payment shall be made in the lump sum price provided.
- 1.1 REFERENCES .1 American Society for Testing and Materials (ASTM)
- .1 ASTM C 117-95, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C 131-96, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3 ASTM C 136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4 ASTM D 698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>3</sup>) (600kN-m/m<sup>3</sup>).
  - .5 ASTM D 1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft<sup>3</sup>) (2,700kN-m/m<sup>3</sup>).
  - .6 ASTM D 1883-99, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .7 ASTM D 4318-00, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- 1.3 DELIVERY, STORAGE, AND HANDLING .1 Deliver and stockpile aggregates in Storage, and accordance with Section 31 05 16 - Aggregate Materials. Stockpile minimum 50% of total aggregate required prior to beginning operation.

## PART 2 - PRODUCTS

- 2.1 MATERIALS .1 Granular base: material in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
- .1 Crushed stone or gravel.
- .2 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117 and to have a smooth curve without sharp breaks when plotted on semi-log grading chart. Sieve sizes to CAN/CGSB-8.2. British Columbia Highway 25mm WCG Base material grade close to this specification can be

accepted with the approval of Departmental Representative.

.1 Gradation Method # 1 to:

Sieve Designation	% Passing Base Course 25mm size
25mm	- 100
19 mm	70-100
4.75 mm	35-60
2.00 mm	22-45
0.425 mm	10-25
0.075 mm	4-8

.2 Liquid limit: to ASTM D 4318, maximum 25

.3 Plasticity index: to ASTM D 4318, maximum 6

.4 Los Angeles degradation: to ASTM C 131. Max.  
% loss by weight: 45

.5 Coarse Aggregate is Aggregate retained on  
4.75 mm sieve and fine aggregate is  
aggregate passing 4.75 mm sieve when tested  
to ASTM C136

.6 Flat and elongated particles: to ASTM D4791,  
( with length to thickness ratio greater  
than 5): Max by mass: 15

.7 Crushed particles: at least 60% of particles  
b mass within each of following sieve  
designation ranges to have at least 1  
freshly fractured face. Material to be  
divided into ranges using methods of ASTM C  
136.

3. Granular base material to satisfy requirements of  
geotechnical report in Appendix 1.

### PART 3 - EXECUTION

#### 3.1 SEQUENCE OF OPERATION

.1 Place granular base after existing surface is  
inspected and approved by Departmental  
Representative.

.2 Placing:

.1 Construct granular base to depth and grade  
in areas indicated.

.2 Ensure no frozen material is placed.

.3 Place material only on clean unfrozen  
surface, free from snow and ice.

.4 Begin spreading base material on crown line  
or on high side of one-way slope.

.5 Place material using methods which do not  
lead to segregation or degradation of  
aggregate.

.6 Place material to full width in uniform  
layers not exceeding 150 mm compacted  
thickness. Departmental Representative may  
authorize thicker lifts (layers) if  
specified compaction can be achieved.

.7 Shape each layer to smooth contour and

- compact to specified density before succeeding layer is placed.
- .8 Remove and replace that portion of layer in which material becomes segregated during spreading.
- .3 Compaction Equipment:
  - .1 Compaction equipment to be capable of obtaining required material densities.
- .4 Compacting:
  - .1 Compact to density not less than 98% corrected maximum dry density
  - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
  - .3 Apply water as necessary during compacting to obtain specified density.
  - .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
  - .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

### 3.2 SITE TOLERANCES

- .1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low. Finished surface not to have irregularities exceeding 10 mm when checked with a 4.5 m straight edge placed in any direction.

### 3.5 SITE TOLERANCES

- .1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Departmental Representative.

-----END OF SECTION-----

## PART 1 - GENERAL

- |   |  |
|---|--|
| <u>1.1 REFERENCES</u>                     | <ul style="list-style-type: none"><li>.1 American Society for Testing and Materials International, (ASTM)<ul style="list-style-type: none"><li>.1 ASTM D 140, Standard Practice for Sampling Bituminous Materials.</li></ul></li><li>.2 Canadian General Standards Board (CGSB)<ul style="list-style-type: none"><li>.1 CAN/CGSB-16.1, Cutback Asphalts for Road Purposes.</li><li>.2 CAN/CGSB-16.2, Emulsified Asphalts, Anionic Type, for Road Purposes.</li></ul></li></ul> |
| <u>1.2 QUALITY ASSURANCE</u>              | <ul style="list-style-type: none"><li>.1 Upon request from Departmental Representative, submit manufacturer's test data and certification that asphalt prime material meets requirements of this Section.</li><li>.2 Provide access on tanker for Departmental Representative to sample asphalt material to be incorporated into work, in accordance with ASTM D140.</li></ul>   |
| <u>1.3 DELIVERY, STORAGE AND HANDLING</u> | <ul style="list-style-type: none"><li>.1 Deliver, store and handle materials to ASTM D 140.</li></ul>  |
| <u>1.4 WASTE MANAGEMENT AND DISPOSAL</u>  | <ul style="list-style-type: none"><li>.1 Divert unused asphalt materials from landfill to local facility approved by Departmental Representative.</li></ul>  |

## PART 2 - PRODUCTS

- |                      |  |
|----------------------|--|
| <u>2.1 MATERIAL</u>  | <ul style="list-style-type: none"><li>.1 Asphalt material: to CAN/CGSB-16.1 grade: RM-20, RM-70 or CAN/CGSB-16.2 grade: SS-1h.</li><li>.2 Sand blotter: clean granular material passing 4.75mm sieve and free from organic matter or other deleterious materials.</li></ul>  |
| <u>2.2 EQUIPMENT</u> | <ul style="list-style-type: none"><li>.1 Pressure distributor to be :<ul style="list-style-type: none"><li>.1 Designed, equipped, maintained and operated so that asphalt material can be:<ul style="list-style-type: none"><li>.1 Maintained at even temperature.</li><li>.2 Applied uniformly on variable widths of surface up to 5 m.</li><li>.3 Applied at controlled rates from 0.2 to 5.4 L/m<sup>2</sup> with uniform pressure, and allowable variation from any specified rate not exceeding 0.1 L/m<sup>2</sup>.</li><li>.4 Distributed in uniform spray without atomization at temperature required.</li></ul></li><li>.2 Equipped with meter registering metres</li></ul></li></ul> |



- 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 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.
- .2 Hand Sprayer: For small and/or inaccessible areas, a pressurized hand-held spray wand may be used.

### PART 3 - EXECUTION

#### 3.1 APPLICATION

- .1 Obtain Departmental Representative's approval of granular base surface before applying asphalt prime.
- .2 Cutback asphalt:
- .1 Heat asphalt prime to between 60 and 70 degrees C for pumping and spraying.
  - .2 Apply asphalt prime to granular base at rate as directed by Departmental Representative, but not to exceed 2 L/m<sup>2</sup>.
  - .3 Apply on dry surface unless otherwise directed by Departmental Representative.
- .3 Emulsified asphalt:
- .1 Dilute asphalt emulsion with clean water at 1:1 ratio for application.
  - .2 Mix thoroughly by pumping or other method approved by Departmental Representative.
  - .3 Apply diluted asphalt emulsion at rate directed by Departmental Representative, but do not exceed 5 L/m<sup>2</sup>.
  - .4 Apply diluted asphalt emulsion on damp surface unless otherwise directed by Departmental Representative.
- .4 Do not apply prime when air temperature is less

than 5 degrees C or when rain is forecast within 2 hours.

- .5 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt prime material.
- .6 Where traffic is to be maintained, treat no more than one-half width of surface in one application.
- .7 Prevent overlap at junction of applications.
- .8 Do not prime surfaces that will be visible when paving is complete.
- .9 Apply additional material to areas not sufficiently covered as directed by Departmental Representative.
- .10 Keep traffic off primed areas until asphalt prime has cured.

### 3.2 USE OF SAND BLOTTER

- .11 Permit prime to cure before placing asphalt paving.
- .1 If asphalt prime fails to penetrate within 24 hours, spread sand blotter material in amounts required to absorb excess material.
- .2 Sweep and remove excess blotter material.

-----END OF SECTION-----

## PART 1 - GENERAL

### 1.1 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM D 140, Standard Practice for Sampling Bituminous Materials.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-16.2, Emulsified Asphalts, Anionic Type, for Road Purposes.

### 1.2 QUALITY ASSURANCE

- .1 Upon request by Departmental Representative, submit manufacturer's test data and certification that asphalt tack coat material meets requirements of this section.
- .2 Provide access on tanker for Departmental Representative to sample asphalt material to be incorporated into work, in accordance with ASTM D140.

### 1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with ASTM D 140.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Emulsified asphalt: to CAN/CGSB-16.2, grade: SS-1.

## PART 3 - EXECUTION

### 3.1 EQUIPMENT

- .1 Refer to Section 32 12 14-Asphalt Prime Coats.

### 3.2 APPLICATION

- .1 Obtain Departmental Representative's approval 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.
  - .1 Mix thoroughly by pumping or other method approved by Departmental Representative.
- .4 Apply asphalt tack coat evenly to pavement surface at rate as directed by Departmental Representative, but not to exceed 0.7 L/m<sup>2</sup> when diluted with water at 1:1 ratio.

- .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 5 degrees C or when rain is forecast within 2 hours of application.
- .7 Apply asphalt tack coat only on unfrozen surface.
- .8 Asphalt tack oil, is toxic to aquatic life. Provide extra caution near catch basins and storm drain inlets as all storm sewers in the worksite drain to an environmentally sensitive watercourse.
- .9 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.
- .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 Departmental Representative.
- .13 Permit asphalt tack coat to set before placing asphalt pavement.

-----END OF SECTION-----

## PART 1 - GENERAL

### 1.1 REFERENCES

- .1 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.
- .2 Asphalt Institute (AI)
  - .1 AI MS2 Sixth Edition, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.
- .3 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM C 88, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
  - .2 ASTM C 117, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.
  - .3 ASTM C 123, Standard Test Method for Lightweight Particles in Aggregate.
  - .4 ASTM C 127, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
  - .5 ASTM C 128, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
  - .6 ASTM C 131, Standard Test Method for Resistance to Degradation of Small-Size Course Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .7 ASTM C 136, Standard Method for Sieve Analysis of Fine and Course Aggregates.
  - .8 ASTM C 207, Standard Specification for Hydrated Lime for Masonry Purposes.
  - .9 ASTM D 995, Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
  - .10 ASTM D 2419, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
  - .11 ASTM D 3203, Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
  - .12 ASTM D 4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- .4 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.
- .3 CAN/CGSB-16.3, Asphalt Cements for Road Purposes.

## 1.2 PRODUCT DATA

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit manufacturer's test data and certification that asphalt cement meets requirements of this Section.
- .3 Submit asphalt concrete mix design and trial mix test results to Departmental Representative for review at least 4 weeks prior to beginning Work.

## 1.3. WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Divert unused aggregate materials from landfill to facility for reuse as approved by Departmental Representative.
- .4 Divert unused asphalt from landfill to facility capable of recycling materials.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Asphalt cement: to CAN/CGSB-16.3-M90, grade: 80-100.
- .2 Aggregates: in accordance with Section 31 05 16 - Aggregate Materials: General following requirements:
  - .1 Crushed stone or gravel consisting of hard, durable angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
  - .2 Gradations: To form smooth line within limits specified when tested to ASTM C 136 and ASTM C 117.
  - .3 Table:

Sieve Designation	% Passing
	Upper Course
	#1
25 mm	--
19 mm	--
12.5 mm	100
9.5 mm	--
4.75 mm	55-75
2.36 mm	38-58
1.18 mm	28-47
0.600 mm	20-36
0.300 mm	10-26
0.150 mm	4-17
0.075 mm	3-8

BC Highway gradation will also be acceptable where it meets all other properties indicated here.

- .4 Coarse aggregate: aggregate retained on 4.75mm sieve and fine aggregate is aggregate passing 4.75mm sieve when tested to ASTM C 136.
- .5 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75mm sieve and stockpile separately from coarse aggregate.
- .6 Do not use aggregates having known polishing characteristics in mixes for surface courses.
- .7 Sand equivalent: ASTM D 2419 Min: 40.
- .8 Magnesium Sulphate soundness: to ASTM C 88  
 Max% loss by mass after five cycles:
  - .1 Coarse aggregate: 12%.
  - .2 Fine aggregate: 16%.
- .9 Los Angeles abrasion: Grading B, to ASTM C 131 Max % loss by mass:
  - .1 Coarse aggregate, upper course: 10%
  - .2 Coarse aggregate, lower course: 30%.
- .10 Absorption: to ASTM C 127 Max % by mass:
  - .1 Coarse aggregate, upper course: 1.75%.
  - .2 Coarse aggregate, lower course: 2.00%.
- .11 Loss by washing: to ASTM C 117 Max % passing 0.075 mm sieve:
  - .1 Coarse aggregate, upper course: 1.5
  - .2 Coarse aggregate, lower course: 2.0
- .12 Flat and elongated particles: to ASTM D 4791, (with length to thickness ratio greater than 3): Max% by mass:
  - .1 Coarse aggregate, upper course: 10%.
  - .2 Coarse aggregate, lower course: 10%.
- .13 Crushed fragments: at least 60% of particles by mass within each of following sieve designation ranges, to have at least 2 freshly fractured face. Material to be tested according to ASTM C 136 and ASTM C117. Determination of amount of fractured

material will be in accordance with Ministry of Transportation and Highways' Specification I-11, Fracture Count for Coarse Aggregate, Method "B", which determines fractured faces by mass.

Passing		Retained on
25 mm	to	12.5mm
12.5 mm	to	4.75mm

.14 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.

.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.

## 2.2 EQUIPMENT

- .1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.
- .2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.
- .3 Vibratory rollers:
  - .1 Minimum drum diameter: 1200mm.
  - .2 Maximum amplitude of vibration (machine setting): 0.5mm for lifts less than 40 mm thick.
- .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 cm<sup>2</sup> for



compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Departmental Representative may be used instead of tamping irons.

- .3 Straight edges, 3.0m in length, to test finished surface.

## 2.3 MIX DESIGN

- .1 Mix design provided by the Contractor (to be developed by testing laboratory) for approval by Departmental Representative.
- .2 Design of mix: by Marshall method to requirements below.
  - .1 Compaction blows on each face of test specimens: 50.
  - .2 Mix physical requirements:

Property	Roads	
Marshall Stability		9.0 upper course
at 60°C	kN min	9.0 lower course
Flow Value	mm	2-4
Air Voids in Mixture	%	3-5 upper course 3-6 lower course
Voids in Mineral Aggregate	% min	14 upper course 1
Index of Retained		75
Stability	% minimum	

- .3 Measure physical requirements as follows:
  - .1 Marshall load and flow value: to ASTM D1559.
  - .2 Air voids: to ASTM D3203.
  - .3 Index of Retained Stability: measure in accordance with Marshall Immersion Test (ASTM D1559).
  - .4 Do not change job-mix without prior approval of Departmental Representative. When change in material source proposed, new job-mix formula to be reviewed by Departmental Representative.

## PART 3 - EXECUTION

### 3.1 PLANT AND MIXING REQUIREMENTS

- .1 Batch and continuous mixing plants:
  - .1 To ASTM D 995.
  - .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 Departmental Representative. Do not heat asphalt cement above 160 degrees C.
- .9 Maintain temperature of materials within 5 degrees C of specified mix temperature during mixing.
- .10 Mixing time:
  - .1 In batch plants, both dry and wet mixing times as directed by Departmental Representative. Continue wet mixing as long as necessary to obtain thoroughly blended mix but not less than 30s or more than 75s.
  - .2 In continuous mixing plants, mixing time as directed by Departmental Representative but not less than 45s.
  - .3 Do not alter mixing time unless directed by Departmental Representative.
- .11 Where RAP is to be incorporated into mix:
  - .1 Feed from separate cold feed bin specially designed to minimize consolidation of material. Provide 37.5mm scalping screen on cold feed to remove oversized pieces of RAP.
  - .2 Ensure positive and accurate control of RAP cold feed by use of hydraulic motor or electric clutch and equip with anti-rollback device to prevent material from sliding backward on feed belt.
  - .3 Combine RAP and new aggregates in proportions as directed by Departmental Representative. Dry mix thoroughly, until uniform temperature within plus or minus 5 degrees C of mix temperature, as directed by Departmental Representative Consultant

is achieved prior to adding new asphalt cement. Do not add new asphalt cement where temperature of dried mix material is above 160 degrees C.

- .2 Dryer drum mixing plant:
  - .1 To ASTM D 995.
  - .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 Where RAP is to be incorporated into mix, dryer drum mixer is to be designed to prevent direct contact of RAP with burner flame or with exhaust gases hotter than 180 degrees C.
  - .5 Feed RAP from separate cold feed bin designed to minimize reconsolidation of material.
  - .6 Meter total flow of aggregate and RAP 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 RAP and asphalt entering mixer remain constant.
  - .7 Provide for easy calibration of weighing systems for aggregates and RAP without having material enter mixer.
  - .8 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%.
  - .9 Make provision for conveniently sampling full flow of materials from cold feed.
  - .10 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate and RAP from cold feed prior to entering drum.
  - .11 Provide system interlock stop on feed components if either asphalt or aggregate from bin stops flowing.
  - .12 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 week, if required.

- .13 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 0.5%.

.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 12 hour.

.4 Mixing tolerances:

- .1 Permissible variation in aggregate gradation from job mix (percent of total mass).

4.75 mm sieve	
and larger	5.5
2.36 mm sieve	4.5
0.600 mm sieve	3.5
0.150 mm sieve	2.5
0.075 mm sieve	1.5

- .2 Permissible variation of asphalt cement from job mix: 0.3%.
- .3 Permissible variation of mix temperature at discharge from plant: 5 degrees C.

### 3.2 EQUIPMENT

- .1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.
- .2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.
- .3 Vibratory rollers:
  - .1 Minimum drum diameter: 1200mm.
  - .2 Maximum amplitude of vibration (machine setting): 0.5mm for lifts less than 40 mm thick.
- .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 cm<sup>2</sup> for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Departmental Representative may be used instead of tamping irons.
  - .3 Straight edges, 3.0m in length, to test finished surface.

### 3.3 PREPARATION

- .1 Reshape granular road bed, if required.
- .2 When paving over existing asphalt surface, clean pavement surface. When leveling course is not require, patch and correct depressions and other irregularities to approval of Departmental Representative before beginning paving operations.
- .3 Adjust existing castings to new elevations and protect from asphaltic mix.
- .4 When matching new pavement with existing pavement make vertical cut between existing pavement and new pavement as shown on Contract Drawings.
- .5 Apply prime coat and/or tack coat in accordance with Section 32 12 14-Asphalt Prime Coat and/or Section 32 12 15-Asphalt Tack Coat prior to paving.
- .6 Prior to laying mix, clean surfaces of loose and foreign material.

### 3.4 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 Departmental Representative approves artificial light.
- .4 Deliver material to paver at uniform rate and in

an amount within capacity of paving and compacting equipment.

- .5 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within range as directed by Departmental Representative, but not less than 125 degrees C.

### 3.5 PLACING

- .1 Obtain Departmental Representative's approval of base and existing surface and tack coat and prime coat prior to placing asphalt.
- .2 Place asphalt concrete to thicknesses, grades and lines as shown on Contract Drawings.
- .3 Placing conditions:
  - .1 Place asphalt mixtures only when air temperature is above 10 degrees C. Place overlay pavement only when air temperature is above 10 degrees C.
  - .2 When temperature of surface on which material is to be placed falls below 10 degrees 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 asphalt concrete in compacted lifts of thickness as shown on Contract Drawings:
  - .1 Lower course in layers of 50mm each.
  - .2 Surface course in layers of 50mm each.
- .5 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm.
- .6 Spread and strike off mixture with self-propelled mechanical finisher.
  - .1 Construct longitudinal joints and edges true to line markings. 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.
- .7 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.

### 3.6 COMPACTING

- .1 Roll asphalt continuously to density not less than 98% of 50 blow Marshall density to ASTM D1559 with no individual test less than 95%.
- .2 General:
  - .1 Provide at least two rollers and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller must be pneumatic tired type.
  - .2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.
  - .3 Operate roller slowly initially to avoid displacement of material. For subsequent rolling do not exceed 5 km/h for static steel-wheeled and 8 km/h for pneumatic tired rollers.
  - .4 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 20 impacts per

- metre of travel. For lifts less than 50 mm thick, impact spacing not to exceed compacted lift thickness. Protect existing PCC slabs from damage by avoiding vibrating or heavy rollers on PCC.
- .5 Overlap successive passes of roller by minimum of 200mm and vary pass lengths.
  - .6 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.
  - .7 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.
  - .8 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
  - .9 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side. Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.
  - .10 When paving in echelon, leave unrolled 50 to 75 mm of edge which second paver is following and roll when joint between lanes is rolled.
  - .11 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.
- .3 Breakdown rolling:
- .1 Commence breakdown rolling immediately following rolling of transverse and longitudinal joint and edges.
  - .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
  - .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. Exceptions may be made when working on steep slopes or super-elevated sections.
  - .4 Use only experienced roller operators for this work.
- .4 Second rolling:
- .1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.
  - .2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.



- .5 Finished rolling:
  - .1 Accomplish finish rolling with steel wheel rollers while material is still warm enough for removal of roller marks.
  - .2 Conduct rolling operations in close sequence.

### 3.7 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 PCC Apron slabs with bituminous material prior to placing adjacent pavement.
- .2 Transverse joints:
  - .1 Offset transverse joint in succeeding lifts by at least 600mm.
  - .2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt 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 150mm.
  - .2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees C prior to paving of adjacent lane.
    - .1 For airfield runway paving, avoid cold joint construction in mid 30 m of runway.
    - .2 If cold joint cannot be avoided, tack face with thin coat of hot asphalt prior to continuing paving.
  - .3 Overlap previously laid strip with spreader by 100mm.
  - .4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.
  - .5 Roll longitudinal joints directly behind paving operation.
  - .6 When rolling with static roller over onto previously placed lane in order that 100 to 150 mm of drum width rides on newly laid lane, then operate roller to pinch and press fines gradually across joint. Continue rolling until thoroughly compacted neat

joint is obtained.

- .7 When rolling with vibratory roller, have most of drum width ride on newly placed lane with remaining 100 to 150 mm extending onto previously placed and compacted lane.

- .4 Construct feather joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix. Place and compact joint so that joint is smooth and without visible breaks in grade. Location of feather joints as indicated.

- .5 Construct butt joints as indicated.

- .6 Wherever practical, locate joints under future traffic markings (paint lines).

### 3.8 PAVEMENT PATCHING

- .1 Ensure temporary and permanent pavement patching done by handwork conforms to all standards specified for machine place asphaltic concrete.

### 3.9 FINISH TOLERANCES

- .1 Finished asphalt surface to be within 6mm of design elevation but not uniformly high or low.
- .2 Finished asphalt surface not to have irregularities exceeding 6mm when checked with 3 m straight edge placed in any direction.
- .3 Water ponding not permitted.
- .4 Against concrete gutter, finished asphalt surface to be higher than the gutter by not more than 6mm.

### 3.10 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.
- .3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

### 3.11 CLEAN-UP

- .1 Remove lids or covers from all castings and clean any prime, tack coat or hot-mix asphaltic concrete from frames, lids and covers of all castings.

-----END OF SECTION-----

## **APPENDIX 1**

Geotechnical Report



March 17, 2016 (Rev Mar. 10, 2016)

Reference No. VAN-00230768-A0

**Randolph R. Rosin, M.Eng., P.Eng.**  
**ISL Engineering & Land Services Ltd.**  
#201 - 8506 200<sup>th</sup> Street  
Langley, BC V2Y

Email: rrosin@islengineering.com

**Re: Geotechnical Exploration and Pavement Final Report**  
**Sandspit Airport Apron 1 Pavement Restoration, Sandspit, BC**

---

## **1.0 INTRODUCTION**

As requested, **exp** Services Inc. (**exp**) has completed a geotechnical exploration and pavement evaluation for the above-referenced project. The study was performed in general accordance with **exp**'s proposal to ISL Engineering Ltd dated September 15, 2015 (our Reference No. 999-038905-PP). The following final report supercedes the report dated 2016 February 25. The purpose of the study was to assess existing site and subsurface conditions in order to provide pavement design recommendations for construction of a new concrete apron.

## **2.0 PROJECT DESCRIPTION AND BACKGROUND INFORMATION**

The project involves replacement of the existing flexible asphalt pavement apron area with Portland cement concrete within two proposed areas, about 30 by 30 m each, located at the sides of Apron 1, adjacent to Taxiway 'A'. The areas are to be used for aircraft parking purposes.

It is understood that the new pavement structure needs to be designed to PLR = 12 (Pavement Load Rating) as per the RFP requirement.

It was understood that the pavement is in good condition, however, where aircraft are being parked, the pavement surface areas have dimple depressions up to 200mm diameter and 30mm deep, as described in the Transport Canada 2014 Pavement Condition Survey report. The restoration is to consist of Portland Cement Concrete (PCC) over granular base, as required in the Transport Canada 2014 Pavement Condition Survey report.

The proposed apron restoration areas are located on the edge of the existing asphalt apron, located east of the airport building. The available records indicated that the paved apron has been built in phases, beginning initially many years ago as part of an RCAF facility in 1940. Most recent paving was done in about 2003.

## **3.0 SUMMARY OF SOIL AND GROUNDWATER CONDITIONS**

A total of four (4) asphalt core and handauger holes were completed on February 10 and 11, 2016 to assess shallow subsurface conditions at the site. The test holes are shown on the attached Testhole Location Plan, Figure 1. The test holes were taken to depths of about 0.5m to 1m using a core drill and handauger. The test holes were located, cored/augered, logged and sampled by an **exp** field technician.

Soil samples were transported to **exp's** soil laboratory for further visual inspection and index testing consisting of moisture content determination and grain size analysis on two samples.

The test holes generally encountered about 150mm to 240mm of asphalt overlying granular soils. However, the two test holes at the north side encountered sand at 0.4 to 0.5m depths, and the sand material was unusual as it contained significant seashell fragments. Test holes AH16-01 and -03, located on north side, were taken to depths of 0.7m to 1m into sand. Test holes AH16-02 and -04, located on south side, were taken to depths of 0.5m to 0.6m into gravels before auger refusals were met.

Groundwater was not encountered within the maximum 1m depths explored at the time of augering.

Please refer to the attached soil logs for a detailed description of the specific conditions encountered at each test location. The moisture content obtained from the laboratory tests are indicated on the soil logs. The sieve results can be found in the attached Sieve Analysis Reports.

The subsurface conditions described above and shown on the attached soil logs are specific to the test hole locations only. It should be noted that soil deposition is innately variable and conditions are likely to vary between the test hole locations. Also, note that groundwater levels would likely fluctuate with changes in season, precipitation, local land use, and other factors. Further, perched groundwater conditions can occur intermittently on top of relatively impervious soil layers after periods of heavy precipitation.

Based on field observations at the time of core testing, the dimples were most evident on the north test area, as compared to little or minimal dimples evident on the south area. The absence of dimples on the south area is considered to be consistent with an absence of sand with seashells material encountered in the test holes HA16-02 and HA16-04 done on the south area.

#### **4.0 FROST PROTECTION CONSIDERATIONS**

The design freezing index for Sandspit may be taken as 173 C°-Days. According to the PWGSC Document AK-68-12, "Manual of Pavement Structural Design" the theoretical frost protection depth for pavement design for Sandspit would be 500mm when considering the design freezing index.

#### **5.0 NEW PAVEMENT STRUCTURE**

##### **5.1 PCC Pavement Structure**

The new PCC pavement structure has been computed using the methodology given in the PWGSC Document AK-68-12, "Manual of Pavement Structural Design" (July/1992) on the basis of the design aircraft discussed previously, subgrade conditions encountered in the test holes, and frost protection considerations.

The recommended minimum Portland cement concrete (PCC) pavement structure to provide a design pavement load rating (PLR) value of 12 is as follows:

375mm PCC  
300mm Crushed Gravel Base Course  
350mm Select Granular Subbase (SGSB, 75mm minus)

Total Thickness: 1025mm

The above minimum recommended pavement structure takes into consideration structural and frost protection requirements, and in consideration of subgrade conditions encountered.

The existing granular materials are considered unsuitable for reuse in the above pavement design due to the materials composition and prior poor performance. However, it is recommended that new construction materials should be utilized for the design and construction.

## **5.2 Asphalt Perimeter Transition**

The new PCC pavement structure will connect to the existing asphalt and the recommended minimum Hot Mix Asphaltic concrete (HMAC) pavement structure to provide a transition is as follows:

150mm HMAC  
300mm Crushed Gravel Base Course  
500mm Select Granular Subbase (SGSB, 75mm minus)

Total Thickness: 950mm

The above minimum recommended HMAC pavement structure takes into consideration the need for a narrow transition between the new PCC and the existing asphalt pavements and subgrade conditions encountered.

## **5.3 Subgrade Preparation**

In order to provide adequate subgrade support for the recommended PCC pavement structure, the following subgrade preparation is recommended:

- Excavate as necessary to facilitate installation of the recommended pavement structures (i.e., 1025mm for concrete apron).
- Any remaining organic topsoil, soft soils, or otherwise unsuitable materials should be over-excavated and replaced with structural backfill compacted to at least 95% Modified Proctor Maximum Dry Density (ASTM D 1557).
- The surface of the subgrade should be shaped/sloped with uniform cross-fall to provide drainage to the perimeter of the pavement structure.
- Compact existing subgrades to at least 95% Modified Proctor Maximum Dry Density (ASTM D 1557) complete with in-place density tests as outlined below prior to placing the Select Granular Sub-base layer.
- Subgrade should be reviewed by the **exp's** geotechnical representative Engineer prior to covering with Select Granular Sub-base.
- Any disturbed, frozen or softened subgrade soil should be removed just prior to placing Select Granular Sub-base.

Surface water runoff and shallow groundwater seepage should be diverted away from the construction area. Care should be taken to avoid disturbance of prepared subgrades. The placement of Select Granular Sub-base should be done as soon as practical after the excavation to minimize disturbance/softening associated with exposure to the environment.

#### 5.4 Construction Materials/Placement/Compaction Criteria

It is recommended that the pavement construction materials be in general conformance with PWGSC/Transport Canada Specifications; and or equivalent BC Ministry of Transportation and Infrastructure (BC MoTI) specifications may be acceptable.

The base course should be placed in maximum 150mm thick lifts with each lift compacted to at least 98% Modified Proctor Maximum Dry Density (ASTM D 1557). The sub-base layer should be placed in lifts not exceeding 150mm thickness and compacted to at least 98% Modified Proctor Maximum Dry Density (ASTM D 1557). The top of the sub-base course layer should be proof-rolled with a fully loaded dump truck upon completion of final grading and compaction and any soft spots repaired as required. The in-place density (IPD) of fill materials should be determined by appropriate testing methods, in particular the ASTM D 6938 unit weight and moisture determination by nuclear methods and including corrections for oversize as per ASTM D 4718. Note that the Transport Canada specifications may refer to corrected maximum dry density determinations for fill materials containing oversize materials. The in-place density testing should include at least six (6) in-place density tests on each lift of fill material and on each day of fill construction, and at least twelve (12) IPDs for each of the base and the sub-base layers under each proposed slab area. Note that where the sub-base materials are found to be too coarse for the in-place density method outlined above ie. containing greater than 25% to 30% oversize materials, the in-place density should be determined by the test strips and method specification procedures.

It is recommended that the crushed granular base fracture should be minimum 85% (minimum 2 face by mass). The percentage passing the 0.075mm sieve should fall between 2 to 5%. For select granular sub-base, the percentage passing the 0.075mm sieve should fall between 0 to 5%, and be free of seashell fragments. The BC MoTI 25mm WGB and Select Granular Sub-base can be considered for the granular base and sub-base layers, respectively.

It is recommended that the construction materials quality control testing methods and results (eg. Modified Proctor Maximum Dry Density (ASTM D 1557), unit weight and moisture determination by nuclear methods (ASTM D 6938) and corrected maximum dry density determination methods) should be reviewed by the geotechnical engineer for compliance with testing expectations. The contractor should provide submittals showing to quality control testing firm qualifications, and the construction materials gradation reports. During the construction, the reports of quality control results including the density oversize correction method should be reviewed by the geotechnical engineer. It is recommended that quality assurance testing should be done by a testing firm independent of the quality control testing firm.

Preliminary concrete pavement design parameters are presented as follows.

375mm PCC for PLR= 12; with  $k = 60$  MPa/m (50 to 100 MPa/m) and  $S = 60$  kN (50 to 90 kN).

1. Concrete class of exposure = "C1"
2. Concrete flexural strength = 5 MPa minimum
3. Air content = 5-8%
4. Slump = 80 +/- 30mm
5. Maximum aggregate size = 28 mm
6. Slab joint spacing = 6,000 mm o/c maximum (preferably square pattern, or aspect ratio not more than 1.25 to 1.0)

Note: 1) concrete and aggregate must meet CSA A23.1/2-09 requirements and free of alkali reaction.  
 2) subgrade to conform with materials defined above and with rigid pavement subgrade bearing modulus-  $k$ , and subgrade strength-  $S$ .



It should be realized that over time the connection joint to the adjacent asphalt pavement may crack due to differential movements. Specifications can be developed to improve the quality of the joints, consistent with design practices. For example, a turn-down PCC edge which supports HMAC and the base on a PCC ledge say 200 to 500 mm wide should be considered to stiffen the joint transition, consistent with some joint details shown in the airfield pavement design manual.

**Exp Services Inc.** or a designated representative should be engaged to carry out field reviews to confirm the adequacy of the excavated subgrade and to review field testing for verification of gradation, placement, and compaction of the construction materials.

## **5.5 Drainage**

It should be noted that the desired pavement performance is dependent, in part, on adequate drainage of the paved area. Pavement design life would be reduced if water were to become trapped within the base and/or subbase layer. With the relatively low groundwater level at the site, it may be advisable to consider a relatively modest sub-drainage systems. Final decisions regarding the need for any supplemental drainage such as perimeter drains or interceptor French drains should be made at time of the preparation of construction documents, and confirmed based on conditions observed at the time of construction. As previously mentioned, the subgrade should be shaped to provide positive drainage of the sub-base layer towards the edges of the pavement. Where this is not practical, installation of French drains along the low points of the subgrade would be recommended.

Good surface drainage will also be important to minimize the amount of water infiltrating the pavement structure. Adequate cross-slope must be provided to prevent ponding of water on the pavement surface. A minimum transverse slope in the order of about 1% across the pavement surface is typically desired for good surface drainage. Surface drainage adjacent to the edges of the pavement should be checked to confirm that surface water runoff flows away from the paved area and that the ground surface is adequately sealed so that a significant portion of surface water does not infiltrate into the ground and flow laterally under the pavement. Inlets and storm drains should be provided at low points to drain away water that may otherwise pond at those locations. Maintaining joints and cracks well sealed on an annual basis is also important for minimizing surface infiltration and extending the life of the pavement.

## **5.6 Construction Materials Sources**

Based on available information, availability and mobilization of construction materials is summarized as follows:

- Graham Island, BC for crushed base and select granular subbase materials,
- Graham Island, BC for Portland cement concrete and asphaltic concrete aggregates,
- Sandspit, (Moresby Island, BC): require suitable, temporary on-site batch plant for Portland Cement Concrete preparation and placement purposes,
- Anticipate materials and equipment transportation on BC Ferries between Skidegate Landing (Graham Island, BC) and Alliford Bay (Moresby Island, BC);
- The HMAC materials may require special temperature controlled transport or provision of batch plant at Sandspit.

The above noted information is provided for information purposes only. The Contractor shall confirm further by their own testing and investigating that specified materials meeting the project specifications are available at the material resource quarry they are going to use. They may need to use different resource quarry if materials are not available at the above mentioned resources.



## 6.0 CLOSURE

Please be advised that this report was prepared based on information provided to **exp** Services Inc. and our understanding of the project as described in the report. **Exp** should be given the opportunity to review preliminary design plans and specifications and provide geotechnical input prior to finalizing project documents.

Also note that this report was prepared for the exclusive use of ISL Engineering Ltd, and their designated agents/consultants, and may not be used by other parties without written consent of **exp** Services Inc. The attached "Interpretation & Use of Study and Report" forms an integral part of this report and must be included with any copies of this report.

We trust that this report will meet your present requirements. Please contact the undersigned if you have any questions, or require further assistance.

Sincerely,

exp Services Inc.



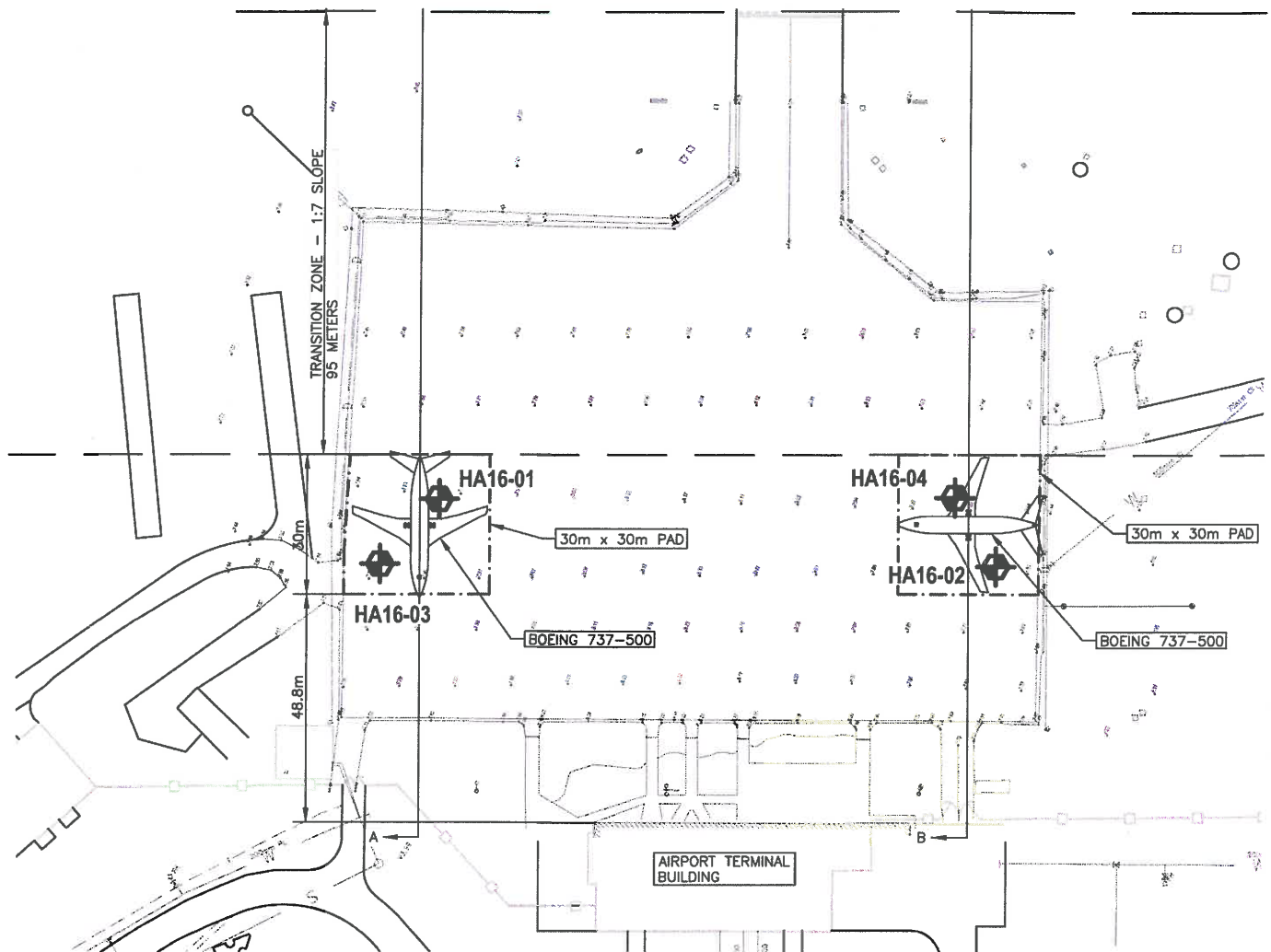
Don Sargent, P.Eng.  
Senior Geotechnical Engineer

Reviewed by:



Ben Weiss, P.Eng.  
Senior Geotechnical Engineer

Enclosures: Interpretation & Use of Study and Report  
Figure 1 – Testhole Location Plan  
Test Hole Logs (AH16-01 through AH16-04)  
Sieve Analysis Reports (No. 1 through 2)



#### LEGEND



HAND AUGERHOLE LOCATION

REFERENCE PAD LOCATIONS PLAN FROM  
ISL ENGINEERING DATED 20146-02-09



CLIENT ISL Engineering and Land Services Ltd.

PROJECT Sandspit Airport Apron 1 Restoration  
Sandspit, BC

PROJECT NO.  
VAN-00230768-A0

DFTR.  
MG

DSGN.  
DGS

CHK.  
DWS

DATE  
2016-02-23

SCALE:  
1:1500

DWG NO.  
FIGURE 1

TITLE:  
Hand Augerhole Location Plan



exp Services Inc.  
275-3001 Wayburne Drive  
Burnaby, BC V5G 4W3  
Telephone: (604)874-1245

# RECORD OF HAND AUGER : HA16-01

PAGE 1 OF 1

PROJECT NUMBER VAN-00230768-A0

CLIENT ISL Engineering and Land Services Ltd.

PROJECT NAME Sandspit Airport Apron 1 Restoration

PROJECT LOCATION Sandspit, BC

DRILLING DATE 2016-02-10

HAND AUGER LOCATION ZONE: 9 N: 5904231 E: 312093

DRILLING CONTRACTOR exp Services Inc.

ELEVATION                     

DRILLING METHOD Hand Auger

GROUND WATER LEVELS: ▽ AT TIME OF DRILLING                     

EQUIPMENT TYPE Hand Auger

▽ AT END OF DRILLING                     

LOGGED BY DGS CHECKED BY DWS

▽ AFTER DRILLING                     

DEPTH (m)	STRATA	SOIL DESCRIPTION	ELEV. DEPTH (m)	SAMPLES			POCKET PEN. (kPa)				FINES CONTENT (%)			
				NUMBER	TYPE	RECOVERY %	FIELD VANE SHEAR (kPa)				PLASTIC & LIQUID LIMIT MOISTURE CONTENT			
							100 200 300 400				20 40 60 80			
							Peak	Remold			PL	MC	LL	
		ASPHALT, 25mm					100 200 300 400				20 40 60 80			
		ASPHALT, 89mm	0.1											
		ASPHALT, 50mm	0.2											
		ASPHALT, 50mm	0.2											
		GRAVELLY SAND, some shells, greyish brown, wet, (loose to compact) sand is coarse grained, gravel is rounded	0.3	S1	GB									
0.5		SAND, some organic silt, trace shells, reddish brown, damp, (loose) fine grained	0.5	S2	GB									
		SAND & SHELLS, white and black, damp, (loose to compact)	0.8	S3	GB									

Refusal at 1.0m.

NOTES: Refusal on cobble/boulder





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Telephone: (604)874-1245

# RECORD OF HAND AUGER : HA16-03

PAGE 1 OF 1

PROJECT NUMBER VAN-00230768-A0

CLIENT ISL Engineering and Land Services Ltd.

PROJECT NAME Sandspit Airport Apron 1 Restoration

PROJECT LOCATION Sandspit, BC

DRILLING DATE 2016-02-11

HAND AUGER LOCATION ZONE: 9 N: 5904233 E: 312074

DRILLING CONTRACTOR exp Services Inc.

ELEVATION                     

DRILLING METHOD Hand Auger




GROUND WATER LEVELS: ▽ AT TIME OF DRILLING                     

EQUIPMENT TYPE Hand Auger

▽ AT END OF DRILLING                     

LOGGED BY DGS CHECKED BY DWS

▽ AFTER DRILLING                     

D E P T H (m)	S T R A T A	SOIL DESCRIPTION	ELEV. DEPTH (m)	SAMPLES			POCKET PEN. (kPa) ⊙	FINES CONTENT (%) □		
				NUMBER	TYPE	RECOVERY %	100 200 300 400	20 40 60 80		
							FIELD VANE SHEAR (kPa)		PLASTIC & LIQUID LIMIT MOISTURE CONTENT	
							Peak ● 100 200 300 400	Remold ○ 100 200 300 400	PL 20 40 60 80	MC 40 60 80
0.5		ASPHALT, 156mm								
		WEAK ASPHALT, 86mm	0.2							
		GRAVEL & SAND, some shells, frequent coarse gravel/small cobbles, grey-black-white, wet, (loose) sand is coarse grained, gravel is subrounded to subangular	0.2	S6	GB					
		SAND & SHELLS, some gravel, black and white, wet, (loose to compact) sand is coarse grained	0.4	S7	GB					
		SAND, some organic silt, trace shells, reddish brown, damp, (loose) fine grained	0.5	S8	GB					

Refusal at 0.7m.

NOTES: Refusal on cobble/boulder.



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# RECORD OF HAND AUGER : HA16-04

PAGE 1 OF 1

PROJECT NUMBER VAN-00230768-A0  
PROJECT NAME Sandspit Airport Apron 1 Restoration  
DRILLING DATE 2016-02-11  
DRILLING CONTRACTOR exp Services Inc.  
DRILLING METHOD Hand Auger  
EQUIPMENT TYPE Hand Auger  
LOGGED BY DGS CHECKED BY DWS

CLIENT ISL Engineering and Land Services Ltd.  
PROJECT LOCATION Sandspit, BC  
HAND AUGER LOCATION ZONE: 9 N: 5904125 E: 312140  
ELEVATION \_\_\_\_\_  
GROUND WATER LEVELS: ☒ AT TIME OF DRILLING \_\_\_\_\_  
☒ AT END OF DRILLING \_\_\_\_\_  
☒ AFTER DRILLING \_\_\_\_\_

DEPTH (m)	STRATA	SOIL DESCRIPTION	ELEV. DEPTH (m)	SAMPLES			POCKET PEN. (kPa)				FINES CONTENT (%)			
				NUMBER	TYPE	RECOVERY %	FIELD VANE SHEAR (kPa)				PLASTIC & LIQUID LIMIT MOISTURE CONTENT			
							100 200 300 400				20 40 60 80			
							Peak ●	Remold ○			PL 	MC 	LL 	
		ASPHALT, 152mm					100 200 300 400				20 40 60 80			
		SAND & GRAVEL, trace silt, brownish black, wet, (compact to dense) sand is medium to coarse grained, gravel is rounded to angular	0.2											
				S9	GB									
				S10	GB									
0.5														

Refusal at 0.6m.

NOTES: Refusal on gravel/cobble.



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604-874-1245

Kamloops Branch  
250-372-5321



CERTIFIED TESTING  
LABORATORY

# SIEVE ANALYSIS REPORT 8 16 30 50 SERIES

TO exp - DON SARGENT

PROJECT NO. 002-30768  
CLIENT ISL ENGINEERING AND LAND  
c.c. exp - DON SARGENT

ATTN: DON SARGENT

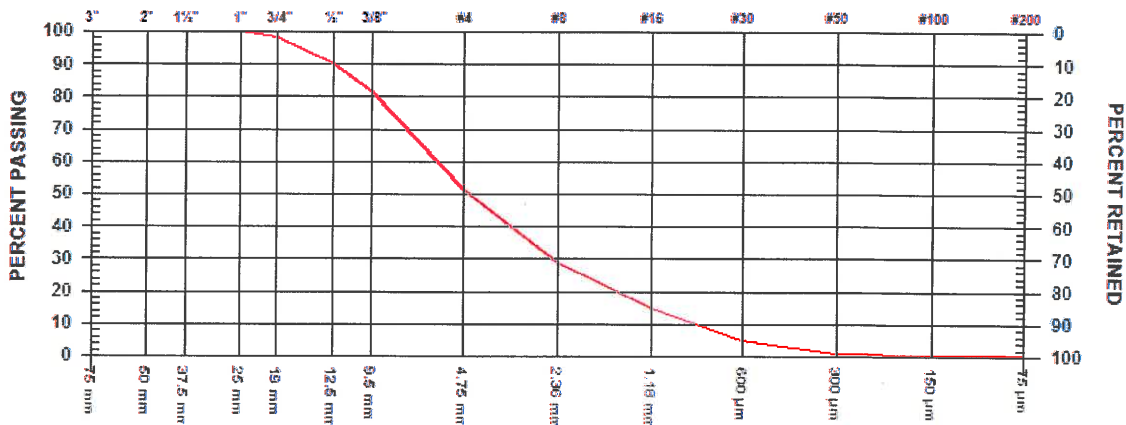
PROJECT SANDSPIT AIRPORT APRON 1  
PAVEMENT RESTORATION  
CONTRACTOR GEOTECHNICAL

SANDSPIT

SIEVE TEST NO. 1 DATE RECEIVED Feb 12, 2016 DATE TESTED Feb 15, 2016 DATE SAMPLED Feb 11, 2016

SUPPLIER SITE  
SOURCE S6  
SPECIFICATION  
MATERIAL TYPE SANDY GRAVEL

SAMPLED BY DGS  
TESTED BY L. JEAN, ASCT  
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm	100.0	
3/4"	19 mm	98.3	
1/2"	12.5 mm	89.9	
3/8"	9.5 mm	81.7	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	51.3	
No. 8	2.36 mm	28.6	
No. 16	1.18 mm	14.7	
No. 30	600 µm	4.9	
No. 50	300 µm	1.0	
No. 100	150 µm	0.4	
No. 200	75 µm	0.3	

## COMMENTS

TEST METHOD: ASTM C136, C117.



exp Services Inc.  
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Burnaby, BC V5G 4W3  
604-874-1245

Kamloops Branch  
250-372-5321



CERTIFIED TESTING  
LABORATORY

# SIEVE ANALYSIS REPORT 8 16 30 50 SERIES

TO exp - DON SARGENT

PROJECT NO. 002-30768

CLIENT ISL ENGINEERING AND LAND

c.c. exp - DON SARGENT

ATTN: DON SARGENT

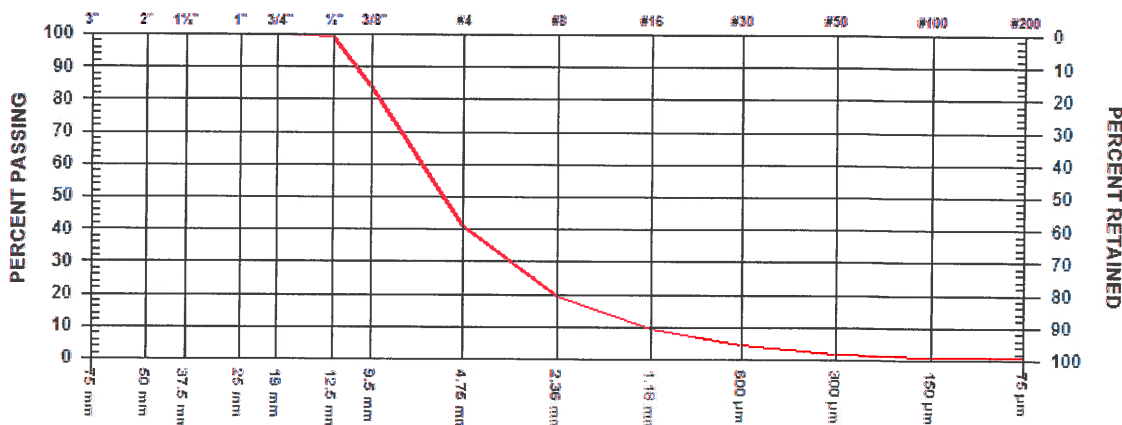
PROJECT SANDSPIT AIRPORT APRON 1  
PAVEMENT RESTORATION  
CONTRACTOR GEOTECHNICAL

SANDSPIT

SIEVE TEST NO. 2 DATE RECEIVED Feb 12, 2016 DATE TESTED Feb 15, 2016 DATE SAMPLED Feb 11, 2016

SUPPLIER SITE  
SOURCE S4  
SPECIFICATION  
MATERIAL TYPE SANDY GRAVEL, TRACE SILT

SAMPLED BY DGS  
TESTED BY L. JEAN, ASCT  
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm	100.0	
1/2"	12.5 mm	99.0	
3/8"	9.5 mm	84.0	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	41.1	
No. 8	2.36 mm	19.2	
No. 16	1.18 mm	9.3	
No. 30	600 µm	4.3	
No. 50	300 µm	1.9	
No. 100	150 µm	1.1	
No. 200	75 µm	1.1	

## COMMENTS

TEST METHOD: ASTM C136, C117.



## **APPENDIX 2**

### Plan of Construction Operations

**PLAN OF CONSTRUCTION OPERATIONS**

**SANDSPIT AIRPORT, SANDSPIT, BRITISH COLUMBIA.**

---

**Appendix 2**

---

**Plan of Construction Operations  
PCO (OPS PLAN)**

**Airside Apron 1 Restoration**

**Sandspit Airport  
Sandspit, British Columbia**

# **PLAN OF CONSTRUCTION OPERATIONS**

## **SANDSPIT AIRPORT, SANDSPIT, BRITISH COLUMBIA.**

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# **PLAN OF CONSTRUCTION OPERATIONS**

## **SANDSPIT AIRPORT, SANDSPIT, BRITISH COLUMBIA.**

### **Project Summary**

---

#### **1 BACKGROUND**

- 1.1 The intent of this project is to Rehabilitate Parts of the Airside Apron 1 Area and provide concrete surface restoration at two locations. The following is a list of major work items required for the project.
  - 1.1.1 Removal of asphalt from existing select Apron Areas.
  - 1.1.2 Common excavation of existing materials from select apron areas.
  - 1.1.3 Compacting sub-grade of select Apron Areas.
  - 1.1.4 Grading and compacting new base material in select Apron Areas.
  - 1.1.5 Placing, grading, and compacting Sub Base material.
  - 1.1.6 Placing, grading, and compacting new Base material.
  - 1.1.7 Placing new Portland Cement Concrete on select apron area.
  - 1.1.8 Adjacent hot mix asphaltic concrete surfaces to tie to existing.
  - 1.1.9 Constructing new box drains in select apron areas

#### **2 THE AIRPORT ENVIRONMENT**

- 2.1 The airport operational environment is extremely dynamic and involves various stakeholders including Transport Canada, the users, airlines, Nav Canada, airport staff, and security. In addition, the airport environment is highly regulated in the interest of public safety. Therefore, any deviation from standard operating procedures are considered carefully and are subject to review and input from the stakeholders and regulators.
- 2.2 The proposed construction project is very important to Transport Canada to ensure the safe operation of the facility. The construction will temporarily impact the normal operation of the facility and will require temporary operational changes. The cooperation of all parties including the contractor will be important to successfully implement the project.

#### **3 PURPOSE OF THE PLAN OF CONSTRUCTION**

- 3.1 The Sandspit Airport is a certified airport and must comply with Aerodrome Standards and Recommended Practices TP312, Rev # 4 and a number of other regulations and standards. This Plan of Construction Operation (PCO) has been prepared based on recommended practices to accommodate temporary deviations to airport operation manual (AOM) and certification criteria to permit the proposed construction activity.

# **PLAN OF CONSTRUCTION OPERATIONS**

## **SANDSPIT AIRPORT, SANDSPIT, BRITISH COLUMBIA.**

- 3.2 The objective of the PCO is to plan the coordination required to implement the construction with a minimum of interruption and conflict with airport operations and ensure that airport security and flight safety are not compromised by the construction operations.
- 3.3 The plan also informs all airport users, tenants, Transport Canada, Nav. Canada and air carriers about the project in order that they can plan for the potential implications on their operations.

## **Construction Staging and Schedule**

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### **1 GENERAL**

- 1.1 The project is scheduled to commence in September 2016, (dates have yet to be finalized) tentative to contractor mobilization, and should be completed approximately within a twelve week time frame.
- 1.2 Only one apron restoration area will be closed at any one time.
- 1.3 During the Apron construction, all airside facilities will be kept open to Air Traffic except the apron area under construction.
- 1.4 Core hours for construction will be the hours of 08:00 to 16:30 local time, Monday to Friday, excluding holidays. Any work undertaken outside of these core hours must be coordinated through the PWGSC Project Manager and the Sandspit Airport Manager.
- 1.5 The closed portions of the facilities will be marked appropriately with signs, barricades, and lights in accordance with TP 312.
- 1.6 The construction equipment and contractor's employee access to the construction areas will be as shown on drawing C08.
- 1.7 During construction, prelocate and protect from all damage existing power to all lighting systems within the closed portions of the Apron Areas

# **PLAN OF CONSTRUCTION OPERATIONS**

## **SANDSPIT AIRPORT, SANDSPIT, BRITISH COLUMBIA.**

# **Airport Operations and Procedures**

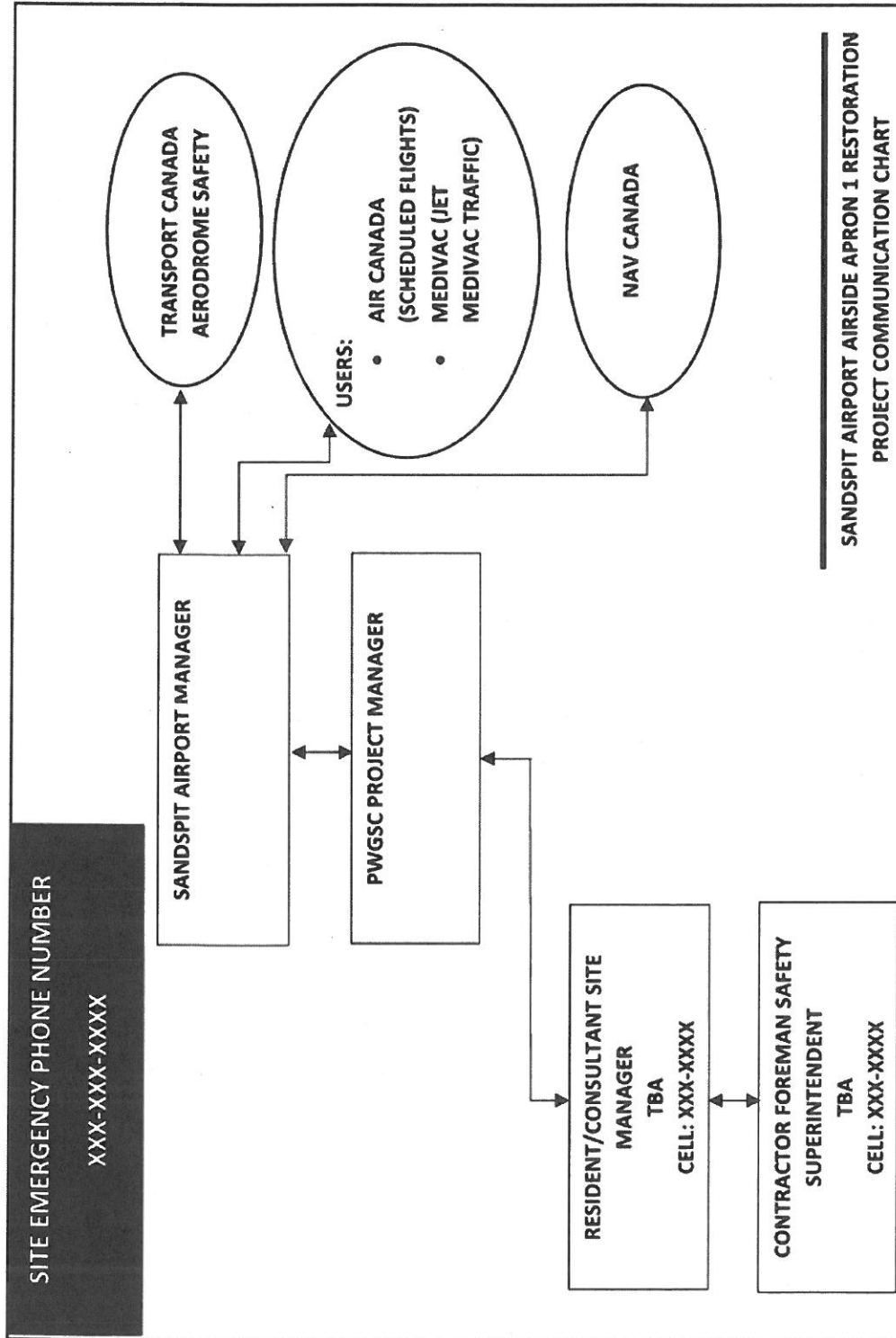
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## **1 COORDINATION OF WORK**

- 1.1 The Contractor will liaise directly with the Public Works Government Services Canada Project Manager or his designate.
- 1.2 Sandspit Airport is a Transport Canada airport and requires specific procedures for communicating with airport users and tenants. The Sandspit Airport Manager will liaise with airport users and tenants and with PWGSC Project Manager.
- 1.3 Also see Project Communication Chart next page

# PLAN OF CONSTRUCTION OPERATIONS

## SANDSPIT AIRPORT, SANDSPIT, BRITISH COLUMBIA.



# **PLAN OF CONSTRUCTION OPERATIONS**

## **SANDSPIT AIRPORT, SANDSPIT, BRITISH COLUMBIA.**

### **2 AIRCRAFT OPERATIONS**

- 2.1 The Airside Apron 1 Restoration will not affect runway availability. Time schedules indicating any construction activity affecting the taxiway availability will be provided by the PWGSC Project Manager to the Sandspit Airport Manager, who will provide this information to the airline operators. Under emergency situations, contractor will move all personnel and equipment to pre-designated staging area. Major airlines operating scheduled flights has been briefed by Airport Manager and have agreed to construction schedule.

### **3 AIRFIELD OPERATIONS**

- 3.1 The Drawing C08 shows construction equipment access for the construction area. This is intended to minimize disruption of the airport operation. These routes may be updated, as required, in future meetings. Site operational requirements **WILL** take precedence.
- 3.2 Where existing access roads are to be used, the Contractor is required to maintain these roads in existing condition. Two Flag persons will be provided by the Contractor to control equipment movement, one at groundside parking, and second at any security gate which is left open for the convenience of the Contractor for hauling materials to and from the site. The Sandspit Airport Manager shall have discretion in this matter.

### **4 OPERATIONAL RESTRICTIONS**

- 4.1 The Contractor's supply vehicles will not be permitted on airside service roads. A staging area for the Contractor's supply vehicles will be determined by the Project Manager to the satisfaction of the Sandspit Airport Manager.
- 4.2 Employee parking will be provided on site at no charge. The location for parking of the Contractor's employee and construction vehicles will be designated by the Project Manager to the satisfaction of the Sandspit Airport Manager.
- 4.3 Any impacts or restrictions on aircraft taxiing or parking operation will be kept to a minimum.

### **5 WORK RESTRICTIONS**

#### **5.1 Fire and Safety**

- 5.1.1 All safety and fire standards of Transport Canada, Labor Canada, the Province of British Columbia, and all other authorities having jurisdiction must be met at all times. The Contractor's supervisor or escort personnel are to be briefed on airport safety regulations, common terminology, and general airport operating procedures by the Sandspit Airport Manager.



## **PLAN OF CONSTRUCTION OPERATIONS**

### **SANDSPIT AIRPORT, SANDSPIT, BRITISH COLUMBIA.**

- 5.1.2 The Contractor's supervisor is responsible to provide the site representative (Sandspit Airport Manager) with Material Safety Data Sheets (MSDS) for all materials which require the Workplace Hazardous Materials Information Systems (WHMIS) labels.
- 5.1.3 The Sandspit Airport Manager shall have the exclusive right to disallow any of the Contractor's personnel on to the construction site if it is found that any unsafe practices are observed and appropriate warnings and instructions are not followed.
- 5.1.4 The Sandspit Airport Manager is to be contacted immediately should there be any operational or environmental incidents or accidents.

#### **5.2 Vehicle Operation**

- 5.2.1 All vehicles operating on airport property must do so in a safe fashion, in accordance with posted signs, traffic regulations and established airport operating procedure. Due consideration must be given to airport related vehicles, aircraft and pedestrian traffic. Maximum equipment height is restricted to 5.0 m. Any equipment and materials shall be below 40 to 1 ratio from ends of the Runway strip and below 7 to 1 ratio from sides of the runway strip. Mark tops with red lights as directed by the PWGSC Project Manager.
- 5.2.2 All escort and supervisory vehicles to be operated on airport maneuvering areas must be equipped with a two-way radio for communication, 360 degree rotating beacon, and be operated only by those personnel holding a valid Identification ID (e.g. driver's license)
- 5.2.3 All persons entering airside will need a valid ID. Vehicles and personnel not meeting these requirements must be escorted by authorized vehicles and personnel.
- 5.2.4 Clearance for movement on active areas will be given on Sandspit vehicle control frequency. PWGSC and Contractor's personnel shall maintain radio contact on this frequency at all times while within the work area.
- 5.2.5 Vehicle escort by airport staff will **ONLY** be done on a time available and cost recoverable basis. Escort requirements must be made with the Sandspit Airport Manager in advance.
- 5.2.6 The Contractor may provide escorts. These personnel must submit to a site specific training that will be provided by the Airport Manager, Sandspit Airport. These personnel shall only be performing escort duties.

## **PLAN OF CONSTRUCTION OPERATIONS**

### **SANDSPIT AIRPORT, SANDSPIT, BRITISH COLUMBIA.**

#### **5.3 Security**

- 5.3.1 All airport security will remain in effect throughout the construction project. All of the Contractor's staff will be required to adhere to security procedures as identified by the Sandspit Airport Manager. The Sandspit Airport Manager is to be supplied with a list of all the Contractor's personnel and vehicles to be working on airside.

#### **5.4 Potential Foreign Object Damage**

- 5.4.1 It is operationally critical that all potential foreign object damage (FOD) be removed from active aircraft operational areas and safety areas. Materials and debris which can be tracked or blown on to the airfield areas can pose a risk to aircraft safety. Removal of potential FOD is a primary responsibility of the Contractor and will be closely monitored to ensure compliance. Appropriate waste containers must be supplied and used to contain the debris and emptied on a regular basis. All clean-up must be to the satisfaction of the Project Manager and the Sandspit Airport Manager. Failure of the Contractor to perform this requirement will result in the Sandspit Airport Manager initiating the required clean-up and all costs incurred by the Sandspit Airport Manager will be recovered from the Contractor.

#### **5.5 Contractor Compounds**

- 5.5.1 The Contractor may establish a material and equipment storage compound area, if required. The Contractor will arrange for an appropriate designated storage compound, and employee parking area with the approval of the Sandspit Airport Manager. All Contractor equipment is to be fully secured if stored within the compound site while not in use or after hours. All hazardous products must be stored according to provincial regulatory requirements.
- 5.5.2 Equipment and materials which cannot be stored directly on the work site may be stored in Transport Canada approved areas.
- 5.5.3 All contents of storage areas will be made known to the site representative to ensure precautions that may need to be taken are addressed.
- 5.5.4 The final decision concerning any storage area location lies with the Sandspit Airport Manager.

# **PLAN OF CONSTRUCTION OPERATIONS**

## **SANDSPIT AIRPORT, SANDSPIT, BRITISH COLUMBIA.**

### **6 COMMUNICATIONS/NAVIGATION**

- 6.1 All construction activity and airport disruptions will be NOTAMed (Notice To Airmen) by the Sandspit Airport Manager in advance to minimize disruption to aircraft. All NOTAMs and construction procedures will be clearly understood between PWGSC, Transport Canada and the Contractor. All electronic navigational equipment will remain operational and available during published operating hours. All NOTAMs will be issued by the Sandspit Airport Manager.
- 6.2 NOTAM Action
  - 6.2.1 The first NOTAM will be required 7 days prior to commencement of construction. For any further NOTAM change, contractor will provide minimum 72 hours notice.

### **7 MEDIA**

The official media spokesperson for this project Robert Ells.

### **8 INSPECTIONS**

- 8.1 All formal inspections will be coordinated by the PWGSC Project Manager with the Programs Group Site Representative or designate as a member of all interim and final acceptance inspections. Inspections by a Programs Group Site Representative may be undertaken at any time.
- 8.2 All projects being implemented on airport property are subject to inspection by the site representative at any time. Any resulting issues will be resolved between the Contractor and the Project Manager.

### **9 CONTRACTOR LIABILITY**

- 9.1 Any damage to airfield systems or equipment directly resulting from the Contractor's actions will be corrected immediately by the Contractor under the direct supervision of the PWGSC, Project Manager and to Transport Canada's satisfaction. These costs shall be the Contractor's responsibility, should it be a result of the Contractor's negligence. The Contractor will be responsible to rectify any environmental damage resulting from their works or operations.

# **PLAN OF CONSTRUCTION OPERATIONS**

## **SANDSPIT AIRPORT, SANDSPIT, BRITISH COLUMBIA.**

### **10 CONSTRUCTION MEETINGS**

- 10.1 Site meetings between the PWGSC Project Manager, Contractor and the Sandspit Airport Manager will be arranged on a weekly basis to review project progress and upcoming work.

### **11 REMOVAL AND SALVAGE OF MATERIAL**

- 11.1 Removed asphalt will be disposed of off-site. All materials which are considered non-recyclable will be removed from the airport property and be disposed of in a dump site arranged for by the Contractor. All waste and waste products must be disposed of according to provincial regulatory requirements.
- 11.2 Reusable clean granular material will be placed in an area designated by the Project Manager to the satisfaction of the Sandspit Airport Manager. All asphalt removed shall be disposed of at an authorized off site location
- 11.3 Arrangements for disposal of any contaminated material will be the responsibility of the Contractor.

### **12 SITE CONDITIONS**

- 12.1 Upon completion of the project, the Contractor will be responsible for returning the area to its pre-project condition to the satisfaction of the Sandspit Airport Manager or his designate. This will include repairing any roadway damage or fencing damage caused by the contractor during project implementation as well as the clean-up and removal of all debris and garbage.

## PLAN OF CONSTRUCTION OPERATIONS

SANDSPIT AIRPORT, SANDSPIT, BRITISH COLUMBIA.

### Sign Off Sheet

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Stakeholders	Signature	Date
TC Project Leader Name: Ph:		
TC Programs Implementation Manager. Name: Ph:		
Airport Manager Name: Ph: Cell:		
PWGSC Project Manager Name: Ph:		
Civil Aviation Safety Inspector, Flight Operations. Ph:		

Project No./Folio No.	Sheet/Feuille	Project/Projet
R.077 013.001	C08	0
Scale 1:1000		

OPS PLAN

Drawing Title/Title du dessin

Scale 1:1000

Project/Projet

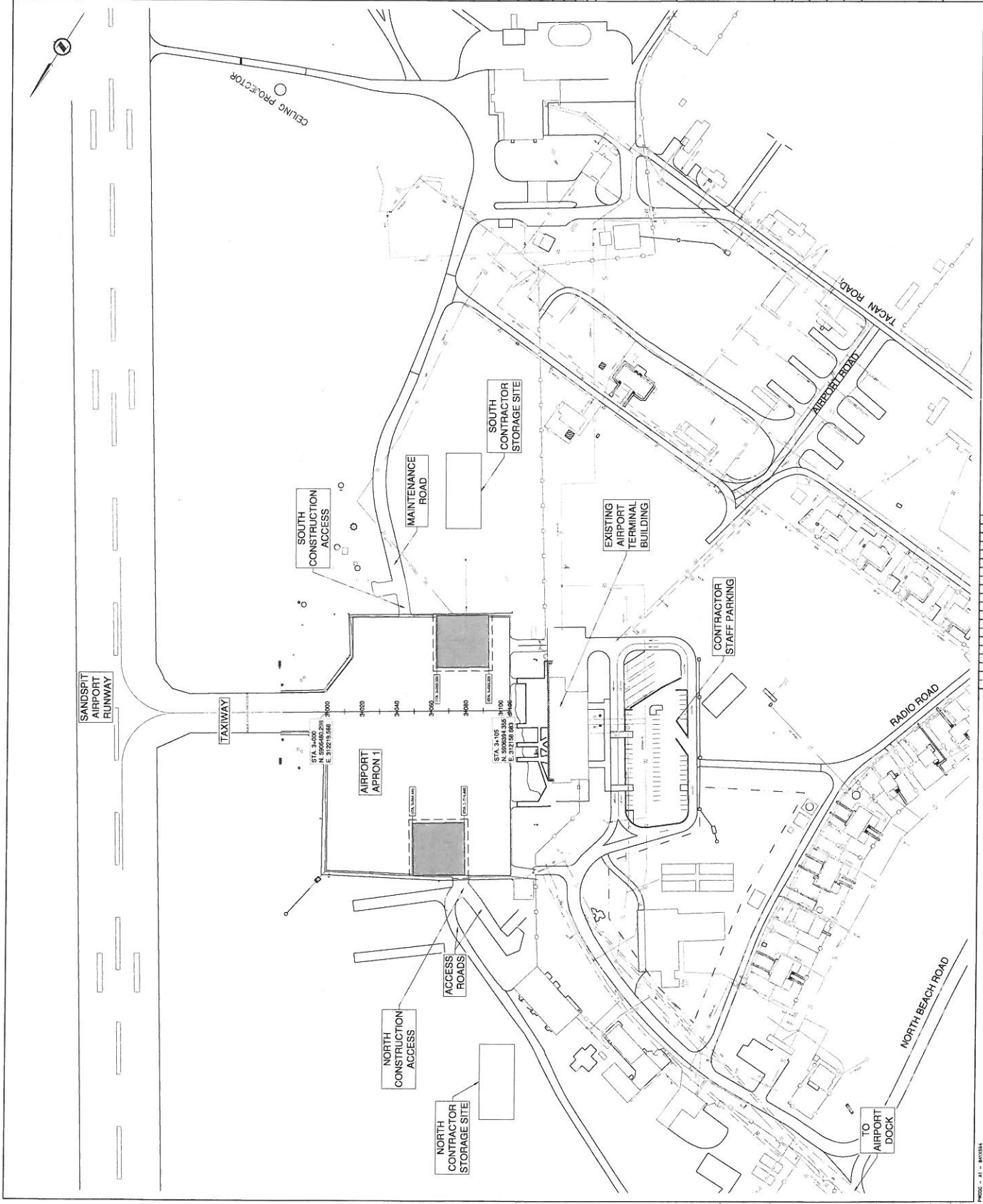
SANDSPIT AIRPORT  
AIRSIDE APRON 1  
RESTORATION

218 - 800 BURRARD STREET  
VANCOUVER, BC, V6Z 0B9

PUBLIC WORKS AND  
GOVERNMENT SERVICES  
CANADA



REAL PROPERTY SERVICES  
SERVICES IMMOBILIERS  
Project/Projet



**APPENDIX 3**

PRELIMINARY HAZARD ASSESSMENT FORM



## PRELIMINARY HAZARD ASSESSMENT FORM

<b>Project Number:</b>	<b>PWGSC #R.077013.001</b>
<b>Location:</b>	<b>Sandspit, BC</b>
<b>Date:</b>	July 26, 2016
<b>Name of Departmental Representative:</b>	
<b>Name of Client:</b>	Transport Canada
<b>Name of Client Project Co-ordinator</b>	

Site Specific Orientation Provided at Project Location Yes ☐ No ☒

Notice of Project Required Yes ☒ No ☐

### NOTE:

**PWGSC REQUIRES A Notice of Project FOR ALL CONSTRUCTION WORK RELATED ACTIVITIES**

### NOTE:

**OHS law is made up of many municipal, provincial, and federal acts, regulations, bylaws and codes. There are also many other pieces of legislation in British Columbia that impose OHS obligations.**

**Important Notice:** This hazard assessment has been prepared by PWGSC for its own project planning process, and to inform the service provider of actual and potential hazards that may be encountered in performance of the work. PWGSC does not warrant the completeness or adequacy of this hazard assessment for the project and the paramount responsibility for project hazard assessment rests with the service provider.

TYPES OF HAZARDS TO CONSIDER	Potential Risk for:				COMMENTS
Examples: Chemical, Biological, Natural, Physical, and Ergonomic	PWGSC, OGD's, or tenants		General Public or other contractors		Note: When thinking about this pre-construction hazard assessment, remember a <b>hazard</b> is anything that may cause harm, such as chemicals, electricity, working from heights, etc; the <b>risk</b> is the chance, high or low, that somebody could be harmed by these and other hazards, together with an indication of how serious the harm could be.
Listed below are common construction related hazards. Your project may include pre-existing hazards that are not listed. Contact the Regional Construction Safety Coordinator for assistance should this issue arise.	Yes	No	Yes	No	

Typical Construction Hazards					
Concealed/Buried Services (electrical, gas, water, sewer etc)	X		X		
Slip Hazards or Unsound Footing		X		X	
Working at Heights		X		X	
Working Over or Around Water		X		X	
Heavy overhead lifting operations, mobile cranes etc.	X		X		
Marine and/or Vehicular Traffic (site	X		X		





vehicles, public vehicles, etc.					
Fire and Explosion Hazards	X		X		
High Noise Levels	X		X		
Excavations	X		X		
Blasting		X		X	
Construction Equipment	X		X		
Pedestrian Traffic (site personnel, tenants, visitors, public)	X		X		
Multiple Employer Worksite		X		X	Example: Contractor working in an occupied Federal Employee space.

Electrical Hazards					Comments
Contact With Overhead Wires		X		X	
Live Electrical Systems or Equipment	X		X		
Other:					
Physical Hazards					
Equipment Slippage Due To Slopes/Ground Conditions		X		X	
Earthquake		X		X	
Tsunami		X		X	
Avalanche		X		X	
Forest Fires		X		X	
Fire and Explosion Hazards	X		X		
Working in Isolation		X		X	
Working Alone		X		X	
Violence in the Workplace		X		X	
High Noise Levels	X		X		
Inclement weather	X		X		
High Pressure Systems	X		X		(Water System)
Other:					
Hazardous Work Environments					
Confined Spaces / Restricted Spaces	X		X		Review and provide confined space assessment(s) from PWGSC or client confined space inventories. Refer to PWGSC Standard on Entry into Confined Spaces. Contact the Regional Construction Safety Coordinator.
Suspended / Mobile Work Platforms		X		X	
Other:					
Biological Hazards					
Mould Proliferations		X		X	
Accumulation of Bird or Bat Guano		X		X	
Bacteria / Legionella in Cooling Towers / Process Water		X		X	
Rodent / Insect Infestation		X		X	
Poisonous Plants		X		X	
Sharp or Potentially Infectious Objects in Wastes		X		X	



Wildlife		X		X	
<b>Chemical Hazards</b>					
Asbestos Materials on Site		X		X	If "yes" a pre-project asbestos survey report is required. Provide Contractor with DP – 057 ELF Form 16 "Contractor Notification and Acknowledgement"
Designated Substance Present		X		X	If "yes" a pre-project designated substance survey report is required.
Chemicals Used in work		X		X	
Lead in paint		X		X	If "yes" a pre-project lead survey report is required.
Mercury in Thermostats or Switches		X		X	If "yes" a pre-project mercury survey report is required.
Application of Chemicals or Pesticides		X		X	
PCB Liquids in Electrical Equipment		X		X	
Radioactive Materials in Equipment		X		X	
Other:					
<b>Contaminated Sites Hazards</b>					
Hazardous Waste		X		X	
Hydrocarbons	X		X		
Metals		X		X	
Other:					

<b>Security Hazards</b>					<b>Comments</b>
Risk of Assault		X		X	
Other:					
<b>Other Hazards</b>					

<b>Other Compliance and Permit Requirements<sup>1</sup></b>	<b>YES</b>	<b>NO</b>	<b>Notes / Comments<sup>2</sup></b>
Is a Building Permit required?		X	
Is an Electrical permit required?		X	
Is a Plumbing Permit required?		X	
Is a Sewage Permit required?		X	
Is a Dumping Permit required?	X		Asphalt, concrete, soil
Is a Hot Work Permit required?		X	
Is a Permit to Work required?		X	Mandatory for ALL AFD managed work sites.
Is a Confined Space Entry Permit required?	X		Mandatory
Is a Confined Space Entry Log required	X		Mandatory for all Confined Spaces
Discharge Approval for treated water required		X	

**Notes:**

(1) Does not relieve Service Provider from complying with all applicable federal, provincial, and municipal laws and regulations.

(2) TBD means To Be Determined by Service Provider.



**Service Provider Acknowledgement: We confirm receipt and review of this Pre-Project Hazard Assessment and acknowledge our responsibility for conducting our own assessment of project hazards, and taking all necessary protective measures (which may exceed those cited herein) for performance of the work.**

<b>Service Provider Name</b>	ISL Engineering and Land Services		
<b>Signatory for Service Provider</b>	Randolph R. Rosin	<b>Date Signed</b>	July 26, 2016

**RETURN EXECUTED DOCUMENT TO PWGSC DEPARTMENTAL REPRESENTATIVE PRIOR TO ANY WORK COMMENCING**