

SPECIFICATION  
INFRASTRUCTURE UPGRADES  
CHANNEL-PORT AUX BASQUES, NL  
Project No.: F6144-140013

PREPARED FOR:

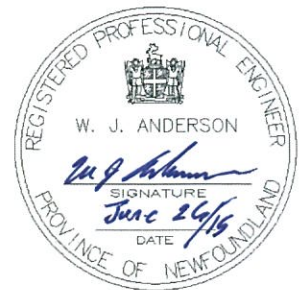
Small Craft Harbours

ON BEHALF OF:

Fisheries and Oceans Canada

DATE:

June 2015



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PART 1 - GENERAL

1.1 SCOPE

- .1 The scope of work for this project is for the removal and replacement of 73 lin meters of water main. Roadway upgrading with approximately 1900 m<sup>2</sup> of new roadway asphalt as shown on accompanying drawings.

1.2 DESCRIPTION OF WORK

- .1 In general, work under this contract consist of, but will not necessarily be limited to, the following:
- .1 Demolition and removal of existing concrete roadway including partial curb removal as shown on drawings. All demolished and excavated materials to be disposed of at an approved waste site.
  - .2 Demolition and removal of existing asphalt roadway as shown on drawings including reinforced concrete wharf slab, timber crib wharf and ballast material as directed on drawings. All demolished and excavated material to be disposed of at an approved waste site.
  - .3 Removal of existing 450 mm dia. P.E. waterline including associated insulation, concrete encasement and metal pipe incasement as shown on drawings.
  - .4 Removal of existing wooden boardwalk including wooden railings and support brackets.
  - .5 Supply and installation of 73.0 meters of new 450 mm HDPE DR11 water main and associated appurtenances.
  - .6 Supply and install 2 - 450 mm dia. butterfly valves c/w valve box (for testing purposes only).
  - .7 Supply and installation of rock fill as outlined in associated drawings.
  - .8 Supply and installation of a catch basin, concrete low back curb and gutter, 450 mm culvert, 150 mm sanitary sewer outfall piping as shown on drawings.
  - .9 Supply and installation of Type 2 sub base material, Type 1 base material and approximately 1900 m<sup>2</sup> of base course and surface course asphalt pavement as outlined on associated drawings.
  - .10 Supply and installation of new galvanized steel guide railing and wooden railing at the pedestrian walkway as shown on drawings.
  - .11 Supply and installation of rip rap rock material as directed on drawings.

- .2 All as indicated on accompanying drawings and specifications hereto.

1.3 SITE OF WORK

- .1 Work will be carried out at Channel-Port aux Basques, Newfoundland and Labrador in the location as shown on the accompanying drawings.

1.4 DATUM

- .1 Datum used for this project is existing fire hydrant and is assumed to be 3.183 metres, top nut as shown on accompanying drawings.

1.5 FAMILIARIZATION WITH SITE

- .1 Before submitting a bid, bidders can visit the site and its surroundings, at their own expense, to review and verify the form, nature and extent of the work, materials needed for the completion of the work, the means of access to the site, severity, exposure and uncertainty of weather, soil conditions, any accommodations they may require, and in general shall obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid. No allowance shall be made subsequently in this connection on account of error or negligence to properly observe and determine the conditions that will apply.
- .2 Contractors, bidders or those they invite to site are to review specification Section 01 35 28 - Health and Safety Requirements before visiting site. Take all appropriate safety measures for any visit to site, either before or after acceptance of bid.
- .3 Obtain prior permission from the Departmental Representative before carrying out such site inspection.

1.6 CODES AND STANDARDS

- .1 Perform work in accordance with the latest edition of the National Building Code of Canada, FCC Standard 373 - Standard for Piers and Wharves, and any other code of provincial or local application including all amendments up to project bid closing date provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.
- .2 Materials and workmanship must meet or exceed requirements of specified standards, codes and referenced documents.

1.7 TERM ENGINEER

- .1 Unless specifically stated otherwise, the term Engineer where used in the Specifications and on the Drawings shall mean the Departmental Representative as defined in the General Conditions of the Contract.

1.8 SETTING OUT WORK

- .1 Set grades and layout work in detail from control points and grades established by Departmental Representative.
- .2 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated or as directed by Departmental Representative.
- .3 Provide devices needed to layout and construct work.
- .4 Supply such devices as straight edges and templates required to facilitate Departmental Representative's inspection of work.
- .5 Supply stakes and other survey markers required for laying out work.

1.9 COST BREAKDOWN

- .1 Before submitting first progress claim submit breakdown of Contract price in detail as directed by Departmental Representative and aggregating contract price. Departmental Representative will provide the required forms for application of progress payment.
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- .2 Provide cost breakdown in same format as the numerical and subject title system used in this specification project manual and thereafter sub-divided into major work components as directed by Departmental Representative.
- .3 Upon approval by Departmental Representative, cost breakdown will be used as basis for progress payment.
- .4 All work items not designated in the unit price table as a measurement for payment, are to be included in the lump sum arrangement, as noted on the Bid and Acceptance Form.

1.10 WORK SCHEDULE

- .1 Submit within 7 work days of notification of acceptance of bid, a construction schedule showing commencement and completion of all work within the time stated on the Bid and Acceptance Form and the date stated in the bid acceptance letter.
  - .2 Provide sufficient details in schedule to clearly illustrate entire implementation plan, depicting efficient coordination of tasks and resources, to achieve completion of work on time and permit effective monitoring of work progress in relation to established milestones.
  - .3 As a minimum, work schedule to be prepared and submitted in the form of Bar (GANTT) Charts, indicating work activities, tasks and other project elements, their anticipated durations and planned dates for achieving key activities and major project milestones provided in sufficient details and supported by narratives to demonstrate a reasonable plan for completion of project within designated time, e.g., show target dates for the placement of new waterline, waterline connection, asphalt placement, if applicable. Generally Bar Charts derived from commercially available computerized project management system are preferred but not mandatory.
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- .4 Submit schedule updates on a minimum monthly basis and more often, when requested by Departmental Representative, due to frequent changing project conditions. Provide a narrative explanation of necessary changes and schedule revisions at each update.
- .5 The schedule, including all updates, shall be to Departmental Representative's approval. Take necessary measures to complete work within approved time. Do not change schedule without Departmental Representative's approval.
- .6 All work on the project will be completed within the time indicated on the Bid and Acceptance Form.

1.11 ABBREVIATIONS

- .1 Following abbreviations of standard specifications have been used in this specification and on the drawings:

CGSB - Canadian Government Specifications Board  
CSA - Canadian Standards Association  
NLGA - National Lumber Grades Authority  
ASTM - American Society for Testing and Materials

- .2 Where these abbreviations and standards are used in this project, latest edition in effect on date of bid call will be considered applicable.

1.12 QUARRY AND EXPLOSIVES

- .1 Make own arrangements with Provincial authorities and owners of private properties, for the quarrying and transportation of rock and all materials and machinery necessary for work over their property, roads or streets as case may be.

1.13 SITE OPERATIONS

- .1 Arrange for sufficient space adjacent to project site for conduct of operations, storage of materials and so on. Exercise care so as not to obstruct or damage public or private property in area. Do not interfere with normal day-to-day operations in progress at site. All arrangements for space and access will be made by Contractor.



- .2 Remove snow and ice as required to maintain safe access in a manner that does not damage existing structures or interfere with the operations of others.

1.14 PROJECT MEETINGS

- .1 Departmental Representative will arrange project meetings and assume responsibility for setting times and recording minutes.
- .2 Project meetings will take place on site of work unless so directed by the Departmental Representative.
- .3 Departmental Representative will assume responsibility for recording minutes of meetings and forwarding copies to all parties present at the meetings.
- .4 Have a responsible member of firm present at all project meetings.

1.15 PROTECTION

- .1 Store all materials and equipment to be incorporated into work to prevent damage by any means.
- .2 Repair or replace all materials or equipment damaged in transit or storage to the satisfaction of Departmental Representative and at no cost to Canada.

1.16 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy of the following:
    - .1 Contract Drawings
    - .2 Specifications
    - .3 Addenda
    - .4 Reviewed Shop Drawing
    - .5 List of outstanding shop drawings
    - .6 Change Orders
    - .7 Other modifications to Contract
    - .8 Field Test Reports
    - .9 Copy of Approved Work Schedule
    - .10 Site specific Health and Safety Plan and other safety related documents
    - .11 Other documents as stipulated elsewhere in the Contract Documents.
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- 1.17 PERMITS
- .1 Obtain and pay for all permits, certificates and licenses as required by Municipal, Provincial, Federal and other Authorities.
  - .2 Provide appropriate notifications of project to municipal and provincial inspection authorities.
  - .3 Obtain compliance certificates as prescribed by legislative and regulatory provisions of municipal, provincial and federal authorities as applicable to the performance of work.
  - .4 Submit to Departmental Representative, copy of application submissions and approval documents received for above referenced authorities.
  - .5 Submit to Departmental Representative, copy of quarry permit, if applicable, prior to start of quarry operations.
  - .6 Comply with all requirements, recommendations and advise by all regulatory authorities unless otherwise agreed in writing by Departmental Representative. Make requests for such deviations to these requirements sufficiently in advance of related work.
- 1.18 CUTTING, FITTING AND PATCHING
- .1 Execute cutting, including excavation, fitting and patching required to make work fit properly.
  - .2 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work. This includes patching of openings in existing work resulting from removal of existing services.
  - .3 Do not cut, bore, or sleeve load-bearing members.
  - .4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
- 1.19 EXISTING SUB-SURFACE CONDITIONS
- .1 Information pertaining to the existing sub-surface conditions may be available by contacting the Departmental Representative.
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- .2 Contractors are cautioned that any previous investigations that may be available for review, were intended to provide general site information only. Any interpolation and/or assumptions made relative to any previous investigations is the Contractor's responsibility.

1.20 LOCATION OF  
EQUIPMENT

- .1 Location of curb stops, waterline connection, catch basin, piping and fixtures, shown or specified shall be considered as approximate. Actual location shall be as required to suit conditions at time of installation and as is reasonable. Obtain approval of Departmental Representative.
- .2 Inform Departmental Representative when impending installation conflicts with other new or existing components. Follow directives for actual location.
- .3 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.21 FISH HABITAT

- .1 This work is being conducted in an area where fish habitat may be affected. Perform work to conform with rules and regulations governing fish habitat and in accordance with authorization for work or undertakings affecting fish habitat.
- .2 Contact the Department of Fisheries and Oceans Marine Development and Infrastructure Unit at (709) 772-2508 at least 48 hours in advance of starting any work on site.

1.22 NOTICE TO  
SHIPPING/MARINERS

- .1 Notify the Marine Communications and Traffic Services' Centre, of Fisheries and Oceans Canada, at (709) 772-,2083, ten (10) days prior to commencement and upon completion of the work, in order to allow for the issuance of Notices to Shipping/Mariners.
- .2 During construction any vessels or barges utilized must be marked in accordance with the provisions of the Canada Shipping Act Collision Regulations.

1.23 ACCEPTANCE

- .1 Prior to the issuance of the Certificate of Substantial Performance, in company with Departmental Representative, make a check of all work. Correct all discrepancies before final inspection and acceptance.

1.24 WORKS  
COORDINATION

- .1 Responsible for coordinating the work of the various trades, where the work of such trades interfaces with each other.
- .2 Convene meetings between trades whose work interfaces and ensure that they are fully aware of the areas and the extent of where interfacing is required. Provide each trade with the plans and specifications of the interfacing trade, as required, to assist them in planning and carrying out their respective work.
- .3 Canada will not be responsible for or held accountable for any extra costs incurred as a result of the failure to carry out coordination work. Disputes between the various trades as a result of their not being informed of the areas and extent of interface work shall be the sole responsibility of the General Contractor and shall be resolved at no extra cost to Canada.

1.25 CONTRACTOR'S  
USE OF SITE

- .1 Construction operations, including storage of materials for this contract, not to interfere with the fishing activity and/or operations at this harbour facility.
- .2 Responsible for arranging the storage of materials on or off site, and any materials stored at the site which interfere with any of the day to day activities at or near the site will be moved promptly at the Contractor's expense, upon request by Departmental Representative.
- .3 Contractor will take adequate precautions to protect existing concrete decks and asphalt when operating tracked equipment.
- .4 Exercise care so as not to obstruct or damage public or private property in the area.

- .5 At completion of work, restore area to its original condition. Damage to ground and property will be repaired by Contractor. Remove all construction materials, residue, excess, etc., and leave site in a condition acceptable to Departmental Representative.

1.26 WORK  
COMMENCEMENT

- .1 Mobilization to project site is to commence immediately after acceptance of bid and submission of Site Specific Safety Plan, unless otherwise agreed by Departmental Representative.
- .2 Project work on site is to commence as soon as possible, with a continuous reasonable work force, unless otherwise agreed by Departmental Representative.
- .3 Weather conditions, short construction season, delivery challenges and the location of the work site may require the use of longer working days and additional work force to complete the project within the specified completion time.
- .4 Make every effort to ensure that sufficient material and equipment is delivered to site at the earliest possible date after acceptance of bid and replenished as required.

1.27 FACILITY  
SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions.

1.28 INTERPRETATION  
OF DOCUMENTS

- .1 Supplementary to the Order of Precedence article of the General Conditions of the Contract, the Division 01 sections take precedence over the technical specification sections in other Divisions of the Specification Manual.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Inspecting and testing by inspecting firms or testing laboratories designated by Departmental Representative.
- 1.2 RELATED REQUIREMENTS SPECIFIED ELSEWHERE .1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Departmental Representative are specified under various sections.
- 1.3 APPOINTMENT AND PAYMENT .1 Departmental Representative will appoint and pay for services of testing laboratory except for the following:  
.1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.  
.2 Inspection and testing performed exclusively for Contractor's convenience.  
.3 Mill tests and certificates of compliance.  
.4 Tests specified to be carried out by Contractor under the supervision of Departmental Representative.  
.5 Tests requested by Departmental Representative to confirm material specifications when the applicable manufacturer's documentation or test results are unavailable.  
.6 Additional tests specified in the following paragraph.
- .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.
- 1.4 CONTRACTOR'S RESPONSIBILITIES .1 Provide labour, equipment and facilities to:  
.1 Provide access to Work to be inspected and tested.  
.2 Facilitate inspections and tests.
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- .3 Make good Work disturbed by inspection and test.
- .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
- .2 Notify Departmental Representative sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

1.1 SECTION  
INCLUDES

- .1 Shop drawings and product data.
- .2 Samples.
- .3 Certificates.

1.2 SUBMITTAL  
GENERAL REQUIREMENTS

- .1 Submit to Departmental Representative for review submittals listed, including shop drawings, samples, certificates and other data, as specified in other sections of the Specifications.
- .2 Submit with reasonable promptness and in orderly sequence so as to allow for Departmental Representative's review and not cause delay in Work. Failure to submit in ample time will not be considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .3 Do not proceed with Work until relevant submissions are reviewed by Departmental Representative.
- .4 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .5 Where items or information is not produced in SI Metric units, provide soft converted values.
- .6 Review submittals prior to submission to Departmental Representative. Ensure during review that necessary requirements have been determined and verified, required field measurements or data have been taken, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents.
  - .1 Submittals not stamped, signed, dated and identified as to specific project will be returned unexamined by Departmental Representative and considered rejected.
- .7 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.



- .8 Verify field measurements and affected adjacent Work are co-ordinated.
- .9 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative's review.
- .11 Submit format: paper originals, or alternatively clear and fully legible photocopies of originals. Facsimiles are not acceptable, except in special circumstances pre-approved by Departmental Representative. Poorly printed non-legible photocopies or facsimiles will not be accepted and be returned for resubmission.
- .12 Make changes or revision to submissions which Departmental Representative may require, consistent with Contract Documents and resubmit as directed by Departmental Representative. When resubmitting, notify Departmental Representative in writing of any revisions other than those requested.
- .13 Keep one reviewed copy of each submittal document on site for duration of Work.

1.3 SHOP DRAWINGS  
AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, product data, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
  - .2 Number of Shop Drawings: submit sufficient copies of shop drawings which are required by the General Contractor and sub-contractors plus (2) copies which will be retained by Departmental Representative. Ensure sufficient numbers are submitted to enable one complete set to be included in each of the maintenance manuals specified, if applicable.
  - .3 Shop Drawings Content and Format:
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- .1 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where items or equipment attach or connect to other items or equipment, confirm that all interrelated work have been coordinated, regardless of section or trade from which the adjacent work is being supplied and installed.
- .2 Shop Drawings Format:
  - .1 Opaque white prints or photocopies of original drawings or standard drawings modified to clearly illustrate work specific to project requirements. Maximum sheet size to be 1000 x 707 mm.
  - .2 Product Data from manufacturer's standard catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products, to be original full colour brochures, clearly marked indicating applicable data and deleting information not applicable to project.
  - .3 Non or poorly legible drawings, photocopies or facsimiles will not be accepted and returned not reviewed.
- .3 Supplement manufacturer's standard drawings and literature with additional information to provide details applicable to project.
- .4 Delete information not applicable to project on all submittals.
- .4 Allow 15 calendar days for Departmental Representative's review of each submission.
- .5 Adjustments or corrections made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, advise Departmental Representative in writing prior to proceeding with Work.
- .6 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections and comments are made, fabrication and installation may proceed upon receipt of shop drawings. If shop drawings are rejected and noted to be Resubmitted, do not proceed with that portion of work until resubmission and review of corrected shop drawings, through same submission procedures indicated above.

- .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 Cross references to particular details of contract drawings and specifications section number for which shop drawing submission addresses.
    - .6 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.
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- .10 The review of shop drawings by the Departmental Representative or their delegated representative is for sole purpose of ascertaining conformance with general concept. This review shall not mean that Public Works and Government Services Canada approves the detail design inherent in the 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 the construction and Contract Documents. 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 all sub-trades.

1.4 SCHEDULE,  
PERMITS AND  
CERTIFICATES

- .1 Upon acceptance of bid, submit to Departmental Representative copy of Work Schedule and various other schedules, permits, certification documents and project management plans as specified in other sections of the Specifications.
- .2 Submit copy of permits, notices, compliance Certificates received by Regulatory Agencies having jurisdiction and as applicable to the Work.
- .3 Submission of above documents to be in accordance with Submittal General Requirements procedures specified in this section

PART 1 - GENERAL

1.1 SECTION  
INCLUDES

- .1 Fire Safety Requirements.
- .2 Hot Work Permit.

1.2 RELATED WORK

- .1 Section 01 35 25 - Special Procedures on Lockout Requirements.
- .2 Section 01 35 28 - Health and Safety Requirements.

1.3 REFERENCES

- .1 Fire Protection Standards issued by Fire Protection Services of Human Resources Development Canada as follows:
  - .1 FCC No. 301-June 1982 Standard for Construction Operations  
([http://ccinfoweb2.ccohs.ca/legislation/documents/fp\\_fcstde/fc301\\_e.htm](http://ccinfoweb2.ccohs.ca/legislation/documents/fp_fcstde/fc301_e.htm)).
  - .2 FCC No. 302-June 1982 Standard for Welding and Cutting  
([http://ccinfoweb2.ccohs.ca/legislation/documents/fp\\_fcstde/fc302\\_e.htm](http://ccinfoweb2.ccohs.ca/legislation/documents/fp_fcstde/fc302_e.htm)).

1.4 DEFINITIONS

- .1 Hot Work defined as:
  - .1 Welding work.
  - .2 Cutting of materials by use of torch or other open flame devices.
  - .3 Grinding with equipment which produces sparks.

1.5 SUBMITTALS

- .1 Submit copy of Hot Work Procedures and sample of Hot Work permit to Departmental Representative for review, within 14 calendar days after notification of acceptance of bid.
  - .2 Submit in accordance with the Submittal General Requirements specified in Section 01 33 00-Submittal Procedures.
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1.6 FIRE SAFETY  
REQUIREMENTS

- .1 Implement and follow fire safety measures during Work. Comply with following:
  - .1 National Fire Code, 2010
  - .2 Fire Protection Standards FCC 301 and FCC 302.
  - .3 Federal and Provincial Occupational Health and Safety Acts and Regulations as specified in Section 01 35 28 - Health and Safety Requirements.
- .2 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.

1.7 HOT WORK  
AUTHORIZATION

- .1 Obtain Departmental Representative's written "Authorization to Proceed" before conducting any form of Hot work on site.
  - .2 To obtain authorization submit to Departmental Representative:
    - .1 Contractor's typewritten Hot Work Procedures to be followed on site as specified below.
    - .2 Description of the type and frequency of Hot Work required.
    - .3 Sample Hot Work Permit to be used.
  - .3 Upon review and confirmation that effective fire safety measures will be implemented during performance of hot work, Departmental Representative will provide authorization to proceed as follows:
    - .1 Issue one written "Authorization to Proceed" covering the entire project for duration of work or;
    - .2 Separate work, or segregate certain parts of work, into individual entities. Each entity requiring a separately written "Authorization to Proceed" from Departmental Representative. Follow Departmental Representative's directives in this regard.
  - .4 Requirement for individual authorization based on:
    - .1 Nature or phasing of work;
    - .2 Risk to Facility operations;
    - .3 Quantity of various trades needing to perform hot work on project or;
    - .4 Other situation deemed necessary by Departmental Representative to ensure fire safety on premises.
-

- .5 Do not perform any Hot Work until receipt of Departmental Representative's written "Authorization to Proceed" for that portion of work.
- 1.8 HOT WORK PROCEDURES
- .1 Develop and implement safety procedures and work practices to be followed during the performance of Hot Work.
- .2 Procedures to include:
- .1 Requirement to perform hazard assessment of site and immediate hot work area for each hot work event in accordance with Hazard Assessment and Safety Plan requirements of Section 01 35 28 -Health and Safety Requirements.
  - .2 Use of a Hot Work Permit system for each hot work event.
  - .3 The step by step process of how to prepare and issue permit.
  - .4 Permit shall be issued by Contractor's site Superintendent, or other authorized person designated by Contractor, granting permission to worker or subcontractor to proceed with hot work.
  - .5 Provision of a designated person to carryout a Fire Safety Watch for a minimum of 60 minutes immediately upon completion of the hot work.
  - .6 Compliance with fire safety codes and standards specified herein and occupational health and safety regulations specified in Section 01 35 28 Health and Safety Requirements.
- .3 Generic procedures, if used, must be edited and supplemented with pertinent information tailored to reflect specific project conditions. Clearly label as being the Hot Work Procedures applicable to this contract.
- .4 Hot Work Procedures shall clearly establish worker instructions and allocate responsibilities of:
- .1 Worker(s),
  - .2 Authorized person issuing the Hot Work Permit,
  - .3 Fire Safety Watcher,
  - .4 Subcontractors and Contractor.
- .5 Brief all workers and subcontractors on Hot Work Procedures and Permit system established for project. Stringently enforce compliance.
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.1 Failure to comply with the established procedures may result in the issuance of a Non-Compliance Notification at Departmental Representative's discretion with possible disciplinary measures imposed as specified in Section 01 35 28 - Health and Safety Requirements.

1.9 HOT WORK  
PERMIT

- .1 Hot Work Permit to include, as a minimum, the following data:
  - .1 Project name and project number.
  - .2 Building name, address and specific room or area where hot work will be performed.
  - .3 Date when permit issued.
  - .4 Description of hot work type to be performed.
  - .5 Special precautions required, including type of fire extinguisher needed.
  - .6 Name and signature of person authorized to issue the permit.
  - .7 Name of worker (clearly printed) to which the permit is being issued.
  - .8 Time Duration that permit is valid (not to exceed 8 hours). Indicate start time and date, and completion time and date.
  - .9 Worker signature with date and time upon hot work termination.
  - .10 Specified time period requiring safety watch.
  - .11 Name and signature of designated Fire Safety Watcher, complete with time and date when safety watch terminated, certifying that surrounding area was under continual surveillance and inspection during the full watch time period specified in Permit and commenced immediately upon completion of Hot Work.
- .2 Permit to be typewritten form. Industry Standard forms shall only be used if all data specified above is included on form.
- .3 Each Hot Work Permit to be completed in full and signed as follows:
  - .1 Authorized person issuing Permit before hot work commences.
  - .2 Worker upon completion of Hot Work.
  - .3 Fire Safety Watcher upon termination of safety watch.
  - .4 Returned to Contractor's Site Superintendent for safe keeping.



1.10 DOCUMENTS ON  
SITE

- .1 Keep Hot Work Permits and Hazard assessment documentation on site for duration of Work.
- .2 Upon request, make available to Departmental Representative or to authorized safety representative for inspection.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 Procedures to isolate and lockout electrical facility or other equipment from energy source.
- 1.2 RELATED WORK
- .1 Section 01 35 24 - Special Procedures On Fire Safety Requirements.
- .2 Section 01 35 28 - Health and Safety Requirements.
- 1.3 REFERENCES
- .1 C22.1-06 - Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.
- .2 CAN/CSA C22.3 No. 1-06 - Overhead Systems.
- .3 CAN/CSA C22.3 No. 7-06 - Underground Systems.
- .4 COSH, Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.
- 1.4 DEFINITIONS
- .1 Electrical Facility: means any system, equipment, device, apparatus, wiring, conductor, assembly or part thereof that is used for the generation, transformation, transmission, distribution, storage, control, measurement or utilization of electrical energy, and that has an amperage and voltage that is dangerous to persons.
- .2 Guarantee of Isolation: means a guarantee by a competent person in control or in charge that a particular facility or equipment is isolated.
- .3 De-energize: in the electrical sense, that a piece of equipment is isolated and grounded, e.g. if the equipment is not grounded, it cannot be considered de-energized (DEAD).
-

- .4 Guarded: means that an equipment or facility is covered, shielded, fenced, enclosed, inaccessible by location, or otherwise protected in a manner that, to the extent that is reasonably practicable, will prevent or reduce danger to any person who might touch or go near such item.
- .5 Isolate: means that an electrical facility, mechanical equipment or machinery is separated or disconnected from every source of electrical, mechanical, hydraulic, pneumatic or other kind of energy that is capable of making it dangerous.
- .6 Live/alive: means that an electrical facility produces, contains, stores or is electrically connected to a source of alternating or direct current of an amperage and voltage that is dangerous or contains any hydraulic, pneumatic or other kind of energy that is capable of making the facility dangerous to persons.

1.5 COMPLIANCE  
REQUIREMENTS

- .1 Perform lockouts in compliance with:
  - .1 Canadian Electrical Code.
  - .2 Federal and Provincial Occupational Health and Safety Acts and Regulations as specified in Section 01 35 28 - Health and Safety Requirements.
  - .3 Regulations and code of practice as applicable to mechanical equipment or other machinery being de-energized.
  - .4 Procedures specified herein.
- .2 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.

1.6 SUBMITTALS

- .1 Submit copy of proposed Lockout Procedures and sample form of lockout permit or lockout tags for review.
  - .2 Submit documentation within 7 calendar days of acceptance of bid. Do not proceed with work until submittal has been reviewed by Departmental Representative.
-

- .3 Submit above documents in accordance with the submittal requirements specified in Section 01 33 00- Submittal Procedures.
- .4 Resubmit Lockout Procedures with noted revisions as may result from Departmental Representative's review.

1.7 ISOLATION OF  
EXISTING SERVICES

- .1 Obtain Departmental Representative's written authorization prior to conducting work on an existing active, energized service or facility required as part of the work and before proceeding with lockout of such services or facility.
  - .2 To obtain authorization, submit to Departmental Representative the following documentation:
    - .1 Written Request for Isolation of the service or facility and;
    - .2 Copy of Contractor's Lockout Procedures.
  - .3 Make a Request for Isolation for each event, unless directed otherwise by Departmental Representative, and as follows:
    - .1 Fill-out standard forms in current use at the Facility when so directed by Departmental Representative or;
    - .2 Where no form exist at Facility, make request in writing identifying:
      - .1 Identification of system or equipment to be isolated, including it's location;
      - .2 Time duration, indicating Start time and date, and Completion time and date when isolation will be in effect;
      - .3 Voltage of service feed to system or equipment being isolated;
      - .4 Name of person making the request.
    - .3 Document to be in typewritten format.
  - .4 Do not proceed until receipt of written notification from Departmental Representative granting the Isolation Request and authorizing to proceed with the isolation of designated equipment or facility. Departmental Representative may designate other individual at the Facility as the person authorized to grant the Isolation Request.
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- .5 Conduct safe, orderly shut down of equipment or facilities, de-energize and isolate power and other sources of energy and lockout items in accordance with requirement of clause 1.8 below.
- .6 Plan and schedule shut down of existing services in consultation with the Departmental Representative and the Facility Manager. Minimize impact and downtime of facility operations.
- .7 Determine in advance, as much as possible, in cooperation with the Departmental Representative, the type and frequency of situations which will require a Request for Isolation. Follow Departmental Representative's directives in this regard.
- .8 Conduct hazard assessment as part of the planning process of isolating existing equipment and facilities. Hazard Assessments to conform with requirements of Health and Safety Section 01 35 28- Health and Safety Requirements.

#### 1.8 LOCKOUTS

- .1 Isolate and lockout electrical facilities, mechanical equipment and machinery from all potential energy sources prior to starting work on such items.
  - .2 Develop and implement lockout procedures to be followed on site as an integral part of the Work.
  - .3 Use energy isolation lockout devices specifically designed and appropriate for type of facility or equipment being locked out.
  - .4 Use industry standard lockout tags.
  - .5 Provide appropriate safety grounding and guards as required.
  - .6 Prepare Lockout Procedures in writing. Describe safe work practices, work functions and sequence of activities to be followed on site to safely isolate all potential energy sources and lockout/tagout facilities and equipment.
-

- .7 Include within procedures a system of worker request and issuance of individual lockout permit by a person, employed by Contractor, designated to be "in-charge" and being responsible for:
    - .1 Controlling issuance of permits or tags to workers.
    - .2 Determining permit duration.
    - .3 Maintaining record of permits and tags issued.
    - .4 Submitting a Request for Isolation to Departmental Representative when required in accordance with Clause 1.7 above.
    - .5 Designating a Safety Watcher, when one is required based on type of work.
    - .6 Ensuring equipment or facility has been properly isolated, providing a Guarantee of Isolation to worker(s) prior to proceeding with work.
    - .7 Collecting and safekeeping lockout tags, returned by workers, as a record of the event.
  - .8 Clearly establish, describe and allocate, within procedures, the responsibilities of:
    - .1 Workers.
    - .2 Designated person controlling issuance of lockout tags/permits.
    - .3 Safety Watcher.
    - .4 Subcontractors and General Contractor.
  - .9 Procedures shall meet the requirements of Codes and Regulations specified in clause 1.5 above.
  - .10 Generic procedures, if used, must be edited, supplemented with pertinent information and tailored to reflect specific project conditions. Clearly label as being the procedures applicable to this contract.
    - .1 Incorporate site specific rules and procedures established by Facility Manager and in force at site. Obtain such procedures through Departmental Representative.
  - .11 Procedures to be in typewritten format.
  - .12 Submit copy of Lockout Procedures to Departmental Representative, in accordance with submittal requirements of clause 1.6 herein, prior to commencement of work.
-

1.9 CONFORMANCE

- .1 Ensure that lockout procedures, as established for project on site, are stringently followed. Enforce use and compliance by all workers.
- .2 Brief all persons working on electrical facilities, mechanical and other equipment fed by an energy source on requirements of this section.
- .3 Failure to perform lockouts in accordance with regulatory requirements or follow procedures specified herein may result in the issuance of a Non-Compliance Notification at Departmental Representative's discretion with possible disciplinary measures imposed as specified in Section 01 35 28 - Health and Safety Requirements.

1.10 DOCUMENTS ON  
SITE

- .1 Post Lockout Procedures on site in common location for viewing by workers.
- .2 Keep copies of Request for Isolation submitted to Departmental Representative and lockout permits or tags issued to workers during the course of work for full project duration.
- .3 Upon request, make such data available to Departmental Representative or to authorized safety representative for inspection.

PART 1 - GENERAL

- 1.1 RELATED WORK
- .1 Section 01 35 24 - Special Procedures on Fire Safety Requirements.
  - .2 Section 01 35 25 - Special Procedures on Lockout Requirements.
- 1.2 SUBMITTALS
- .1 Submit to Departmental Representative copies of the following documents, including updates:
    - .1 Site Specific Health and Safety Plan.
    - .2 Building Permit, compliance certificates and other permits obtained.
    - .3 Reports or directions issued by Federal and Provincial Inspectors and other Authorities having jurisdiction.
    - .4 Accident or Incident Reports.
    - .5 MSDS data sheets.
    - .6 Name of Contractor's representative designated to perform full time health and safety supervision on site.
    - .7 Letter of Good Standing/Certificate of Clearance form the provincial Workers Compensation Board.
  - .2 Upon request by Departmental Representative, submit reports and other documentation as stipulated to be produced and maintained by Federal and Provincial Occupational Health and Safety Regulations and as specified herein.
  - .3 Submit above documents in accordance with the submittal procedures specified in Section 01 33 00-Submittal Procedures.
- 1.3 COMPLIANCE REQUIREMENTS
- .1 Comply with the Occupational Health and Safety Act for the Province of Newfoundland and Labrador, and the Occupational Health and Safety Regulations made pursuant to the Act.
  - .2 Comply with Canada Labour Code Part II, and the Canada Occupational Safety and Health Regulations made under Part II of the Canada Labour Code.
-



- .3 Observe and enforce construction safety measures required by:
  - .1 2005 National Building Code of Canada, Part 8.
  - .2 Provincial Worker's Compensation Board.
  - .3 Municipal statutes and ordinances.
- .4 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.
- .5 Maintain Workers Compensation Coverage for duration of Contract. Submit Letter of Good Standing to Departmental Representative at time of submitting the Project Health and Safety Plan and with each Request for Progress Payment.

#### 1.4 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, of property and for protection of persons and public circulating adjacent to work operations to extent that they may be affected by conduct of the Work.
- .2 Enforce compliance by all workers, sub-contractors and other persons granted access to work site with safety requirements of Contract Documents, applicable Federal, Provincial, and local statutes, regulations, and ordinances, and with site specific Health and Safety Plan.

#### 1.5 SITE CONTROL AND ACCESS

- .1 Control work site and entry points to construction areas.
    - .1 Delineate and isolate construction areas from other areas of Facility by use of appropriate means.
    - .2 Post notices and signage at entry points and at other strategic locations identifying entrance onto site to be restricted to authorized persons only.
    - .3 Signage must be professionally made, bilingual in both official languages or display internationally understood graphic symbols.
  - .2 Approve and grant access to site only to workers and authorized persons.
-

- .1 Immediately stop non-authorized persons from circulating in construction areas and remove from site.
- .2 Provide site safety orientation to all persons before granting access. Advise of site conditions, hazards and mandatory safety rules to be observed on site.
- .3 Secure site at night time to extent required to protect against unauthorized entry. Provide security guard where protection cannot be achieved by other means.
- .4 Ensure persons granted access to site wear appropriate personal protective equipment (PPE) suitable to work and site conditions.
  - .1 Provide such PPE to authorized persons who require access to perform inspections or other approved purposes.

1.6 PROTECTION

- .1 Carry out work placing emphasis on health and safety of the Public, Facility personnel, construction workers and protection of the environment.
- .2 Erect safety barricades, lights and signage on site to effectively delineate work areas, protect pedestrian and vehicular traffic around and adjacent to work, and to create a safe working environment.
  - .1 Erect fences, hoarding, protective barriers and temporary lighting as required. See Section 01 56 00- Temporary Barriers and Enclosures for minimum acceptable barricades.
- .3 Should unforeseen or peculiar safety related hazard or condition become evident during performance of work, immediately take measures to rectify the situation and prevent damage or harm. Advise Departmental Representative verbally and in writing.

1.7 PERMITS

- .1 Obtain building permit, licenses, compliance certificates and other permits as specified in Section 01 10 10 - General Instructions before and during progress of work. Post on site.
-

- .2 Where particular permit or compliance certificate cannot be obtained at the required stage of work, notify Departmental Representative in writing and obtain Departmental Representative's approval to proceed prior to carrying out that portion of work.

1.8 HAZARD  
ASSESSMENTS

- .1 Conduct site specific health and safety hazard assessment before commencing project and during course of work identifying risks and hazards resulting from site conditions, weather conditions and work operations.
  - .1 Perform on-going assessments addressing new risks and hazards as work progresses including when new subtrade or sub-contractor arrives on site.
  - .2 Also, conduct assessment when the scope of work has been changed by Change Order and when potential hazard or weakness in current health and safety practices are identified by Departmental Representative or by an authorized safety representative.
- .2 Record results in writing and address in Health and Safety Plan.
- .3 Keep copy of all assessments on site.

1.9 PROJECT/SITE  
CONDITIONS

- .1 The following are known or potential project related health, environmental and safety hazards at site which must be properly managed if encountered during course of work:
  - .1 The following are known or potential project related safety hazards at site:
    - .1 Working in close proximity of water.
    - .2 Use of water crafts and floating platforms.
    - .3 Wet and slippery conditions.
    - .4 Inclement weather.
    - .5 Potential structural weakness of existing structures.
    - .6 Heavy equipment activity in the area.
    - .7 Heavy lifting.
    - .8 Working at heights.
    - .9 Cutting tools and other construction power tools.
    - .10 Overhead power/utility lines.
    - .11 Risk of electric shock.

- .12 Vehicular and pedestrian traffic.
- .13 Confined spaces.

- .2 Above list shall not be construed as being complete and inclusive of potential health, and safety hazards encountered during work. Include above items into hazard assessment process.
- .3 Obtain from Departmental Representative, copy of MSDS Data sheets for existing hazardous products stored on site or used by Facility personnel.

1.10 HEALTH AND  
SAFETY MEETINGS

- .1 Attend pre-construction health and safety meeting conducted by Departmental Representative. Have following persons in attendance:
  - .1 Site Superintendent.
  - .2 Contractor's designated Health and Safety Site Supervisor.
  - .3 Departmental Representative will advise of date, time and location.
- .2 Conduct health and safety meetings and tool box briefings on site. Hold on a regular and pre-scheduled basis during entire work in accordance with requirements and frequency as stipulated in provincial Occupational Health and Safety Regulations.
  - .1 Keep workers informed of potential hazards and provide safe work practices and procedures to be followed.
  - .2 Take written minutes and post on site.

1.11 HEALTH AND  
SAFETY PLAN

- .1 Develop written site specific Project Health and Safety Plan, based on hazard assessments, prior to commencement of work.
    - .1 Submit copy to Departmental Representative within 14 calendar days of acceptance of bid.
    - .2 Submit updates as work progresses.
  - .2 Health and Safety Plan shall contain three (3) parts with the following information:
    - .1 Part 1 - Hazards: List of individual health risks and safety hazards identified by hazard assessment process.
-

.2 Part 2 - Safety Measures: Engineering controls, personal protective equipment and safe work practices used to mitigate hazards and risks listed in Part 1 of Plan.

.3 Part 3a: Emergency Response: standard operating procedures, evacuation measures and emergency response in the occurrence of an accident, incident or emergency.

.1 Include response to all hazards listed in Part 1 of Plan.

.2 Evacuation measures to complement the Facility's existing Emergency Response and Evacuation Plan. Obtain pertinent information from Departmental Representative.

.3 List names and telephone numbers of officials to contact including:

.1 General Contractor and all Subcontractors.

.2 Federal and Provincial Departments as stipulated by laws and regulations of authorities having jurisdiction and local emergency resource organizations, as needed base on nature of emergency.

.3 Officials from site Facility Management. Departmental Representative will provide list.

.4 Part 3b - Site Communications:

.1 Procedures used on site to share work related safety issues between workers, subcontractors, and General Contractor.

.2 List of critical tasks and work activities, to be communicated with the Facility Manager, which has risk of affecting tenant operations, or endangering health and safety of Facility personnel and the general public. Develop list in consultation with the Departmental Representative.

.3 Prepare Health and Safety Plan in a three column format, addressing the three parts specified above, as follows:

Column 1	Column 2	Column 3
Part 1	Part 2	Part 3a/3b
Identified Hazards	Safety Measures	Emergency Response & Site Communications

.4 Develop Plan in collaboration with subcontractors. Address work activities of all trades. Revise and update Plan as subcontractors arrive on site.

- .5 Implement and enforce compliance with requirements of Plan for full duration of work to final completion and demobilization from site.
- .6 As work progresses, review and update Plan. Address additional health risks and safety hazards identified by on-going hazard assessments.
- .7 Post copy of Plan and updates, on site.
- .8 Submission of the Health and Safety Plan and updates, to the Departmental Representative, is for review and information purposes only. Departmental Representative's receipt, review and any comments made of the Plan shall not be construed to imply approval in part, or in hold, of such Plan by Departmental Representative, and shall not be interpreted as a warranty of being complete and accurate, or as a confirmation that all health and safety requirements of the Work, have been addressed, and that it is legislative compliant. Furthermore, Departmental Representative's review of the Plan shall not relieve the Contractor of any of his legal obligations for Occupational Health and Safety provisions specified as part of the Work and those required by provincial legislation or those which would otherwise be applicable to the site of the work.

1.12 SAFETY  
SUPERVISION AND  
INSPECTIONS

- .1 Designate one person to be present on site at all times, responsible for supervising health and safety of the Work.
  - .1 Person to be competent in Occupational Health and Construction Safety as defined in the Provincial Occupational Health and Safety Act.
- .2 Assign responsibility, obligation and authority to such designated person to stop work as deemed necessary for reasons of health and safety.
- .3 Conduct regularly scheduled informal safety inspections of work site on a minimum bi-weekly basis.
  - .1 Note deficiencies and remedial action taken in a log book or diary.

- .4 Conduct Formal Inspections on a minimum monthly basis.
  - .1 Use standardized safety checklist forms.
  - .2 Prepare written report of each inspection. Document deficiencies, remedial action needed and assign responsibility for rectification to appropriate subcontractor or worker.
  - .3 Distribute monthly reports to subcontractors for their pursuance.
  - .4 Follow-up and ensure appropriate action and corrective measures are taken.
- .5 Cooperate with Facility's Health and Safety Site Coordinator responsible for the entire site, should one be designated by Departmental Representative.
- .6 Keep inspection reports on site.

1.13 TRAINING

- .1 Ensure that all workers and other persons granted access to site are competently trained and knowledgeable on:
  - .1 Safe use of tools and equipment.
  - .2 How to wear and use personal protective equipment (PPE).
  - .3 Safe work practices and procedures to be followed in carrying out work.
  - .4 Site conditions and minimum safety rules to be observed on site, as given at site orientation session.
- .2 Maintain evidence and records of worker training.

1.14 MINIMUM SITE  
SAFETY RULES

- .1 Notwithstanding the requirement to abide by federal and provincial health and safety regulations, the following safety rules shall be considered minimum requirements to be obeyed by all persons granted site access:
    - .1 Wear personnel protective equipment (PPE) appropriate to function and task on site; the minimum requirements being hard hat, safety footwear and eye protection.
    - .2 Immediately report unsafe activity or condition at site, near-miss accident, injury and damage.
    - .3 Maintain site in tidy condition.
    - .4 Obey warning signs and safety tags.
-

- .2 Brief workers on site safety rules and on disciplinary measures to be taken by Departmental Representative for violation or non-compliance of such rules. Post rules on site.
- .3 The following actions or conduct by Contractor, workers and sub-contractors will be considered as non conformance with the health and safety requirements of the contract for which a Non-compliance Notification will be issued to the General Contractor by the Departmental Representative:
  - .1 Failure to follow the minimum site safety rules specified above.
  - .2 Negligence resulting in serious injury or major property damage.
  - .3 Deliberate non-compliance with Federal and Provincial Acts and Regulations.
  - .4 Falsification of information in Workers Compensation Reports, safety reports and other health and safety related documents submitted to Departmental Representative or to Authority having jurisdiction.
  - .5 Possession of firearms on site.
  - .6 Possession of non-prescriptive illegal drugs or alcohol.
  - .7 Action, or lack thereof, resulting in the issuance of Warnings, Fines or Stop Work Orders from a Provincial Authority having jurisdiction.
  - .8 Violation of other specified health and safety rules and requirements as determined by Departmental Representative.
- .4 See elsewhere in this section for details on Non-Compliance Notifications and resulting disciplinary measures.

1.15 ACCIDENT  
REPORTING

- .1 Investigate and report the following incidents and accidents:
  - .1 Those as required by Provincial Occupational Safety and Health Act and Regulations.
  - .2 Injury requiring medical aid as defined in the Canadian Dictionary of Safety Terms-1987, published by the Canadian Society of Safety Engineers (C.S.S.E) as follows:



.1 Medical Aid Injury: any minor injury for which medical treatment was provided and the cost of which is covered by Workers' Compensation Board of the province in which the injury was incurred.

.3 Property damage in excess of \$5000.00.

.4 Interruption to Facility operations with potential loss to a Federal Department in excess of \$5000.00.

.5 Those which require notification to Workers Compensation Board or other regulatory agencies as stipulated by applicable law or regulations.

.2 Send written report to Departmental Representative for all above cases.

1.16 TOOLS AND  
EQUIPMENT SAFETY

.1 Routinely check and maintain tools, equipment and machinery for safe operation.

.2 Conduct checks as part of site safety inspections. When requested, submit proof that checks and maintenance have been carried out.

.3 Tag and immediately remove from site items found faulty or defective.

1.17 HAZARDOUS  
PRODUCTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS).

.2 Keep MSDS data sheets for all products delivered to site. Post on site. Submit copy to Departmental Representative upon receipt.

.3 On building renovation projects where work is within or immediately adjacent to occupied areas, also post copy of data sheets in a public location accessible to Facility personnel.

1.18 BLASTING

.1 Do blasting operations in accordance with local and provincial codes.

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1.19 POWDER  
ACTUATED DEVICES

- .1 Use powder actuated fastening devices only after receipt of written permission from Departmental Representative.

1.20 CONFINED  
SPACES

- .1 Carry out work in confined spaces in compliance with:
  - .1 Provincial Occupational Safety and Health Regulations; and
  - .2 Canada Occupational Safety and Health Regulations (COSH) made under the Canada Labour Code - Part II.
- .2 Conduct hazard assessment and address in Safety Plan before entering confined space.
- .3 Provide and maintain equipment and PPE as required for the safety and emergency evacuation of persons entering confined spaces.
- .4 Provide training to persons who will be entering and to those persons who will be assisting in the confined space entry process. Training to be specialized instructions beyond (basic confined space entry information) as required to suit type and conditions of confined space.

1.21 POSTING OF  
DOCUMENTS

- .1 Post on site safety documentation as stipulated by Authorities having jurisdiction and as specified herein. Place in a common visible location.

1.22 SITE RECORDS

- .1 Maintain on site a copy of all health and safety documentation and reports specified to be produced as part of the work and received from authorities having jurisdiction.
  - .2 Upon request, make available to Departmental Representative, or authorized safety representative, for review. Provide copy when directed by Departmental Representative.
-

1.23 NON-COMPLIANCE  
AND DISCIPLINARY  
MEASURES

- .1 Immediately address and correct health and safety violations and non-compliance issues.
  - .2 Negligence or failure to follow occupational health and safety provisions specified in the Contract Documents and of those of applicable laws and regulations could result in disciplinary measures taken by the Departmental Representative against the General Contractor.
  - .3 PWGSC/DFO uses a system of Non-Compliance Notifications and Disciplinary Measures on projects as follows:
    - .1 A non-compliance notification is issued to the General Contractor, by the Departmental Representative, whenever there is a violation or non-compliance of the project's health and safety requirements and of those of Provincial and Federal regulations by any worker, subcontractor or other person to whom the Contractor has granted access to the work site.
    - .2 Non-compliance notifications are progressive in nature resulting in disciplinary measures imposed depending on the frequency, nature and severity of the infraction.
    - .3 Disciplinary measures could include:
      - .1 Removal of the offending person or party from site;
      - .2 Financial penalties in the form of progress payment reduction or holdback assessments made against the Contract and;
      - .3 Taking the Work Out of Contractor's Hands in accordance with the General Conditions.
  - .4 Departmental Representative will make final decision as to what constitutes a violation and when to issue a Non-compliance Notification.
  - .5 Non-compliance Notifications issued by Departmental Representative shall not be construed as to overrule or disregard warnings, orders and fines levied against Contractor by a regulatory agency having jurisdiction.
  - .6 Details of the Non-compliance Notification and Disciplinary Measures system will be provided by Departmental Representative upon acceptance of bid and prior to commencement of work.
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- .7 Be responsible to fully brief workers and subcontractors on the operation and importance of this system.

1.24 DIVING  
OPERATIONS

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- .1 All diving work to comply fully with the requirements of CSA Z275.2-11, "Occupational Safety Code for Diving Operations", CSA Z275.4-12, "Competency Standards for Diving, Hyperberic Chamber and Remotely Operated Vehicle Operations" and CSA Z180.1-13, "Compressed Breathing Air and Systems."
- .2 Dive personnel must meet the minimum competency requirements of the CSA Z275.4-12 and all divers must possess a valid Category 1 Diving Certificate or an Unrestricted Surface-supplied Certificate.
- .3 Diving in free-swim mode is not permitted at the work site.
- .4 Divers must have a current (less than one year) validated medical examination certificate(s) from a licensed Diving Physician in Newfoundland and Labrador who is knowledgeable and competent in diving and hyperbaric medicine, for all dives.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS .1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- 1.2 DEFINITIONS .1 Hazardous Material: Product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to the environment or adversely affect health of persons, animals, or plant life when released into the environment.
- 1.3 FIRES .1 Fires and burning of rubbish on site are not permitted.
- 1.4 DISPOSAL OF WASTES AND HAZARDOUS MATERIALS .1 Do not bury rubbish and waste materials on site. Dispose at approved landfill sites as specified in Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Do not dispose of hazardous waste or volatile materials, such as mineral spirits, paints, thinners, oil or fuel into waterways, storm or sanitary sewers or waste landfill sites.
- .3 Store, handle and dispose of hazardous materials and hazardous waste in accordance with applicable federal and provincial laws, regulations, codes and guidelines.
- .4 Dispose of construction waste materials and demolition debris, resulting from work, at approved landfill sites only. Carryout such disposal in strict accordance with provincial and municipal rules and regulations. Separate out and prevent improper disposal of items banned from landfills.
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- .5 Establish methods and undertake construction practices which will minimize waste and optimize use of construction materials. Separate at source all construction waste materials, demolition debris and product packaging and delivery containers into various waste categories in order to maximize recycling abilities of various materials and avoid disposal of debris at landfill site(s) in a "mixed state". Where recycling firms, specializing in recycling of specific materials exist, transport such materials to the recycling facility and avoid disposal at landfill sites.
- .6 Communicate with landfill operator prior to commencement of work, to determine what specific construction, demolition and renovation waste materials have been banned from disposal at the landfill and at transfer stations.

#### 1.5 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 governing regulations and requirements.
  - .4 Pumped water must meet applicable federal, provincial, and municipal standards before it can be discharged to a surface water body. If regulatory guidelines exceedences are noted, the Departmental Representative has the right to issue stop pumping instructions to the Contractor. Contractor will not be compensated for any delays associated with retrofitting equipment to meet guidelines.
  - .5 Provide control devices such as filter fabrics, sediment traps and settling ponds to control drainage and prevent erosion of adjacent land. Maintain in good order for duration of work.
-

1.6 PERMIT .1 All guidelines and instructions stated on permits must be strictly adhered to.

1.7 WORK ADJACENT TO WATERWAYS .1 Do not operate construction equipment in waterways.

.2 Do not use waterway beds for borrow material.

.3 Do not dump excavated fill, waste material or debris in waterways.

.4 At borrow sites, design and construct temporary crossings to minimize erosion to waterways in strict conformance with provincial and federal environmental regulations.

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

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

.7 Do not blast under water or within 100 m of spawning beds.

.8 Do not refuel any type of equipment within 100 m of a water body. Maintain equipment in good working condition with no fluid leaks, loose hoses or fittings.

1.8 POLLUTION CONTROL .1 Maintain temporary erosion and pollution control features installed under this contract.

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

.3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.

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

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- .5 Maintain inventory of hazardous materials and hazardous waste stored on site. List items by product name, quantity and date when storage began.
- .6 Have emergency spill response equipment and rapid clean-up kit, appropriate to work, at site. Locate adjacent to work and where hazardous materials are stored. Provide personal protective equipment as required for clean-up.
- .7 Report, to Federal and Provincial Department of the Environment, spills of petroleum and other hazardous materials as well as accidents having potential of polluting the environment. Also notify Departmental Representative and submit a written spill report to Departmental Representative within 24 hours of occurrence.
- .8 Provide a floating debris containment boom whenever any of the Contractors methods of work allow for the potential of floating debris.

1.9 WILDLIFE  
PROTECTION

- .1 Should nests of migratory birds in wetlands be encountered during work, immediately notify Departmental Representative for directives to be followed.
  - .1 Do not disturb nest site and neighbouring vegetataion until nesting is completed.
  - .2 Minimize work immediately adjacent to such areas until nesting is completed.
  - .3 Protect these areas by following recommendations of Canadian Wildlife Service.



PART 1 - GENERAL

1.1 SECTION  
INCLUDES

- .1 Inspection and testing, administrative and enforcement requirements.
- .2 Tests and mix designs.
- .3 Mock-ups.
- .4 Mill tests.
- .5 Equipment and system adjust and balance.

1.2 RELATED  
SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 78 00 - Closeout Submittals.

1.3 INSPECTION

- .1 Facilitate Departmental Representative's access to Work. If part of Work is being fabricated at locations other than construction site, make preparations to allow access to such Work whenever it is in progress.
  - .2 Give timely notice requesting inspection of Work designated for special tests, inspections or approvals by Departmental Representative or by inspection authorities having jurisdiction.
  - .3 If Contractor covers or permits to be covered Work designated for special tests, inspections or approvals before such is made, uncover Work until particular inspections or tests have been fully and satisfactorily completed and until such time as Departmental Representative gives permission to proceed. Pay costs to uncover and make good such Work.
  - .4 In accordance with the General Conditions, Departmental Representative may order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents.
-

1.4 INDEPENDENT  
INSPECTION AGENCIES

- .1 Departmental Representative will engage and pay for service of Independent Inspection and Testing Agencies for purpose of inspecting and testing portions of Work except for the following which remain part of Contractor's responsibilities:
  - .1 Inspection and testing required by laws, ordinances, rules, regulations, or orders of public authorities.
  - .2 Inspection and testing performed exclusively for Contractor's convenience.
  - .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
  - .4 Mill tests and certificates of compliance.
  - .5 Tests as specified within various sections designated to be carried out by Contractor under the supervision of Departmental Representative.
  - .6 Additional tests specified in Clause 1.4.2.
- .2 Where tests or inspections by designated Testing Agency reveal work not in accordance with contract requirements, Contractor shall pay costs for additional tests or inspections as Departmental Representative may require to verify acceptability of corrected work.
- .3 Employment of inspection and testing agencies by Departmental Representative does not relax responsibility to perform Work in accordance with Contract Documents.

1.5 ACCESS TO WORK

- .1 Furnish labour and facility to provide access to the work being inspected and tested.
- .2 Co-operate to facilitate such inspections and tests.
- .3 Make good work disturbed by inspections and tests.

1.6 PROCEDURES

- .1 Notify Departmental Representative sufficiently in advance of when work is ready for tests, in order for Departmental Representative to make attendance arrangements with Testing Agency. When directed by Departmental Representative, notify such Agency directly.

- .2 Submit representative samples of materials specified to be tested. Deliver in required quantities to Testing Agency. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.
- .3 Provide labour and facilities to obtain and handle samples on site. Provide sufficient space on site for Testing Agency's exclusive use to store equipment and cure test samples.

1.7 REJECTED WORK

- .1 Remove and replace defective Work, whether result of poor workmanship, use of defective or damaged products and whether incorporated in Work or not, which has been identified by Departmental Representative as failing to conform to Contract Documents.
- .2 Make good damages to existing or new work, including work of other Contracts, resulting from removal or replacement of defective work.

1.8 TESTING BY CONTRACTOR

- .1 Provide all necessary instruments, equipment and qualified personnel to perform tests designated as Contractor's responsibilities herein or elsewhere in the Contract Documents.
- .2 At completion of test, turn over 2 copies of fully documented test reports to Departmental Representative. Additionally, obtain other copies in sufficient quantities to enable one complete set of test reports to be placed in each of the maintenance manuals specified in Section 01 78 00 - Closeout Submittals.
- .3 Submit mill test certificates and other certificates as specified in various sections.
- .4 Furnish test results and mix designs as specified in various sections.

- 1.9 MOCK-UPS
- .1 Prepare mock-ups for Work specifically requested in various trade sections. Include in each mock-up all related work components representative of final assembly.
  - .2 Construct in locations acceptable to Departmental Representative.
  - .3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in orderly sequence, so as not not to cause any delay in Work.
  - .4 Failure to prepare mock-ups 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.
  - .5 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.
  - .6 Remove mock-up at conclusion of Work or when acceptable to Departmental Representative unless approval is given to remain as part of Work.

PART 1 - GENERAL

1.1 ACCESS

- .1 Provide and maintain adequate access to project site.
- .2 Maintain access roads for duration of contract and make good damage resulting from Contractors' use of roads.

1.2 CONTRACTOR'S  
SITE OFFICE

- .1 Be responsible for and provide own site office, if required, including electricity, heat, lights and telephone. Locate site office as directed by Departmental Representative.

1.3 DEPARTMENTAL  
REPRESENTATIVE'S  
SITE OFFICE

- .1 Provide or construct a separate site office for the use of the Departmental Representative and the Site Representative. The building must be in place prior to commencement of work.
- .2 Provide heating system to maintain 22°C inside temperature at -20°C outside temperature.
- .3 The building will be approximately 2400 mm x 3600 mm. It will have a suitable frame covered with a weatherproof siding and lined with plywood or other approved material. The floor will be of 19 mm thick material. It will be provided with suitable window with at least 1 m<sup>2</sup> of glass and arranged to provide at least 0.5 m<sup>2</sup> of screened opening. The door will be fitted with a lockset and 2 keys.
- .4 The office will be equipped with a drafting chair and a 900 mm x 1500 mm table having a hinged, smooth wooden top suitable for drafting.
- .5 Install electrical lighting system to provide minimum 750 lux using surface mounted, shielded commercial fixtures with 10% upward light component.
- .6 Maintain office in clean condition.

- .7 Arrange and pay for telephone and facsimile machine in the Departmental Representative's Office for Site Representative's exclusive use. Long distance calls or faxes placed on this phone by the Departmental Representative or the Site Representative will be paid by the Departmental Representative.
- .8 Contractor may, on approval of Departmental Representative, provide cellular or mobile phone. If approval to use cellular or mobile phone is granted, be responsible for all services, airtime, license and network access fees, and all other fees or charges required to utilize the phone as intended by the manufacturer.

1.4 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.5 POWER

- .1 Arrange, pay for and maintain temporary electrical power supply in accordance with governing regulations and ordinances.
- .2 Supply and install all temporary facilities for power such as pole lines and underground cables to approval of local power supply authority.

1.6 WATER SUPPLY

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

1.7 SCAFFOLDING

- .1 Design, construct and maintain scaffolding in rigid, secure and safe manner in accordance with Z797-09 (R2014).
  - .2 Erect scaffolding independent of walls. Remove when no longer required.
-

1.8 CONSTRUCTION  
SIGN AND NOTICES

- .1 Contractor or subcontractor advertisement signboards are not permitted on site.
- .2 Only notices of safety or instructions are permitted on site.
- .3 Safety and Instruction Signs and Notices:
  - .1 Signs and notices for safety and instruction shall be in both official languages. Graphic symbols shall conform to CAN/CSA-Z321-96 (R2006).
- .4 Maintenance and Disposal of Site Signs:
  - .1 Maintain approved signs and notices in good condition for duration of project and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.9 REMOVAL OF  
TEMPORARY  
FACILITIES

- .1 Remove temporary facilities from site when directed by Departmental Representative.

PART 1 - GENERAL

1.1 SECTION  
INCLUDES

- .1 Barriers.
- .2 Traffic Controls.

1.2 INSTALLATION  
AND REMOVAL

- .1 Provide temporary controls in order to execute Work expeditiously.
- .2 Remove from site all such work after use.

1.3 HOARDING

- .1 Erect temporary site enclosures using 1.8 m high x 2.4 m long welded wire galvanized mesh panel with end post of 32 mm dia. galvanized tubes. Each panel shall have a "hook" end of clamp system to engage the top of the adjoining panel post. Panel support base plate of 12 ga. galvanized steel plate with double "stems" to engage and support tube frame ends.
- .2 Provide (2) swing frame gates using galvanized steel tube 50 mm and vertical and horizontal bars rigid frame wire mesh to match fence panels. Provide hinge to structurally support all gates without deformation gravity system that is self-latching. Provide one drop bar to secure in closed position and padlock for night security. Keys to be supplied to Departmental Representative.
- .3 Secure fencing at established boundary lines inside property lines as shown on drawings and/or determined by Departmental Representative. Second base plates to ground with 15 mm x 250 mm long (2 pen plate) lag screws placed into existing asphalt. After removal, fill holes with cold patch.

1.4 GUARD RAILS AND  
BARRICADES

- .1 Provide secure, rigid guard rails and barricades around open excavations.
  - .2 Provide barricades along wharf structure when wheelguard is not in place.
-



.3 Provide as required by governing authorities.

1.5 ACCESS TO SITE .1 Provide and maintain access to adjacent harbour facilities.

1.6 PUBLIC TRAFFIC FLOW .1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect the public.

1.7 FIRE ROUTES .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.8 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY .1 Protect surrounding private and public property from damage during performance of Work.  
.2 Be responsible for damage incurred.

PART 1 - GENERAL

1.1 DESCRIPTION

- .1 This section specifies requirements for board, lodgings and related services to be provided by the Contractor for the Inspector.
- .2 It is a requirement of this contract that the Contractor provide and pay for all board and lodgings for the Inspector's sole use for the duration of the project. Provide for and maintain acceptable living accommodations on site for the Inspector's sole use. The minimum requirement would be a self-contained unit with private sleeping accommodation and shower or bath or other arrangement approved by the Inspector.

1.2 BOARD AND LODGINGS

- .1 For the purpose of this contract board and lodgings shall include but not necessarily be limited to: sleeping accommodation, meals and dining facilities, washroom facilities, laundry facilities, electrical and heating service, linens and bedding, etc. and any reasonable service as directed by the Inspector.
- .2 Board and lodgings must be approved by the Inspector and Contractor will cooperate in providing all services required to maintain an acceptable standard of living during construction period.
- .3 The Contractor shall include all calendar days, including weekends and statutory holidays in determining the cost.

1.3 REQUIREMENTS OF REGULATORY AGENCIES

- .1 Comply with any or all applicable Agencies regulation of the Province of Newfoundland and Labrador, relating to the set up, servicing and maintenance of accommodations for the Inspector.
- .2 Obtain and pay for any permits which may be required and comply to regulations of same.

PART 1 - GENERAL

1.1 GENERAL

- .1 Use new material and equipment unless otherwise specified.
- .2 Within 7 days of written request by Departmental Representative, submit following information for any materials and products proposed for supply:
  - .1 name and address of manufacturer;
  - .2 trade name, model and catalogue number;
  - .3 performance, descriptive and test data;
  - .4 manufacturer's installation or application instructions;
  - .5 evidence of arrangements to procure;
  - .6 evidence of manufacturer delivery problems or unforeseen delays.
- .3 Provide material and equipment of specified design and quality, performing to published ratings and for which replacement parts are readily available.
- .4 Use products of one manufacturer for equipment or material of same type or classifications unless otherwise specified.
- .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.2 PRODUCT QUALITY  
AND REFERENCED  
STANDARDS

- .1 Contractor shall be solely responsible for submitting relevant technical data and independent test reports to confirm whether a product or system proposed for use meets contract requirements and specified standards.
  - .2 Final decision as to whether a product or system meets contract requirements rest solely with the Departmental Representative in accordance with the General Conditions.
-

1.3 ACCEPTABLE  
MATERIALS AND  
ALTERNATIVES

- .1 Acceptable Materials: When materials specified include trade names or trade marks or manufacturer's or supplier's name as part of the material description, select and only use one of the names listed for incorporation into the Work.
- .2 Alternative Materials: Submission of alternative materials to trade names or manufacturer's names specified must be done during the bidding period following procedures indicated in the Instructions to Bidders.
- .3 Substitutions: After acceptance of bid, substitution of a specified material will be dealt with as a change to the Work in accordance with the General Conditions of the Contract.

1.4 MANUFACTURERS  
INSTRUCTIONS

- .1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods to be used. Do not rely on labels or enclosure provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing of any conflict between these specifications and manufacturers instructions, so that Departmental Representative will designate which document is to be followed.

1.5 AVAILABILITY

- .1 Immediately notify Departmental Representative in writing of unforeseen or unanticipated material delivery problems by manufacturer. Provide support documentation as per Clause 1.1.2 above.

1.6 WORKMANSHIP

- .1 Ensure quality of work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed.
- .2 Remove unsuitable or incompetent workers from site as stipulated in General Conditions.

- .3 Ensure cooperation of workers in laying out work. Maintain efficient and continuous supervision on site at all times.
- .4 Coordinate work between trades and subcontractors.
- .5 Coordinate placement of openings, sleeves and accessories.

1.7 FASTENINGS -  
GENERAL

- .1 Provide metal fastenings and accessories in same texture, colour and finish as base metal in which they occur. Prevent electrolytic action between dissimilar metals. Use non-corrosive fasteners, anchors and spacers for securing exterior work and in humid areas.
- .2 Space anchors within limits of load bearing or shear capacity and ensure that they provide positive permanent anchorage. Wood or organic material plugs not acceptable.
- .3 Keep exposed fastenings to minimum, space evenly and lay out neatly.
- .4 Fastenings which cause spalling or cracking of material to which anchorage is made, are not acceptable.
- .5 Do not use explosive actuated fastening devices unless approved by Departmental Representative. See Section 01 35 28 - Health and Safety Requirements in this regard.

1.8 FASTENINGS -  
EQUIPMENT

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
  - .2 Use heavy hexagon heads, semi-finished unless otherwise specified.
  - .3 Bolts may not project more than one diameter beyond nuts.
  - .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.
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1.9 STORAGE,  
HANDLING AND  
PROTECTION

- .1 Deliver, handle and store materials in manner to prevent deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled materials in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work. Provide additional cover where manufacturer's packaging is insufficient to provide adequate protection.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear or earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Immediately remove damaged or rejected materials from site.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

PART 1 - GENERAL

- 1.1 GENERAL
- .1 Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
  - .2 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
  - .3 Prevent accumulation of wastes which create hazardous conditions.
  - .4 Provide adequate ventilation during use of volatile or noxious substances.
- 1.2 MATERIALS
- .1 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- 1.3 CLEANING DURING CONSTRUCTION
- .1 Maintain project grounds and public properties in a tidy condition, free from accumulations of waste material and debris. Clean areas on a daily basis.
  - .2 Provide on-site garbage containers for collection of waste materials and debris.
  - .3 Remove waste materials and debris from site on a daily basis.
- 1.4 FINAL CLEANING
- .1 In preparation for acceptance of the Work perform final cleaning.
  - .2 Inspect finishes, fitments and equipment. Ensure specified workmanship and operation.
  - .3 Broom clean exterior paved and concrete surfaces; rake clean other surfaces of grounds.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 35 43 - Environmental Procedures.
  - .2 Section 02 41 16 - Sitework, Demolition and Removal.
- 1.2 WASTE MANAGEMENT PLAN
- .1 Prior to commencement of work, prepare waste Management Workplan.
  - .2 Workplan to include:
    - .1 Waste audit.
    - .2 Waste reduction practices.
    - .3 Material source separation process.
    - .4 Procedures for sending recyclables to recycling facilities.
    - .5 Procedures for sending non-salvageable items and waste to approved waste processing facility or landfill site.
    - .6 Training and supervising workforce on waste management at site.
  - .3 Workplan to incorporate waste management requirements specified herein and in other sections of the Specifications.
  - .4 Develop Workplan in collaboration with all subcontractors to ensure all waste management issues and opportunities are addressed.
- 1.3 WASTE AUDIT
- .1 At project start-up, conduct waste audit of:
    - .1 Site conditions identifying salvageable and non-salvageable items and waste resulting from demolition and removal work.
    - .2 Projected waste resulting from product packaging and from material leftover after installation work.
  - .2 Develop written list. Record type, composition and quantity of various salvageable items and waste anticipated, reasons for waste generation and operational factors which contribute to waste.
-



1.4 WASTE REDUCTION

- .1 Based on waste audit, develop waste reduction program.
- .2 Structure program to prioritize actions, with waste reduction as first priority, followed by salvage and recycling effort, then disposal as solid waste.
- .3 Identify materials and equipment to be:
  - .1 Protected and turned over to Departmental Representative when indicated.
  - .2 Salvaged for resale by Contractor.
  - .3 Sent to recycling facility.
  - .4 Sent to waste processing/landfill site for their recycling effort.
  - .5 Disposed of in approved landfill site.
- .4 Reduce construction waste during installation work. Undertake practices which will minimize waste and optimize full use of new materials on site, such as:
  - .1 Use of a central cutting area to allow for easy access to off-cuts;
  - .2 Use of off-cuts for blocking and bridging elsewhere.
  - .3 Use of effective and strategically placed facilities on site for storage and staging of left-over or partially cut materials to allow for easy incorporation into work whenever possible avoiding unnecessary waste.
- .5 Develop other strategies and innovative procedures to reduce waste such as minimizing the extent of packaging used for delivery of materials to site, etc.

1.5 MATERIALS  
SOURCE SEPARATION  
PROCESS

- .1 Develop and implement material source separation process at commencement of work as part of mobilization and waste management at site.
  - .2 Provide on-site facilities to collect, handle, and store anticipated quantities of reusable, salvageable and recyclable materials.
    - .1 Use suitable containers for individual collection of items based on intended purpose.
    - .2 Locate to facilitate deposit but without hindering daily operations of existing building tenants.
    - .3 Clearly mark containers and stockpiles as to purpose and use.
-

- .3 Perform demolition and removal of existing components and equipment following a systematic deconstruction process.
  - .1 Separate materials and equipment at source, carefully dismantling, labelling and stockpiling alike items for the following purposes:
    - .1 Reinstallation into the work where indicated.
    - .2 Salvaging reusable items not needed in project which Contractor may sell to other parties. Sale of such items not permitted on site.
    - .3 Sending as many items as possible to locally available recycling facility.
    - .4 Segregating remaining waste and debris into various individual waste categories for disposal in a "non-mixed state" as recommended by waste processing/landfill sites.
- .4 Isolate product packaging and delivery containers from general waste stream. Send to recycling facility or return to supplier/manufacturer.
- .5 Send leftover material resulting from installation work for recycling whenever possible.
- .6 Establish methods whereby hazardous and toxic waste materials, and their containers, encountered or used in the course work are properly isolated, stored on site and disposed in accordance with applicable laws and regulations from authorities having jurisdiction.
- .7 Isolate and store existing materials and equipment identified for re-incorporation into the Work. Protect against damage.

1.6 WORKER  
TRAINING AND  
SUPERVISION

- .1 Provide adequate training to workforce, through meetings and demonstrations, to emphasize purpose and worker responsibilities in carrying out the Waste Management Plan.
- .2 Waste Management Coordinator: designate full-time person on site, experienced in waste management and having knowledge of the purpose and content of Waste Management Plan to:

.1 Oversee and supervise waste management during work.

.2 Provide instructions and directions to all workers and subcontractors on waste reduction, source separation and disposal practices.

.3 Post a copy of Plan in a prominent location on site for review by workers.

1.7 CERTIFICATION  
OF MATERIAL  
DIVERSION

.1 Submit to Departmental Representative, copies of certified weigh bills from authorized waste processing sites and sale receipts from recycling/reuse facilities confirming receipt of building materials and quantity of waste diverted from landfill.

.2 Submit data at pre-determined project milestones as determined by Departmental Representative.

.3 Compare actual quantities diverted from landfill with projections made during waste audit.

1.8 DISPOSAL  
REQUIREMENTS

.1 Burying or burning of rubbish and waste materials is prohibited.

.2 Disposal of waste, volatile materials, mineral spirits, oil, paint, paint thinner or unused preservative material into waterways, storm, or sanitary sewers is prohibited.

.3 Do not dispose of preservative treated wood through incineration.

.4 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.

.5 Dispose of treated wood, end pieces, wood scraps and sawdust at a sanitary landfill.

.6 Dispose of waste only at approved waste processing facility or landfill sites approved by authority having jurisdiction.

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- .7 Contact the authority having jurisdiction prior to commencement of work, to determine what, if any, demolition and construction waste materials have been banned from disposal in landfills and at transfer stations. Take appropriate action to isolate such banned materials at site of work and dispose in strict accordance with provincial and municipal regulations.
- .8 Transport waste intended for landfill in separated condition, following rules and recommendations of Landfill Operator in support of their effort to divert, recycle and reduce amount of solid waste placed in landfill.
- .9 Collect, bundle and transport salvaged materials to be recycled in separated categories and condition as directed by recycling facility. Ship materials only to approved recycling facilities.
- .10 Sale of salvaged items by Contractor to other parties not permitted on site.

PART 1 - GENERAL

1.1 SECTION  
INCLUDES

- .1 Project Record Documents as follows:
  - .1 As-built drawings;
  - .2 As-built specifications;
  - .3 Reviewed shop drawings.

1.2 PROJECT RECORD  
DOCUMENTS

- .1 Departmental Representative will provide two white print sets of contract drawings and two copies of Specifications Manual specifically for "as-built" purposes.
- .2 Maintain at site one set of the contract drawings and specifications to record actual as-built site conditions.
- .3 Maintain up-to-date, real time as-built drawings and specifications in good condition and make available for inspection by the Departmental Representative at any time during construction.
- .4 As-Built Drawings:
  - .1 Record changes in red ink on the prints. Mark only on one set of prints and at completion of project and prior to final inspection, neatly transfer notations to second set (also by use of red ink). Submit both sets to Departmental Representative. All drawings of both sets shall be stamped "As-Built Drawings" and be signed and dated by Contractor.
  - .2 Show all modifications, substitutions and deviations from what is shown on the contract drawings or in specifications.
  - .3 Record following information:
    - .1 Horizontal and vertical location of various elements in relation to CHS Chart Datum.
    - .2 Field changes of dimension and detail.
    - .3 All design elevations, sections, and details dimensioned and marked-up to consistently report finished installation conditions.

.4 Any details produced in the course of the contract by the Departmental Representative to supplement or to change existing design drawings must also be marked-up and dimensioned to reflect final as-built conditions and appended to the as-built drawing document.

.5 All change orders issued over the course of the contract must be documented on the finished as-built documents, accurately and consistently depicting the changed condition as it applies to all affected drawing details.

- .5 As-built Specifications: legibly mark in red each item to record actual construction, including:
  - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly items substituted from that specified.
  - .2 Changes made by Addenda and Change Orders.
  - .3 Mark up both copies of specifications; stamp "as-built", sign and date similarly to drawings as per above clause.
- .6 Maintain As-built documents current as the contract progresses. Departmental Representative will conduct reviews and inspections of the documents on a regular basis. Frequency of reviews will be subject to Departmental Representative's discretion. Failure to maintain as-builts current and complete to satisfaction of the Departmental Representative shall be subject to financial penalties in the form of progress payment reductions and holdback assessments.
- .7 Record information concurrently with construction progress.
  - .1 Do not conceal Work until required information is recorded.
- .8 Provide digital photos, if requested, for site records.

1.3 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system and component specifications.

- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communication.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
  - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
  - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .9 Provide installed control diagrams by controls manufacturer.
- .10 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .11 Additional requirements: as specified in individual specification sections.

1.4 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.

- .3 Submit Warranty information made available during construction phase to Departmental Representative for approval prior to each monthly pay estimate.
- .4 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
  - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
  - .2 List subcontractor, supplier and manufacturer with name, address, and telephone number of responsible principal.
  - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
  - .4 Retain warranties and bonds until time specified for submittal.
- .5 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .6 Respond in a timely manner to oral or written notification of required construction warranty repair work.

1.5 REVIEWED SHOP  
DRAWINGS

- .1 Compile 2 full sets of all reviewed shop drawings.



PART 1 - GENERAL

1.1 DESCRIPTION

- .1 This section specifies requirements for demolishing and removing wholly or in part various items designated to be removed or partially removed.

1.2 GENERAL REQUIREMENTS

- .1 A Notice to Shipping is to be issued prior to commencement and upon completion of work.
- .2 During construction, any vessels or barges utilized must be marked in accordance with the provisions of the Canada Shipping Act Collision Regulations.
- .3 Upon completion of the project, a written Notice to Mariners must be issued.

1.3 PROTECTION

- .1 Protect existing objects designated to remain. In event of damage, immediately replace or make repairs to approval of and at no additional cost to Canada.
- .2 Place a floating boom around entire demolition site to prevent loss of any materials.
- .3 Remove all floating debris from water on a routine and timely basis.

PART 3 - EXECUTION

3.1 EXECUTION

- .1 Inspect site and verify with Departmental Representative objects designated for removal.
  - .2 Locate and protect utility lines. Preserve in operating condition active utilities traversing site.
-

3.2 REMOVAL

- .1 Demolition and removal of existing concrete roadway including partial concrete curb removal as shown on drawings.
- .2 Demolition and removal of existing asphalt roadway surface as indicated on drawings including reinforced concrete slab, timber crib, and rock ballast.
- .3 Removal of existing 450 mm dia. P.E. waterline including pipe insulation, concrete encasement, and associated heat tracing wiring.
- .4 Remove of existing metal pipe enclosure and associated timber supports.
- .5 Removal of existing galvanized steel guide railing complete with support post as indicated on drawings.
- .6 Removal of existing wooden boardwalk including wooden railings and support brackets.
- .7 Remove in their entirety all materials and objects specified for removal.
- .8 Do not disturb adjacent work designated to remain in place.

3.3 DISPOSAL OF MATERIAL

- .1 All demolished materials, except materials designated to be reused or turned over to owner, will become property of contractor and will be removed from site and disposed of to satisfaction of Departmental Representative and in accordance with environmental guidelines. It is the sole responsibility of the contractor to dispose of all demolished materials at an approved disposal site. Ensure that disposal site is approved and willing to accommodate any materials disposed of from work site.
- .2 Contractor shall obtain and pay for all necessary permits and disposal fees for use of an approved waste disposal site.

3.4 RESTORATION

- .1 Upon completion of work, remove debris, trim surfaces and leave work site in clean condition.
-

- .2 Reinststate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work.

PART 1 - GENERAL

1.1 SUMMARY

- .1 This section defines correction to maximum dry density to take into account aggregate particles larger than 19 mm.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)  
.1 ASTM C127-12 (2001), Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.  
.2 ASTM D698-12a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).  
.3 ASTM D1557-12, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).  
.4 ASTM D4253-00 (2006), 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  $D = (D1 \times D2) / ((F1 \times D2) + (F2 \times D1))$   
.2  $D = (F1 \times D1) + (0.9 \times D2 \times F2)$   
.3 Where: D = corrected maximum dry density kg/m<sup>3</sup>.  
.1 F1 = fraction (decimal) of total field sample passing 19 mm sieve  
.2 F2 = fraction (decimal) of total field sample retained on 19 mm sieve (equal to 1.00 - F1)  
.3 D1 = maximum dry density, kg/m<sup>3</sup> of material passing 19 mm sieve determined in accordance with Method A of ASTM D698.  
.4 D2 = bulk density, kg/m<sup>3</sup>, of material retained on 19 mm sieve, equal to 1000G where G is bulk specific gravity (dry basis) of material when tested to ASTM C127.  
.4 For free draining aggregates, determine D1 (maximum dry density) to ASTM D4253 dry method when directed by Departmental Representative.

1.4 MEASUREMENT FOR PAYMENT

- .1 All work covered under this specification is considered to be incidental to the project and will not be measured for payment.

PART 2 - PRODUCTS

2.1 NOT USED              .1    Not Used.

PART 3 - EXECUTION

3.1 NOT USED              .1    Not Used.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- 1.2 REFERENCES
- .1 American Society for Testing and Materials (ASTM)
    - .1 ASTM D4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- 1.3 SAMPLES
- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Allow continual sampling by Departmental Representative during production.
  - .3 Provide Departmental Representative with access to source and processed material for sampling.
  - .4 Install sampling facilities at discharge end of production conveyor, to allow Departmental Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by Departmental Representative to permit full cross section sampling.
  - .5 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.
- 1.4 WASTE MANAGEMENT AND DISPOSAL
- .1 Divert unused granular materials from landfill to local quarry facility as approved by Departmental Representative.
-

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
  - .1 Greatest dimension to exceed five times least dimension.
- .3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
  - .1 Natural sand.
  - .2 Manufactured sand.
  - .3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.
- .4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
  - .1 Crushed rock.
  - .2 Gravel and crushed gravel composed of naturally formed particles of stone.
  - .3 Light weight aggregate, including slag and expanded shale.

2.2 SOURCE QUALITY CONTROL

- .1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least 2 weeks prior to commencing production.
  - .2 If, in opinion of Departmental Representative, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.
  - .3 Advise Departmental Representative 2 weeks in advance of proposed change of material source.
-

- .4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- .1 Aggregate source preparation
  - .1 Prior to excavating materials for aggregate production, clear area to be worked, and strip unsuitable surface materials. Dispose of cleared unsuitable materials as directed by Departmental Representative.
  - .2 Where clearing is required, leave screen of trees between cleared area and roadways as directed.
  - .3 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.
  - .4 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.
  - .5 Trim off and dress slopes of waste material piles and leave site in neat condition.
- .2 Processing
  - .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
  - .2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by 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.
- .3 Handling
  - .1 Handle and transport aggregates to avoid segregation, contamination and degradation.
- .4 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. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.
- .5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
- .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 hours of rejection.
- .7 Stockpile materials in uniform layers of thickness as follows:
  - .1 Max 1.5 m for coarse aggregate and base course materials.
  - .2 Max 1.5 m for fine aggregate and sub-base materials.
  - .3 Max 1.5 m for other materials.
- .8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
- .9 Do not cone piles or spill material over edges of piles.
- .10 Do not use conveying stackers.
- .11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

### 3.2 CLEANING

- .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .2 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.

PART 1 - GENERAL

- 1.1 DESCRIPTION .1 This section specifies supply, placement and compaction of rock and gravel fill as required or as directed by Departmental Representative.
- 1.2 RELATED SECTIONS .1 Section 31 23 33.01 - Excavating, Trenching, and Backfilling.
- 1.3 MEASUREMENT FOR PAYMENT .1 Rock Fill (100 mm minus): Supply, placement, and compaction of rock fill will be measured by the cubic metre (CMPM). The volume of material will be determine in place from measurements taken prior to and at completion of the work. Include the cost of all plant, labour, equipment, and materials required to complete the work as specified.
- .2 Rock Fill (100 mm - 300 mm): Supply, placement, and compaction of rock fill will be measured by the cubic metre (CMPM). The volume of material will be determine in place from measurements taken prior to and at completion of the work. Include the cost of all plant, labour, equipment, and materials required to complete the work as specified.
- 1.4 REFERENCES .1 ASTM International
- .1 ASTM C 117-13, Standard Test Method for Material Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C 127-12, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
- .3 ASTM C 136-13, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- 1.5 DELIVERY, STORAGE AND HANDLING .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Rock fill material to following requirements:
  - .1 Crushed quarry stone consisting of hard durable particles free from clay lumps, frozen material and other deleterious materials, and free from splits, seams or defects likely to impair its soundness during handling or under action of water.
  - .2 Relative density: to ASTM C 127, not less than 2.65.
  - .3 (100 mm minus) Rock size to be 85% - 90% 38 mm - 100 mm and with rock no greater than 150 mm dia.
  - .4 (100 mm to 300 mm minus) Rock size to be 80% - 90% 100 mm - 300 mm and with no rock greater than 300 mm dia.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Excavate in accordance with Section 31 23 33.01 - Excavation, Trenching and Backfilling area where rock fill is to be placed to elevation as indicated.
- .2 Visually inspect substrate in presence of Departmental Representative.
- .3 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PLACEMENT

- .1 Ensure that no frozen material is used in placing.
  - .2 Do not place rock fill material until bottom area has been reviewed by Departmental Representative.
-

- .3 Place rock fill materials to dimensions as indicated.
- .4 Prevent segregation in placing of material sizes.
- .5 Do not place material during weather judged unsuitable by Departmental Representative.
- .6 Level top surface of rockfill to specified grade.
  - .1 Use excavation bucket as screed to level surface of each layer.
  - .2 Other methods of levelling may be employed subject to review of Departmental Representative.

3.3 TOLERANCES

- .1 Surface of rockfill to be parallel with elevation as indicated with mean elevation of surface within 50 mm of elevations as indicated.

PART 1 - GENERAL

- 1.1 RELATED REQUIREMENTS
- .1 Section 31 23 25 - Rock and Gravel Fill.
  - .2 Section 31 32 19.01 - Geotextiles.
- 1.2 MEASUREMENT FOR PAYMENT
- .1 Mass Excavation - Backfilling: Measurements for payment to be made under this section will be measured by the cubic metre. Include costs in unit prices for item for which excavating and backfilling is required. Include the cost of all plant, labour, equipment required to complete the work as specified.
- 1.3 REFERENCES
- .1 American Society for Testing and Materials (ASTM)
    - .1 ASTM C 117-03, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
    - .2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
    - .3 ASTM D422-63 (2007), Standard Test Method for Particle-Size Analysis of Soils.
    - .4 ASTM D698-12e, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbs/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).
    - .5 ASTM D4318-10e, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- 1.4 DEFINITIONS
- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
    - .1 Rock: any solid material in excess of 0.25 m<sup>3</sup> and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15m<sup>3</sup> bucket. Frozen material not classified as rock.
    - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
-

- .2 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .3 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .4 Unsuitable materials:
  - .1 Weak and compressive materials under excavated areas.
  - .2 Frost susceptible materials under excavated areas.
  - .3 Frost susceptible materials:
    - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1.
    - .2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45
    - .3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.
- .5 Unshrinkable fill: very weak mixture of Portland cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Type 1 fill: to the following requirements:
  - .1 Crushed, pit run or screened stone, gravel or sand.
  - .2 Gradations to be within limits specified when tested to ASTM C136. Sieve sizes to CAN/CGSB-8.1.
- .2 Type 2 fill: selected material from excavation or other sources, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

Sieve Designation	% Passing
	Type 1
101.6 mm	100
50 mm	75-100
4.75 mm	25-55
1.2 mm	10-35
0.3 mm	5-20
0.075 mm	0-12

PART 3 - EXECUTION

3.1 SITE PREPARATION

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

3.2 EXCAVATION

- .1 Excavate to lines, grades, elevations and dimensions as indicated.
- .2 Remove all cribwork, ballast and other obstructions encountered during excavation in accordance with Section 02 41 16 - Sitework, Demolition and Removal.
- .3 Excavation must not interfere with bearing capacity of adjacent foundations.
- .4 Dispose of surplus and unsuitable excavated material in approved location off site.
- .5 Do not obstruct flow of surface drainage.
- .6 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .7 Notify Departmental Representative's approval of excavation is reached.
- .8 Obtain Departmental Representative's approval of completed excavation.

3.3 FILL TYPES AND COMPACTION

- .1 Use fill of types as indicated.

3.4 BACKFILLING

- .1 Do not proceed with backfilling operations until Departmental Representative has inspected and approved installations.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
  - .1 Place bedding and surround material as specified elsewhere.
  - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
  - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 1.0 m.

3.5 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Clean and reinstate areas affected by Work as directed by Departmental Representative.
- .3 Restore site to its normal state prior to excavation.



PART 1 - GENERAL

1.1 SECTION  
INCLUDES

- .1 Materials and installation of polymeric geotextiles used in retaining wall structures, filtration, drainage structures and roadbeds, purpose of which is to:
  - .1 Separate and prevent mixing of granular materials of different grading.
  - .2 Act as hydraulic filters permitting passage of water while retaining soil strength of granular structure.

1.2 RELATED WORK

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.3 REFERENCES

- .1 ASTM Society for Testing and Materials (ASTM)
    - .1 ASTM D4491-99a(2004)e1, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
    - .2 ASTM D 4595-05, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
    - .3 ASTM D 4716-04, Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
    - .4 ASTM D 4751-04, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
  - .2 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-4.2-M88, Textile Test Methods.
    - .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Geomembranes.
      - .1 No.2-M85, Mass per Unit Area.
      - .2 No.3-M85, Thickness of Geotextiles.
      - .3 No.7.3-92, Grab Tensile Test for Geotextiles.
      - .4 No. 6.1-93, Bursting Strength of Geotextiles Under No Compressive Load.
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- .3 Canadian Standards Association (CSA)
  - .1 CAN/CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel.
  - .2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.4 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative the following samples at least 2 weeks prior to commencing work.
  - .1 Minimum length of 1 m of roll width of geotextile.

1.5 MILL CERTIFICATES

- .1 Submit to Departmental Representative a copy of mill test data and certificate at least 2 weeks prior to start of work.

1.6 DELIVERY AND STORAGE

- .1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, and packaging material, in appropriate on-site bins, for recycling in accordance with Waste Management Plan.
- .4 Fold up metal banding, flatten and place in designated area for recycling.

- 1.8 MEASUREMENT FOR PAYMENT .1 Geotextiles: Measurement for payment to be made under this section will be measured by the square metre. Include cost in unit price of all plant, labour, equipment required to complete the work as specified.

PART 2 - PRODUCTS

- 2.1 MATERIAL .1 Non-woven, mechanically bounded, needle punched polyester membrane, suitable for use in seawater environment, with the following material properties:
- .1 4.7 mm thickness (CAN-148.1, No. 3)
  - .2 1180 N tensile strength (ASTM D4595)
  - .3 530 N Tear propagation (CAN-12.2)
  - .4 3850 Kpa Burst (Mullen) (CAN-4.2 method 11.1)
- .2 Physical properties:
- .1 Thickness: to CAN/CGSB-148.1, No.3, minimum 2.5 mm.
  - .2 Mass per unit area: to CAN/CGSB-148.1, No.2, minimum 400 g/m<sup>2</sup>.
  - .3 Tensile strength and elongation (in any principal direction): to ASTM D4595.
    - .1 Tensile strength: minimum 1180 N, wet condition.
    - .2 Elongation at break: 50 to 100 percent.
    - .3 Seam strength: equal to or greater than tensile strength of fabric.
  - .4 Mullen burst strength: to CAN/CGSB-4.2, method 11.1, minimum 3100 kPa.
- .3 Hydraulic properties:
- .1 Apparent opening size (AOS): to ASTM D4751, 50 to 150 micrometres.
  - .2 Permittivity: to ASTM D4491, 0.25 cm per second.
- .4 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m<sup>2</sup> to CAN/CSA G164.
-

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Place one (1) layer of geotextile material as indicated on drawings.
- .2 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with securing pins and washers.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .5 Overlap each successive strip of geotextile 600 mm over previously laid strip.
- .6 Join successive strips of geotextile by sewing.
- .7 Pin successive strips of geotextile with securing pins at 300 mm interval at mid point of lap as indicated.
- .8 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .9 After installation, cover with overlying layer within 4 hours of placement.
- .10 Replace damaged or deteriorated geotextile to approval of Departmental Representative.
- .11 Place and compact soil layers in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3.2 CLEANING

- .1 Remove construction debris from Project site and dispose of debris in an environmentally responsible and legal manner.
-

3.3 PROTECTION .1 Vehicular traffic not permitted directly on  
geotextile.

PART 1 - GENERAL

1.1 RELATED  
SECTIONS

- .1 Section 01 45 00 - Quality Control.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 31 05 17 - Aggregate Materials.
- .4 Section 32 12 16 - Asphalt Paving.

1.2 MEASUREMENT  
PROCEDURES

- .1 Type 1 Granular Base: will be measured in cubic metres. Supply and placement of Type 1 granular base including the cost of all plant, labour, equipment and materials required to complete the work as specified.
- .2 Type 2 Granular Sub Base: will be measured in cubic meters. Supply and placement of Type 2 granular sub base including the cost of all plant, labour, equipment and materials required to complete the work as specified.

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
    - .1 ASTM C117-13, Standard Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
    - .2 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
    - .3 ASTM C117-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregate.
    - .4 ASTM D698, 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 D1557, 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 D1883, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soil.
    - .7 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
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- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.4 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver and stockpile aggregates in accordance with Section 31 05 17 - Aggregate Materials. Stockpile minimum 50% of total aggregate required prior to beginning operation.
- .2 Divert unused granular material from landfill to local facility as approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Type 1 Granular Base: Material to the following requirements:
  - .1 Granulations to be within following limits when tested to ASTM C136-84a and ASTM C117-87. The gradings shall not show marked fluctuations from opposite extremes of the limiting sizes, and giving a smooth curve without sharp breaks when plotted on a semi-log grading chart to ASTM.

<u>ASTM Sieve Designation</u>	<u>% Passing</u>
19.0 mm	100
12.5 mm	70-100
9.5 mm	-
4.75 mm	40-70
2.00 mm	23-50
0.425 mm	7-25
0.180 mm	-
0.075 mm	3-8

- .2 Type 2 Granular Sub-Base Material to the following requirements:
  - .1 Gradation to be within following limits when tested to ASTM C136-82 and ASTM C117-80. The gradings shall not show marked fluctuations from opposite extremes of the limiting sizes, having a smooth curve without sharp breaks when plotted on a semi-log grading chart to ASTM E11-87.

<u>ASTM Sieve Designation</u>	<u>%Passing</u>
15.9 mm	45-80
4.76 mm	25-55
1.20 mm	12-35
0.300 mm	7-20
0.075 mm	3-6 (Pit Source) 3-8 (Rock Source)
.2	Other properties as follows:
.1	Liquid Limit ASTM D423-66 (1972) Maximum 25.
.2	Plasticity Index ASTM D424-59 (1971) Maximum 0.
.3	Los Angeles Abrasion ASTM C131-81 Maximum % Loss by Weight: 35.
.4	Crushed fragments: 50%. The percent of crushed particles will be determined by examining the fraction retained on the 4.76 mm sieve and dividing the weight of the crushed particles by the total weight retained on the 4.76 mm sieve.
.5	CBR: AASHTO T180-74 Method D.
.3	Other properties as follows:
.1	Liquid Limit: to ASTM D4318 (1972) maximum 25.
.2	Plasticity Index: to ASTM D4318-59 (1971) maximum 0.
.3	Los Angeles Abrasion: to ASTM C131-06. Maximum % loss by weight: 35.
.4	Crushed Fragments: 50%. The percent of crushed particles will be determined by examining the fraction retained on the 4.76 mm sieve and dividing the weight of the crushed particles by the total weight retained on the 4.76 mm sieve.
.5	CBR:AASHTO T 193-10 (2010) Min 100 when compacted to 100% of AASHTO T 180-10 Method D.

PART 3 - EXECUTION

3.1 SEQUENCE OF OPERATIONS

- .1 Place granular base after common backfill 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 Place material to full width in uniform layers not exceeding 150mm compacted thickness. Department Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
- .5 Shape to smooth contour and compact to specified density before succeeding layer is placed.
- .6 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 100% corrected maximum dry density ASTM D698.
- .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
- .3 Apply water as necessary during compacting to obtain specified density.
- .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Department Representative.

3.2 SITE TOLERANCES

- .1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.3 PROTECTION

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

PART 1 - GENERAL

- 1.1 SUMMARY .1 This method covers measurement of loss of Marshall Stability resulting from action of water on compacted asphalt paving mixtures containing penetration grade asphalt cement.
- .2 Numerical index of retained stability is obtained by comparing stability of specimens determined in accordance with usual Marshall procedures with stability of specimens that have been immersed in water for prescribed period.
- 1.2 RELATED SECTIONS .1 Section 32 12 16 - Asphalt Paving.
- 1.3 REFERENCES .1 American Association of State Highway and Transportation Officials (AASHTO)  
.1 AASHTO T245-97 (2001), Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.

PART 2 - PRODUCTS

- 2.1 MATERIALS .1 Representative samples of each asphalt paving mixture proposed for use on Project.
- 2.2 EQUIPMENT .1 One or more water baths with automatic controls for immersing specimens. Baths normally used for Marshall test are suitable for test.
- .2 Scale and water bath with suitable accessory equipment for weighing test specimens in air and in water to determine their densities.
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- .3 Flat transfer plates of glass or metal. Keep one plate under each specimen during immersion period and during subsequent handling, except when weighing and testing, to prevent breakage or distortion of specimens.
- .4 Apparatus required to conduct Marshall test.

### PART 3 - EXECUTION

#### 3.1 PREPARATION OF TEST SPECIMENS

- .1 Prepare at least 8 specimens for each test with hand-operated hammer, in accordance with AASHTO T245, except where specified otherwise.

#### 3.2 TEST PROCEDURES

- .1 Do Marshall testing in accordance with AASHTO T245, except where specified otherwise.
- .2 Weigh each specimen in air and in water. Weigh in water as rapidly as possible to minimize absorption.
- .3 Calculate specific gravity of each specimen as follows:
  - .1 Specific Gravity =  $A / (A-B)$
  - .2 Where A = weight of specimen in air in grams
  - .3 B = weight of specimen in water in grams
- .4 Sort each set of 8 specimens into 2 groups of 4 specimens each so that average specific gravity of specimens in group 1 is essentially same as that of group 2.
- .5 Test group 1 specimens for Marshall stability. Calculate S1 = Marshall stability of group 1 (average).
- .6 Immerse group 2 specimens in water for 24h at 60°C, then test immediately for Marshall stability. Calculate S2 = Marshall stability of group 2 (average).

#### 3.3 Test Report

- .1 Report test results to Departmental Representative.
-

- .2 Report numerical index of retained stability as resistance of asphaltic paving mixtures to detrimental effect of water, expressed as percentage of original stability retained after immersion period.
- .3 Calculate index as follows:
  - .1 Index of Retained Stability =  $S2 / S1 \times 100$

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Materials and installation for asphalt concrete paving.
- 1.2 RELATED SECTIONS .1 Section 01 29 83 - Payment Procedures for Testing Laboratory Services.
- .2 Section 01 33 00 - Submittal Procedures.
- .3 Section 01 35 28 - Health and Safety Requirements.
- .4 Section 31 05 17 - Aggregate Materials.
- .5 Section 32 12 10 - Marshall Immersion Test for Bitumen.
- .6 Section 32 11 23 - Aggregate Base Courses.
- 1.3 REFERENCES .1 American Association of State Highway and Transportation Officials (AASHTO)
- .1 AASHTO M320-02, Standard Specification for Performance Graded Asphalt Binder.
- .2 AASHTO R29-02, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.
- .3 AASHTO T245-97(2001), Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.
- .2 Asphalt Institute (AI)
- .1 AI MS2-1994 Sixth Edition, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.
- .3 American Society for Testing and Materials International, (ASTM)
- .1 ASTM C88-05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
- .2 ASTM C117-04, Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.
- .3 ASTM C123-04, Standard Test Method for Lightweight Particles in Aggregate.
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- .4 ASTM C127-07, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
- .5 ASTM C128-07a, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
- .6 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .7 ASTM C136-06, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
- .8 ASTM C207-06, Standard Specification for Hydrated Lime for Masonry Purposes.
- .9 ASTM D995-95b(2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
- .10 ASTM D2419-02, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- .11 ASTM D3203-05, Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
- .12 ASTM D4791-05e1, 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-M88, Sieves Testing, Woven Wire, Metric.
  - .2 CAN/CGSB-16.3-M90, Asphalt Cements for Road Purposes.

1.4 PRODUCT DATA

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C at least 2 weeks prior to beginning Work.
- .3 Submit manufacturer's test data and certification that asphalt cement meets requirements of this Section.
- .4 Submit asphalt concrete mix design and trial mix test results to Departmental Representative for review at least 2 weeks prior to beginning Work.

1.5 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least 2 weeks prior to beginning Work.
- .3 Submit samples of following materials proposed for use at least 2 weeks prior to beginning Work.
  - .1 One 5 L container of asphalt cement.
- .4 If materials have been tested by an independent testing laboratory within previous 6 months and have successfully passed tests equal to requirements of this specification, disregard above instructions and submit test certificates from testing laboratory showing suitability of materials for this project.

1.6 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver and stockpile aggregates in accordance with Section 31 05 17 - Aggregate Materials. Stockpile minimum 50% of total amount of aggregate required before beginning asphalt mixing operation.
- .2 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.
- .3 Stockpile fine aggregate separately from coarse aggregate, although separate stockpiles for more than two mix components are permitted.
- .4 Provide approved storage, heating tanks and pumping facilities for asphalt cement.

1.7 WASTE  
MANAGEMENT AND  
DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
-

- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused aggregate materials from landfill to quarry facility for reuse as approved by Departmental Representative.
- .5 Divert unused asphalt from landfill to facility capable of recycling materials.
- .6 Fold up metal banding, flatten and place in designated area for recycling.

1.8 MEASUREMENT FOR PAYMENT

- .1 Asphalt Paving: (40mm) Surface Course, (40 mm) Base Course will be measured by the square metre (m<sup>2</sup>) of compacted surface coarse asphalt installed in the work within the limits indicated on the drawings.
- .2 No separate payment will be made for any other ingredient or feature of the work and all factors, including asphalt bituminous tack coat, compaction, cold weather, asphalt, aggregates, saw cutting, and all plant, labour and materials is inclusive in the above price.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Performance graded asphalt cement: to AASHTO M320, grade PG 58 - 28 when tested to AASHTO R29.
- .2 Aggregates: in accordance with Section 31 05 17 - Aggregate Materials: General and following requirements:
  - .1 Crushed stone or gravel.
  - .2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.
  - .3 Table



Sieve Designation	% Passing	
	Lower Course	Surface Course
200 mm	-	-
75 mm	-	-
50 mm	-	-
38.1 mm	-	-
25 mm	100	-
19 mm	-	-
12.5 mm	70-85	100
9.5 mm	-	-
4.75 mm	40-65	55-75
2.00 mm	30-50	35-55
0.425 mm	15-30	15-30
0.180 mm	5-20	5-20
0.075 mm	3-8	3-8

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

.5 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75 mm 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 D2419. Min: 50.

.8 Magnesium Sulphate soundness: to ASTM C88.

Max % loss by mass:

.1 Coarse aggregate surface course: 12%.

.2 Coarse aggregate lower course: 12%.

.3 Fine aggregate, surface course: 16%.

.4 Fine aggregate, lower course: 16%.

.9 Los Angeles degradation: Grading B, to ASTM C131. Max % loss by mass:

.1 Coarse aggregate, surface course: 25%.

.2 Coarse aggregate, lower course: 35%.

.10 Absorption: to ASTM C127. Max % by mass:

.1 Coarse aggregate, surface course: 1.75%.

.2 Coarse aggregate, lower course: 2.00%.

.11 Loss by washing: to ASTM C117. Max % passing 0.075 mm sieve:

.1 Coarse aggregate, surface course: 1.5%.

.2 Coarse aggregate, lower course: 2.0%.

.12 Lightweight particles: to ASTM C123. Max % by mass less than 1.95 relative density:

.1 Surface course: 1.5%.

.2 Lower course: 3.0%.

- .13 Flat and elongated particles: to ASTM D4791, (with length to thickness ratio greater than 5):  
Max % by mass:  
.1 Coarse aggregate, surface course: 15%.  
.2 Coarse aggregate, lower course: 15%..  
.14 Crushed fragments: at least 60% of particles by mass within each of following sieve designation ranges, to have at least 1 freshly fractured face. Material to be divided into ranges, using methods of ASTM C136.

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

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

- .3 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: 1200 mm.  
.2 Maximum amplitude of vibration (machine setting): 0.5 mm 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.
  
- .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, 4.5 m in length, to test finished surface.

2.3 MIX DESIGN

- .1 Mix design to be provided approved by Departmental Representative.
  
- .2 Mix design to be developed by testing laboratory approved by Departmental Representative.
  
- .3 Design of mix: by Marshall method to requirements below.
  - .1 Compaction blows on each face of test specimens: 75.
  - .2 Mix physical requirements:

<u>Property</u>	<u>Roads</u>
Marshall Stability	5.5 surface course
at 60°C kN min	4.5 lower course
Flow Value mm	2-4
Air Voids in	3-5 surface course
Mixture, %	2-6 lower course
Voids in Mineral	15 surface course
Aggregate, % min	13 lower course
Index of Retained	75
Stability % minimum	

- .3 Measure physical requirements as follows:
  - .1 Marshall load and flow value: to AASHTO T245.
  - .2 Compute void properties on basis of bulk specific gravity of aggregate to ASTM C127 and ASTM C128. Make allowance for volume of asphalt absorbed into pores of aggregate.
  - .3 Air voids: to ASTM D3203.
  - .4 Voids in mineral aggregates: to AI MS2, chapter 4.
  - .5 Index of Retained Stability: measure in accordance with Section 32 12 10 - Marshall Immersion Test for Bitumen.
- .4 Do not change job-mix without prior approval of Departmental Representative. When change in material source proposed, new job-mix formula will be provided to be approved to be reviewed by Departmental Representative.
- .5 Return plant dust collected during processing to mix in quantities acceptable to Departmental Representative.

### PART 3 - EXECUTION

#### 3.1 PLANT AND MIXING REQUIREMENTS

- .1 Batch and continuous mixing plants:
  - .1 To ASTM D995.
  - .2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders. Do not load frozen materials into bins.
  - .3 Feed cold aggregates to plant in proportions to ensure continuous operations.
  - .4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.
  - .5 Before mixing, dry aggregates to moisture content not greater than 1% 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 maximum temperature indicated on temperature-viscosity chart

.9 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used, Departmental Representative to approve review temperature of completed mix at plant and at paver after considering hauling and placing conditions.

.10 Maintain temperature of materials within 5 degrees C of specified mix temperature during mixing.

.11 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.

.2 Dryer drum mixing plant:

.1 To ASTM D995.

.2 Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.

.3 Feed aggregates to burner end of dryer drum by means of multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.

.4 Meter total flow of aggregate by an electronic weigh belt system with indicator that can be monitored by plant operator and which is interlocked with asphalt pump so that proportions of aggregate ,RAP and asphalt entering mixer remain constant.

.5 Provide for easy calibration of weighing systems for aggregates without having material enter mixer.

- .6 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved. Calibrate weigh bridge on charging conveyor by weighing amount of aggregate passing over weigh bridge in set amount of time. Difference between this value and amount shown by plant computer system to differ by not more than plus or minus 2%.
- .7 Make provision for conveniently sampling full flow of materials from cold feed.
- .8 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate from cold feed prior to entering drum.
- .9 Provide system interlock stop on feed components if either asphalt or aggregate from bin stops flowing.
- .10 Accomplish heating and mixing of asphalt mix in approved parallel flow dryer-mixer in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream. Control heating to prevent fracture of aggregate or excessive oxidation of asphalt. Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with printing recorder that can be monitored by plant operator. Submit printed record of mix temperatures at end of each day.
- .11 Mixing period and temperature to produce uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer to be less than 2%.
- .3 Temporary storage of hot mix:
- .1 Provide mix storage of sufficient capacity to permit continuous operation and designed to prevent segregation.
- .2 Do not store asphalt mix in storage bins in excess of 3 hours.
- .4 Mixing tolerances:
- .1 Permissible variation in aggregate gradation from job mix (percent of total mass).

4.75 mm sieve and larger	5.0
2.00 mm sieve	4.0
0.425 mm sieve	3.0
0.180 mm sieve	2.0
0.075 mm sieve	1.0

.2 Permissible variation of asphalt cement from job mix: 0.25%.

.3 Permissible variation of mix temperature at discharge from plant: 5 degrees C.

3.2 PREPARATION

- .1 Preparation of granular base, prior to paving, shall be carried out in accordance with Section 32 11 23 - Aggregate Base Courses.
- .2 Prior to laying mix, clean surfaces of loose and foreign material.

3.3 TRANSPORTATION OF MIX

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

3.4 PLACING

- .1 Obtain Departmental Representative's approval of existing surface prior to placing asphalt butuminous tack coat.

- .2 Place asphalt concrete to thicknesses, grades and lines as indicated. Bevel all perimeter edges of asphalt as indicated on drawings.
- .3 Placing conditions:
  - .1 Place asphalt mixtures only when air temperature is above 5 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 indicated.
  - .1 Lower course in 1 layer of 50 mm.
  - .2 Surface course in 1 layer of maximum 50 mm.
- .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. Departmental Representative to establish lines for paver to follow parallel to centerline of proposed pavement. Position and operate paver to follow established line closely.
  - .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case permit them to be more than 30 m apart.
  - .3 Maintain constant head of mix in auger chamber of paver during placing.
  - .4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
  - .5 Correct irregularities in alignment left by paver by trimming directly behind machine.
  - .6 Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.
  - .7 Do not throw surplus material on freshly screeded surfaces.



- .7 When hand spreading is used:
  - .1 Distribute material uniformly. Do not broadcast material.
  - .2 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.
  - .3 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
  - .4 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.

### 3.5 COMPACTING

- .1 Do not change rolling pattern unless mix changes or lift thickness changes. Change rolling pattern only as directed by Departmental Representative.
  - .2 Roll asphalt continuously to density not less than 98% of blow Marshall density to AASHTO T245.
  - .3 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. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel-wheeled and pneumatic tired rollers. Do not exceed 9 km/h for finish rolling.
    - .4 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 25 impacts per metre of travel. For lifts less than 50 mm thick, impact spacing not to exceed compacted lift thickness.
    - .5 Overlap successive passes of roller by minimum of 200 mm 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.

.4 Breakdown rolling:

.1 Begin breakdown rolling with static steel wheeled roller vibratory roller 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. When working on steep slopes or super-elevated sections use operation approved by Departmental Representative.

.4 Use only experienced roller operators.

.5 Intermediate 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.

.6 Finish rolling:

.1 Accomplish finish rolling with two-axle or three-axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks. If necessary to obtain desired surface finish, use pneumatic-tired rollers as directed by Departmental Representative.

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.2 Conduct rolling operations in close sequence.

### 3.6 JOINTS

- .1 General:
  - .1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.
  - .2 Paint contact surfaces of existing structures such as Portland cement concrete deck, manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.
- .2 Transverse joints:
  - .1 Offset transverse joint in succeeding lifts by at least 600 mm.
  - .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 150 mm.
  - .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 If cold joint can not be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane.
  - .3 Overlap previously laid strip with spreader by 25 to 50 mm.
  - .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 or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.

- .4 Construct bevel 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.
- .5 Construct butt joints as directed by Departmental Representative.

3.7 FINISH  
TOLERANCES

- .1 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.
- .2 Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5 m straight edge placed in any direction.

3.8 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.

PART 1 - GENERAL

- 1.1 RELATED EQUIREMENTS
- .1 Section 31 05 17 - Aggregate Material.
  - .2 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
  - .3 Section 32 11 23 - Aggregate Base Course.
- 1.2 REFERENCES
- .1 American Society for Testing and Materials International (ASTM)
    - .1 ASTM C 117-04, Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
    - .2 ASTM C 136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
    - .3 ASTM D 260-(2001), Standard Specification for Boiled Linseed Oil.
    - .4 ASTM D 698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).
  - .2 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-3.3-(March 2004), Kerosene, Amend. No. 1, National Standard of Canada.
    - .2 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
  - .3 Canadian Standards Association (CSA International)
    - .1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- 1.3 CERTIFICATES
- .1 Submit certificate in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Minimum 2 weeks prior to starting concrete work submit to Departmental Representative manufacturer's test data and certification by qualityied independent inspection and testing laboratory that following materials will meet specified requirements:
    - .1 Portland cement.
-

- .2 Blended hydraulic cement.
- .3 Supplementary cementing materials.
- .4 Grout.
- .5 Admixtures.
- .6 Aggregates.
- .7 Water.
- .8 Joint filler.
- .9 Joint Sealant.

- .3 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.
- .4 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.

1.4 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Waste Management and Disposal:
  - .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.5 MEASUREMENT FOR  
PAYMENT

- .1 Concrete Curb and Gutter: Measurement for payment to be made under this section will be measured by the linear meter. Include all the cost of all plant, labour, equipment required to complete the work as specified.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Granular base: material to Section 31 05 16 - Aggregate Materials and following requirements:
    - .1 Type 1.
    - .2 Crushed stone or gravel.
    - .3 Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1.
-

- .2 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water-soluble soap.

### PART 3 - EXECUTION

#### 3.1 GRADE PREPARATION

- .1 Do grade preparation work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Construct embankments using excavated material free from organic matter or other objectionable materials.
  - .1 Dispose of surplus and unsuitable excavated material in approved location.
- .3 When constructing embankment provide for minimum 1.0 m shoulders, where applicable, outside of neat lines of concrete.
- .4 Place fill in maximum 200 mm layer and compact to at least 95% of maximum dry density to ASTM D 698.

#### 3.2 GRANULAR BASE

- .1 Obtain Departmental Representative's approval of subgrade before placing granular base.
- .2 Place granular base material to lines, widths, and depths as indicated.
- .3 Compact granular base in maximum 200 mm layer to at least 95% of maximum density to ASTM D 698.

#### 3.3 CONCRETE

- .1 Obtain Departmental Representative approval of granular base prior to placing concrete.
  - .2 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
  - .3 Slip-form pavers equipped with string line system for line and grade control may be used if quality of work acceptable to Departmental Representative can be demonstrated. Hand finish surfaces.
-

- 3.4 TOLERANCES .1 Finish surfaces to within 3 mm in 3 m as measured with 3 m straightedge placed on surface.
- 3.5 EXPANSION AND CONTRACTION JOINTS .1 Install expansion joints as indicated at intervals of 6 m.
- 3.6 ISOLATION JOINTS .1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.
- .2 Install joint filler in isolation joints in accordance with Section 03 30 00 - Cast-in-Place Concrete as indicated.
- 3.7 CURING .1 Cure concrete by adding moisture continuously in accordance with CSA-A23.1/A23.2 to exposed finished surfaces for at least 1 day after placing, or sealing moisture in by curing compound as directed by Departmental Representative.
- .2 Where burlap is used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.
- .3 Apply curing compound evenly to form continuous film, in accordance with manufacturer's requirements.
- 3.8 BACKFILL .1 Allow concrete to cure for 7 days prior to backfilling.
- .2 Backfill to designated elevations with material as directed by Departmental Representative.
- .1 Compact and shape to required contours as indicated.
-



3.9 LINSEED OIL  
TREATMENT

- .1 Apply two coats of linseed oil mixture uniformly to surfaces of curb and gutters, after concrete has cured for specified curing time and when surface of concrete is clean and dry.
- .2 Linseed oil mixture to consist of 50% boiled linseed oil and 50% mineral spirits by volume.
- .3 Apply treatment when air temperature above 10 degrees C.
- .4 Apply first coat at 135 mL/m<sup>2</sup>.
- .5 Apply second coat at 90 mL/m<sup>2</sup> when first coat has dried.

3.10 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Materials and installation for constructing new catch basin structures.
- 1.2 RELATED SECTIONS .1 Section 01 33 00 - Submittal Procedures.  
.2 Section 31 05 17 - Aggregate Materials.  
.3 Section 33 41 00 - Storm Utility Drains.
- 1.3 REFERENCES .1 Codes and Standards referenced in this section refer to the latest edition thereof.  
.2 American Society for Testing Materials (ASTM International).  
.1 ASTM A48/A48M, Standard Specification for Gray Iron Castings.  
.2 American Society for Testing and Materials (ASTM International).  
.3 ASTM C478M, Specification for Precast Reinforced Concrete Manhole Sections Metric.  
.3 Canadian General Standards Board (CGSB).  
.4 Canadian Standards Association (CAS International).  
.1 CAS-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction Methods of Test for Concrete.  
.2 CAN/CSA-G30.18-M9, Billet Steel Bars for Concrete Reinforcement.  
.3 CAN/CSA-G165, Hot Dip Galvanizing of irregularly shaped articles.
- 1.4 SUBMITTALS .1 Submit manufacturer's test data and certification at least 4 weeks prior to beginning of Work. Include manufacturer's drawings, information and shop drawings where pertinent.
-

1.5 SCHEDULING OF  
WORK

- .1 Schedule work to minimize interruptions to existing services and to maintain existing flow during construction.
- .2 Submit schedule of expected interruptions for approval and adhere to approved schedule.

1.6 MEASUREMENT FOR  
PAYMENT

- .1 Catch Basin: (1.8 m deep) Measurement for payment by each and includes the cost of all plant, labour and material required to complete the work specified including excavation, backfilling, installation and grouting required.
- .2 Work shall include the supply and installation of the catch basin frame and grate.
- .3 Work shall include excavation and backfilling as per construction drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Precast catch basin sections: to ASTM C478M.
  - .2 Mortar:
    - .1 Aggregate: to CSA A82.56.
    - .2 Cement: to CAN/CSA-A8.
  - .3 Adjusting rings: to ASTM C478M.
  - .4 Concrete Brick: to CAN3-A165 Series.
  - .5 Frames, gratings, covers to dimensions as indicated and following requirements:
    - .1 Metal gratings and covers to bear evenly on frames. A frame with grating or cover to constitute one unit. Assemble and mark unit components before shipment.
    - .2 Gray iron castings: to ASTM A48/A48M, strength class 30B.
    - .3 Castings: coated with two applications of asphalt varnish or cleaned and ground to eliminate surface imperfections.
    - .4 Catch basin frame and cover: heavy duty municipal type for road service; cover cast without perforations. BM17 600 x 600 opening.
-

- .6 Granular bedding and backfill: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
- .1 Crushed screened stone, gravel or sand.
  - .2 Granulations to be within limits specified when tested to ASTM C136. Sieve sizes to CAN/CGSB-8.1.
  - .3 Table

Sieve Designation	% Passing Stone/Gravel	Gravel/Sand
200mm	-	-
75mm	-	-
50mm	-	-
39.1mm	-	-
25mm	100	-
19mm	-	-
12.5mm	65-90	100
9.5mm	-	-
4.75mm	35-55	50-100
2.00mm	-	30-90
0.425mm	10-25	10-50
0.180mm	-	-
0.075mm	0-8	0-10

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILL

- .1 Excavate and backfill in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling and as indicated.
- .2 Obtain approval of Department Representative before installing catch basin.

3.2 CONCRETE WORK

- .1 Do concrete work in accordance with CSA A23.2 and A23.3.
- .2 Position metal inserts in accordance with dimensions and details as indicated.

3.3 INSTALLATION

- .1 Construct units in accordance with details indicated, plumb and true to alignment and grade.

- .2 Complete units as pipe laying progresses. Maximum of three units behind point of pipe laying will be allowed.
- .3 Dewater excavation to approval of Departmental Representative and remove soft and foreign material before placing concrete base.
- .4 Set precast concrete base on 160mm minimum of granular bedding compacted to 100% corrected maximum dry density.
- .5 Compact granular backfill to 95% corrected maximum dry density.
- .6 Place unshrinkable backfill in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .7 Set frame and cover and cover to required elevation on no more than 4 courses of brick. Make brick joints and join brick to frame with cement mortar. Parge and make smooth and watertight.
- .8 Place frame and cover on top section to elevation as indicated. If adjustment required use concrete ring.
- .9 Clean units of debris and foreign materials. Remove fins and sharp projections. Prevent debris from entering system.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
- .1 Materials and installation for water lines, valves, tees, bends, and service connections.
- 1.2 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .3 Section 01 78 00 - Closeout Submittals.
- .4 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- 1.3 MEASUREMENT FOR PAYMENT
- .1 450 mm dia. DR 11 HDPE Sclair Piping: Supply, placement and installation of the water supply line will be measured by the linear meter. Include the cost of all plant, labour, equipment and materials required to complete work as specified. Include in the price bedding/levelling material, insulation and metallic marking tape as shown on construction drawings.
- .2 450 mm dia. Transition Coupler: Supply, placement, installation of the coupler will be measured by each. Include all cost of plant, labour, installation, equipment and material required to complete work as specified.
- .3 450 mm dia. butterfly valve: Supply, placement and installation of the butterfly valve including valve box will be measured by each including the cost of all plant, labour, equipment and material required to complete work as specified.
- .4 Curb Stop (19 mm dia): Supply, placement and installation of the curb stop will be measured by each including the cost of all plant, labour, equipment and material required to complete work as specified. Include in the price corporation stop supply and installation.
-

1.3 MEASUREMENT FOR .5  
PAYMENT  
(Cont'd)

19 mm dia. Municiplex Service Line: Supply, placement and installation of the water service line will be measured by the linear meter. Include the cost of all plant, labour, equipment and material required to complete work as specified. Include bedding material in this unit price.

- 1.4 REFERENCES
- .1 American National Standards Institute/American Water Works Association (ANSI/AWWA).
    - .1 ANSI/AWWA C800-14, Underground Service Line Valves and Fittings (Also Included: Collected Standards for Service Line Materials).
  - .2 American Society for Testing and Materials International, (ASTM)
    - .1 ASTM B88M-13, Standard Specification for Seamless Copper Water Tube (Metric).
    - .2 ASTM C136-06, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
    - .3 ASTM F714-13, Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
  - .3 American Water Works Association (AWWA)/Manual of Practice
  - .4 Canadian General Standards Board (CGSB)
    - .1 CGSB 41-GP-25M-77, Pipe, Polyethylene, for the Transport of Liquids.
  - .5 Canadian Standards Association (CSA International)
    - .1 CSA B137 Series-13, Thermoplastic Pressure Piping Compendium. (Consists of B137.0, B137.1, B137.2, B137.3, B137.4, B137.4.1, B137.5, B137.6, B137.8, B137.9, B137.10, B137.11 and B137.12).
      - .1 CSA B137.1-13, Polyethylene Pipe, Tubing, and Fittings for Cold-Water Pressure Services.
      - .2 CSA B137.3-13, Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications.
  - .6 Department of Justice Canada (Jus)
    - .1 Canadian Environmental Protection Act, 1999 (CEPA).
  - .7 Transport Canada (TC)
    - .1 Transportation of Dangerous Goods Act, 1992 (TDGA)
-

#### 1.4 REFERENCES

(Cont'd)

- .7 (Cont'd)
- .8 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S520-M91, Standard for Fire Hydrants.
  - .2 CAN4-S543-09, Standard for Internal-Lug, Quick Connect Couplings for Fire Hose.

#### 1.5 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Inform Departmental Representative of proposed source of bedding materials and provide access for sampling at least 4 weeks prior to commencing work.
- .4 Submit manufacturer's test data and certification that pipe materials meet requirements of this section at least 4 weeks prior to beginning work. Include manufacturer's drawings, information and shop drawings where pertinent.
- .5 Pipe certification to be on pipe.

#### 1.6 CLOSEOUT SUBMITTALS

- .1 Provide data and drawings, including directions for operating valves, list of equipment required to operate valves, details of pipe material, location of valves, maintenance and operating instructions in accordance with Section 01 78 00 - Closeout Submittals.

#### 1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
-



1.7 WASTE  
MANAGEMENT AND  
DISPOSAL  
(Cont'd)

- .3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Separate for reuse and recycling and place in designated containers Steel Metal Plastic waste in accordance with Waste Management Plan.
- .5 Place materials defined as hazardous or toxic in designated containers.
- .6 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .7 Ensure emptied containers are sealed and stored safely.
- .8 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.
- .9 Dispose of unused asbestos cement pipe in accordance with regulations governing disposal of hazardous materials.
- .10 Divert unused aggregate materials from landfill to quarry facility for reuse as approved by Departmental Representative.
- .11 Dispose of unused disinfection material at official hazardous material collections site approved by Departmental Representative.
- .12 Do not dispose of unused disinfection material into sewer system, into streams, lakes, onto ground or in other location where they will pose health or environmental hazard.
- .13 Fold up metal banding, flatten and place in designated area for recycling.

1.8 SCHEDULING OF  
WORK

- .1 Schedule Work to minimize interruptions to existing services.
- .2 Notify Departmental Representative minimum of 24 h in advance of interruption in service.

- 1.9 EXTRA MATERIALS
- .1 Provide Departmental Representative with following tools:
    - .1 1 tee-handle operating keys for curb stop.

PART 2 - PRODUCTS

- 2.1 PIPE, JOINTS AND FITTINGS
- .1 Polyethylene pressure pipe:
    - .1 NPS 1/2 to NPS 6: to CAN/CSA-B137.1 type, series 160 ASTM F 714, series DR 11 AWWA C906.
    - .2 450 mm: to CGSB 41-GP-25M, type, series 160, DR 11. ASTM F714 and AWWA C906.
    - .3 Polyethylene to polyethylene joints: to be thermal butt fusion joined, to ASTM D 2657 or flanged with ductile iron backing flanges. AWWA C207.
    - .4 Flange end: to ASTM A536 uniflange adapter flange working pressure 150 psi. Restraining pressure 1000 KPa - 1400 KPa. Set screws stainless steel (A151410). Fusion bonded epoxy coating and gasket as required for working pressure.
    - .5 Cast iron fittings with flanged ends: to ANSI/AWWA C110/A21.10 for pipe size above NPS 4.
    - .6 Polyethylene fittings: to CAN/CSA B137.1, for pipe sizes NPS 4 and less.
    - .7 Brass fittings to CSA B 137.1 150 psi pressure rating.

- 2.2 VALVES AND VALVE BOXES
- .1 Valves to open counter clockwise.
  - .2 450 mm dia. butterfly valve: AWWA C-504, 50 mm AWWA operating nut, class 150, buried operator flange ends.
  - .3 Valve Box: Adjustable valve box, 168 mm dia. cast iron valve box cover and steam 686 mm long. Lower section to be lightweight MVB composite valve box, length as required. 140 mm dia. stem and 233 mm dia. bell end. Valve box to come with guide plate to fit valve box bell end.

2.3 SERVICE  
CONNECTIONS

- .1 Municipal water service pressure pipe: to CSA-B137.9, series 160WWA 904. 19 mm dia municipex.
- .2 Brass corporation stops: brass, compression type having threads to ANSI/AWWA C800. 19 mm dia. c/w required for water service pipe.
- .3 Brass inverted key-type curb stops: brass to ASTM B62, compression type with drains, AWWA C800.
  - .1 Curb stops to have adjustable cast iron service box with stainless steel stem to suit depth of bury.
  - .2 Top of cast iron box marked "WATER"/"EAU".
- .4 Pipe connections: To be compression fittings with proper rug insert fitting and to same standards as specified pipe fittings and to have ends matching pipe to which they are joined.

2.4 PIPE BEDDING  
AND SURROUND  
MATERIAL

- .1 Granular material to: Section 31 05 16 - Aggregate Materials and following requirements:
  - .1 Crushed or screened stone, gravel or sand.
  - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.
  - .3 Table

Sieve Designation	% Passing	
	Stone/Gravel	Gravel/Sand
200 mm	-	-
75 mm	-	-
50 mm	-	-
38.1 mm	-	-
25 mm	100	-
19 mm	-	-
12.5 mm	65-90	100
9.5 mm	-	-
4.75 mm	35-55	80-100
2.00 mm	-	50-90
0.425 mm	10-25	10-50
0.180 mm	-	-
0.075 mm	0-8	0-10

2.4 PIPE BEDDING AND SURROUND MATERIAL (Cont'd) .2 Concrete mixes and materials required for bedding cradles, encasement, supports, thrust blocks: to Section 03 30 00 - Cast-in-Place Concrete.

2.5 BACKFILL MATERIAL .1 In accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

PART 3 - EXECUTION

3.1 PREPARATION .1 Clean pipes, fittings, valves, and appurtenances of accumulated debris and water before installation.  
.1 Inspect materials for defects to approval of Departmental Representative.  
.2 Remove defective materials from site as directed by Departmental Representative.

3.2 TRENCHING .1 Do trenching work in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling.  
.2 Trench depth to provide cover over pipe of not less than 1.8 m from finished grade or as indicated on accompanying drawings.  
.3 Trench alignment and depth require Departmental Representative's approval prior to placing bedding material and pipe.

3.3 PIPE INSTALLATION .1 Lay piping to ANSI/AWWA C600 ANSI/AWWA C603 ANSI/AWWA M-9 M-11 and manufacturer's standard instructions and specifications. Do not use blocks except as specified.  
.2 Position and join pipes with equipment and methods approved by Departmental Representative.  
.3 Cut piping in approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.

3.3 PIPE  
INSTALLATION  
(Cont'd)

- .4 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes or as otherwise approved by Departmental Representative.
- .5 When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.
- .6 Recheck pipe joints assembled above ground after placing in trench to ensure that no movement of joint has taken place.
- .7 Do not lay pipe on frozen bedding.
- .8 Do hydrostatic and leakage test and have results approved by Departmental Representative before surrounding and covering joints and fittings with granular material.
- .9 Backfill remainder of trench.

3.4 VALVE  
INSTALLATION

- .1 Install valves to manufacturer's recommendations at locations as indicated.
- .2 Support valves located in valve boxes by means of Bedding same as adjacent pipe. Valves not to be supported by pipe.

3.5 PIPE BEDDING

- .1 Upon completion of pipe laying and after Departmental Representative has inspected Work in place, surround and cover pipes as indicated.
- .2 Hand place surround material in uniform layers not exceeding 300 mm compacted thickness as indicated.
  - .1 Do not dump material within 3 m of pipe.
- .3 Place layers uniformly and simultaneously on each side of pipe.
- .4 Do not place material in frozen condition.
- .5 Compact each layer from pipe invert to mid height of pipe to at least 95% of corrected maximum dry density 95% maximum density to ASTM D698.

3.5 PIPE BEDDING (Cont'd) .6 Compact each layer from mid height of pipe to underside of backfill to at least 90% of corrected maximum dry density 90% maximum density to ASTM D698.

3.6 BACKFILL .1 Place backfill material, above pipe surround, in uniform layers not exceeding 300 mm compacted thickness up to grades as indicated.  
.2 Do not place backfill in frozen condition.  
.3 Under paving and walks, compact backfill to at least 95% corrected maximum dry density 95% maximum density to ASTM D698.  
.1 In other areas, compact to at least 90% corrected maximum dry density 90% maximum density to ASTM D698.

3.7 FLUSHING AND DISINFECTING .1 Flushing and disinfecting operations: under direct control of witnessed by Departmental Representative carried out by contractor.  
.1 Notify Departmental Representative at least 4 days in advance of proposed date when disinfecting operations will begin.

.2 Flush water mains through available outlets with a sufficient flow of potable water to produce velocity of 1.5 m/s, within pipe for minimum 10 minutes, or until foreign materials have been removed and flushed water is clear.

.3 Flushing flows as follows:

Pipe Size NPS	Flow (L/s) Minimum
6 and below	38
8	75
10	115
12	150

.4 Provide connections and pumps for flushing as required.

3.8 HYDROSTATIC AND  
LEAKAGE TESTING

- .1 Do tests in accordance with ANSI/AWWA C600.
  - .2 Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described.
  - .3 Notify Department Representative at least 24 hours in advance of proposed tests.
    - .1 Perform tests in presence of Departmental Representative.
  - .4 Test pipeline in sections not exceeding 365 m in length, unless otherwise authorized by Departmental Representative.
  - .5 Upon completion of pipe laying and after Departmental Representative has inspected Work in place, surround granular material placed to dimensions indicated.
  - .6 When testing is done during freezing weather, protect valves, joints and fittings from freezing.
  - .7 Strut and brace caps, bends, tees, and valves, to prevent movement when test pressure is applied.
  - .8 Open valves.
  - .9 Expel air from main by slowly filling main with potable water.
    - .1 Install corporation stops at high points in main where no air-vacuum release valves are installed.
    - .2 Remove stops after satisfactory completion of test and seal holes with plugs.
  - .10 Thoroughly examine exposed parts and correct for leakage as necessary.
  - .11 Apply hydrostatic test pressure of 1.5 times the static working pressure based on elevation of lowest point in main and corrected to elevation of test gauge, for period of 2 hours.
  - .12 Examine exposed pipe, joints, fittings and appurtenances while system is under pressure.
  - .13 Remove joints, fittings and appurtenances found defective and replace with new sound material and make watertight.
-

3.8 HYDROSTATIC AND  
LEAKAGE TESTING  
(Cont'd)

- .14 Repeat hydrostatic test until defects have been corrected.
- .15 Locate and repair defects if leakage is greater than amount specified.
- .16 Repeat test until leakage is within specified allowance for full length of water main.



PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Materials and installation for storm sewer piping.
- 1.2 RELATED SECTIONS .1 Section 01 33 00 - Submittal Procedures.  
.2 Section 31 05 17 - Aggregate Materials.  
.3 Section 31 23 33.01 - Excavating, Trenching and Backfilling.  
.4 Section 33 05 13 - Manholes and Catch Basin Structures.
- 1.3 MEASUREMENT FOR PAYMENT .1 150 mm dia. PVC SDR 35 Pipe: Measurement for payment by meters and includes the cost of all plant labour and materials required to complete the work specified including excavation, trenching, backfilling pipe bedding, and pipe couplers.
- 1.4 REFERENCES .1 Codes and Standards in this section refer to the latest edition thereof.  
.2 American Society for Testing and Materials (ASTM).  
.1 ASTM C 117-95, Standard Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.  
.2 ASTM C 136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.  
.3 ASTM D 698, Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).  
.4 ASTM D 1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.  
.5 ASTM D3350 Standard Specification for Polyethylene Plastics Pipe and Fittings.  
.6 ASSHTO M294-881 Standard Specification for Corrugated Polyethylene Pipe.
-

- 1.4 REFERENCES .2 (Cont'd)  
(Cont'd) .3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire.
  - .2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire.
- .4 Canadian Standards Association (CSA International), Latest Edition.
- .1 CSA-B1800, Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B182.1, B182.2. CSA B182, PVC Sewer Pipe and Fittings (PSM Type). PVC Sewer Pipe and Fittings (PSM Type).
    - .1 CSA B182.2, Profile PVC Sewer Pipe and Fittings.
    - .2 CSA B182.11, Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.

- 1.5 DEFINITIONS .1 A pipe section is defined as length of pipe between successive catch basins and/or manholes.

- 1.6 SUBMITTALS .1 Shop drawings to indicate proposed method for installing carrier pipe for undercrossings.
- .2 Inform Department Representative at least 4 weeks prior to beginning Work of proposed source of bedding materials and provide access for sampling.
  - .3 Submit manufacturer's test data and certification at least 2 weeks prior to beginning Work.
  - .4 Certification to be marked on pipe.
  - .5 Submit to Department Representative 1 copy of manufacturer's installation instructions.

## PART 2 - PRODUCTS

- 2.1 PVC PIPE .1 PVC smooth wall sanitary sewer pipe ASTM D034, F679, CSA B182.2, SDR35.
- .2 Normal lengths: 6 m.
-

2.2 PIPE BEDDING  
AND SURROUND  
MATERIAL

- .1 Granular material in accordance with Section 31 05 16 - Aggregate Materials.  
.1 Crushed or screened stone, gravel or sand.  
.2 Gradations to be within limits specified when tested to ASTM C 136 and following requirement:

- .2 Table:

Sieve Designation (mm)	% Passing Stone/Gravel	Gravel/Sand
25	100	-
19	-	-
12.5	65-90	100
9.5	-	-
4.75	35-55	50-100
2.00	-	30-90
0.425	10-25	10-50
0.180	35-55	50-100
2.00	-	30-90
0.425	10-25	10-50
0.180	-	-
0.075	0-8	0-10

- .3 Concrete mixes and materials for bedding, cradles, encasement, supports: to CSA A23.1/A23.2.

2.3 BACKFILL  
MATERIAL

- .1 Rock fill to Section 31 23 33.01 - Excavating, Trenching and Backfilling.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Departmental Representative.

3.2 TRENCHING

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

3.2 TRENCHING  
(Cont'd)

- .2 Do not allow contents of sewer or sewer connection to flow into trench.
- .3 Trench alignment and depth to approval of Departmental Representative prior to placing bedding material and pipe.

3.3 GRANULAR  
BEDDING

- .1 Place bedding in unfrozen condition.
- .2 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness.
- .3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.
  - .1 Do not use blocks when bedding pipes.
- .4 Shape transverse depressions as required to suit joints.
- .5 Compact each layer full width of bed to at least 95% corrected maximum dry density.

3.4 INSTALLATION

- .1 Lay and join pipe in accordance with manufacturer's recommendations and to approval of Departmental Representative.
  - .2 Handle pipe using methods approved by Departmental Representative.
    - .1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.
  - .3 Lay pipes on prepared bed, true to line and grade with pipe inverts smooth and free of sags or high points.
    - .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
  - .4 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.
  - .5 Do not exceed maximum joint deflection recommended by pipe manufacturer.
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3.4 INSTALLATION  
(Cont'd)

- .6 Do not allow water to flow through pipes during construction except as may be permitted by Department Representative.
- .7 When any stoppage of Work occurs, restrain pipes as directed by Departmental Representative to prevent "creep" during down time.
- .8 Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .9 Use prefabricated saddles or approved field pipes.
  - .1 Joint to be structurally sound and watertight.
- .10 Temporarily plug open upstream ends of pipes with removable watertight concrete, steel or plastic bulkheads.

3.5 PIPE SURROUND

- .1 Place surround material in unfrozen condition.
  - .2 Upon completion of pipe laying, and after Departmental Representative has inspected pipe joints, surround and cover pipes as indicated.
  - .3 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.
  - .4 Place layers uniformly and simultaneously on each side of pipe.
  - .5 Compact each layer from pipe invert to mid height of pipe to at least 95% corrected maximum dry density.
  - .6 Compact each layer from mid height of pipe to underside of backfill to at least 90% corrected maximum dry density to ASTM D698.
  - .7 When field test results are acceptable to Departmental Representative, place surround material at pipe joints.
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- 3.6 BACKFILL .1 Place backfill material in unfrozen condition.
- .2 Place backfill material, above pipe surround, in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.
- 3.7 FIELD TESTING .1 Repair or replace pipe, pipe joint or bedding found defective.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- 1.2 REFERENCES
- .1 American Association of State Highway and Transportation Officials (AASHTO)
    - .1 AASHTO M180-12, Standard Specification for Corrugated Sheet Steel Beams for Highway Guardrails.
  - .2 American Society for Testing and Materials (ASTM International)
    - .1 ASTM A307-12, Standard Specification for Carbon Steel Bolts Studs and Threaded Rod, 60 000 PSI Tensile Strength.
  - .3 ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - .4 Canadian Standards Association (CSA International)
    - .1 CAN/CSA-O80 Series-08(R2012), Wood Preservation.
- 1.3 SAMPLES
- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed sources of guide rail and components.
- 1.4 WASTE MANAGEMENT AND DISPOSAL
- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .2 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
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- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Unused paint or coating material must be disposed of at an official hazardous material collections site as approved by Departmental Representative.
- .6 Fold up metal banding, flatten and place in designated area for recycling.
- .7 Do not dispose of unused paint material into sewer system, into streams, lakes, onto ground or in any other location where it will pose a health or environmental hazard.
- .8 Do not dispose of preservative treated wood through incineration.
- .9 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.
- .10 Dispose of treated wood, end pieces, wood scraps and sawdust at a sanitary landfill.
- .11 Dispose of unused preservative material at an official hazardous material collections site. Do not dispose of unused preservative material into the sewer system, streams, lakes, on ground or in any other location where they will pose a health or environmental hazard.

1.5 MEASUREMENT FOR  
PAYMENT

- .1 Guide Rail: Measure supply and erection of roadside steel W-beam guide rail including posts and necessary hardware in lin. meters of guide rail installed and measured from outer tips of steel W-beam guide rail. Include the cost of all plant, labour, equipment and materials required to complete work as specified on accompanying drawings.



PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel W-beam guide rail as indicated and to following requirements:
  - .1 Steel rail and terminal sections: to AASHTO M180-78, class A Type 1 zinc coated.
  - .2 Bolts, nuts and washers: to ASTM A307, hot dip galvanized to ASTM A123/A123M (CSA G-164M).
- .2 Organic zinc-rich coating: to CAN/CGSB-1.181.
- .3 Sawn timber posts and offset blocks:
  - .1 Species: Hemlock or Douglas Fir.
  - .2 Type: pressure treated in accordance with CAN/CSA-O80 Series.
  - .3 Grade: No 1 Structural Grade.
  - .4 Dimensions: as indicated 200 x 200 x 2440 mm.

PART 3 - EXECUTION

3.1 ERECTION

- .1 Set posts by instrument for alignment, and locations as indicated and as directed by Departmental Representative.
  - .2 Excavate post holes to depths as indicated and to diameter of 360 mm plus or minus 20 mm. Compact bottom to provide firm foundation. Set post plumb and square in hole.
  - .3 Backfill around posts using excavated material and compact in uniform layers not exceeding 150 mm compacted thickness.
  - .4 Cut off tops of posts as indicated, with tops parallel to grade of pavement edge.
  - .5 Worker protection: workers must wear gloves respirators dust masks long sleeved clothing eye protection protective clothing when handling, drilling, sawing, cutting or sanding preservative treated wood and applying preservative materials.
  - .6 Construct anchorages to details as indicated. Place and compact backfill for anchors as directed by Departmental Representative.
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- .7 Erect steel W-beam components to details as indicated. Lap joints in direction of traffic. Tighten nuts to 100 N.m torque. Maximum protrusion of bolt 12 mm beyond nut.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures.
  - .2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- 1.2 REFERENCES
- .1 American Society for Testing and Materials (ASTM)
    - .1 ASTM C117-13, Standard Test Method for Material Finer than 0.075 mm Sieve in Mineral Aggregates by Washing.
    - .2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .2 Canadian General Standards Board (CGSB)
    - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire.
    - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- 1.3 SUBMITTALS
- .1 Submit to Departmental Representative for approval, 4 weeks before blasting, details of proposed blasting operations showing types and quantities of explosives, loading charges and patterns, type of blasting caps, blasting techniques, blast protection measures, time of blasting and other pertinent details. Submit subsequent changes to Departmental Representative before proceeding.
  - .2 Samples
    - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
    - .2 Inform Departmental Representative of proposed source of materials and provide access for sampling at least 2 weeks prior to commencing Work.
    - .3 Submit samples representative of quarry, minimum 2 weeks prior to beginning Work.
    - .4 Ship samples prepaid to Departmental Representative for approval.
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- .3 Submit for approval of review by Departmental Representative proposed method of handling armour stone. Submission to cover phases of handling, from removal from form to final position.

1.4 WASTE  
MANAGEMENT AND  
DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Collect and separate for disposal paper, plastic, polystyrene, and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .3 Divert unused geotextiles from landfill to plastic recycling facility as approved by Departmental Representative.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Divert unused concrete materials from landfill to local quarry facility as approved by Departmental Representative.
- .6 Fold up metal banding, flatten and place in designated area for recycling.

1.5 INTERFERENCE TO  
NAVIGATION

- .1 Be familiar with vessel movements and fishery activities in area affected by construction operations.
  - .2 Plan and execute work, in a manner that will not impede navigation, including movement of vessels at the facility.
  - .3 Plan and execute work, in a manner that will not interfere with fishing operations or access to marine structures by land and water.
  - .4 Departmental Representative will not be responsible for loss of time, equipment, material or any other charges related to interference with moored vessels in the harbour or other Contractor's operations.
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- .5 Keep the Marine Communications and Traffic Services' Centre, Fisheries and Oceans Canada, informed of construction operations, in order that necessary Notices to Mariners may be issued.

1.6 REGULATORY REQUIREMENTS

- .1 Comply with municipal, provincial and national codes and regulations relating to project.

1.7 MEASUREMENT FOR PAYMENT

- .1 Rip Rap (500 - 750 kg): measured in cubic metres of material and supplied and placed in this work within the limits specified on drawings.
- .2 There will be no payment made for any material or stone placed beyond limits indicated on the drawings. The final contract grade must be within 200 mm of the specific elevation. Quantities will be based on a as-built survey. Any material placed outside the lines and grades as shown on the drawings will not be measured.
- .3 There will be no additional payment for delays resulting from fishing operations.
- .4 There will be no additional payment for downtime.
- .5 Mobilization/demobilization of equipment to be lump sum will not be measured for payment included in the above pay items.
- .6 Construction and maintenance of haul roads will not be measured for payment.

PART 2 - PRODUCTS

2.1 ROCK MATERIAL

- .1 Hard, angular rock free from cracks, seams and other defects which may impair durability.
  - .2 Relative density, 2.65 minimum.
  - .3 Absorption, 1.5 to 2.0% maximum as determined by ASTM C127 test procedure.
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.4 Durability, less than 35% abrasion Wear, ASTM C535 test procedure.

.5 Sulphate Soundness Determination maximum 12% by ASTM C88.

## 2.2 RIP-RAP

.1 Hard, dense with relative density (formally specific gravity) not less than 2.65, durable quarry stone, free from seams, cracks or other structural defects, to meet following size distribution for use intended.

.2 Rip-rap stone to be well graded with maximum sizes not exceeding 800 mm on any side and minimum size of not less than 500 mm on any side.

.3 Supply rock spalls to fill open joints.

.4 Field stones of appropriate sizes are acceptable for hand placed rip-rap.

## PART 3 - EXECUTION

### 3.1 GENERAL

.1 Contractors will not be permitted to work the existing wharf deck. No equipment allowed on or operate from the structure.

### 3.2 PREPARATION

.1 Haul roads: construct and maintain haul roads.

### 3.3 PLACING

.1 Place rip-rap as directed to thickness and details indicated or as designated by Departmental Representative.

.2 Where rip-rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.

.3 All side slopes to be one (1) vertical to one and one half (1.5) horizontal.

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- .4 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.
- .5 Place stones in manner approved by Departmental Representative.

3.4 ROCK MATERIAL  
WASHED OUT OF WORK

- .1 Should during the progress of the Work, any rock material be washed out of the Work, or through neglect or carelessness of the Contractor or their employees or from any other cause, be dumped into the water near the Work or anywhere within the harbour or channel so as to interfere in the opinion of the Departmental Representative with actual depths of water and/or impede navigation, it will be removed by the Contractor when ordered to do so by the Departmental Representative. Any material washed out of the Work or displaced beyond the contract limits will be replaced by the Contractor at no cost to Canada.

3.5 TOLERANCES

- .1 Note: These tolerances are not to be considered pay limits but are specified to ensure contractor keeps within acceptable lines and grades.
- .2 Completed component layers to be within the following tolerances of lines and grades as indicated:
  - .1 Rip rap +/-300 mm.