

TABLE OF CONTENTS

	Pages
Division 00	
Section 00 41 44.00 - Measurement and Payment.....	9
Division 01	
Section 01 00 10.00 - General Instructions.....	3
Section 01 33 00.00 - Submittal Procedures.....	4
Section 01 35 29.00 - Health, Safety, and Emergency Response Procedures	3
Section 01 35 43.00 - Environmental Procedures.....	4
Section 01 35 73.00 - Procedures for Deconstruction of Structures.....	6
Section 01 41 00.00 - Regulatory Requirements	1
Section 01 45 00.00 - Quality Control.....	2
Section 01 51 00.00 - Temporary Utilities.....	3
Section 01 52 00.00 - Construction Facilities.....	5
Section 01 56 00.00 - Temporary Barriers and Enclosures	3
Section 01 61 00.00 - Common Product Requirements.....	4
Section 01 71 00.00 - Examination and Preparation.....	2
Section 01 73 00.00 - Execution	2
Section 01 74 11.00 - Cleaning.....	2
Division 02	
Section 02 62 00.01 - Hazardous Materials	4
Division 03	
Section 03 30 00.01 - Cast-in-place Concrete Short Form	5
Section 03 41 00.00 - Precast Structural Concrete	4
Section 31 05 10.00 - Corrected Maximum Dry Density For Fill	1
Section 31 05 16.00 - Aggregate Materials	3
Section 31 14 13.00 - Soil Stripping and Stockpiling.....	2
Section 31 22 16.13 - Roadway Subgrade Reshaping	2
Section 31 23 16.26 - Rock Removal	3
Section 31 23 33.01 - Excavating, Trenching and Backfilling.....	9
Section 31 32 19.01 - Geotextiles	3
Section 33 42 13.00 - Pipe Culverts.....	7
Section 33 46 16.00 – Subdrainage Piping	6
ADDITIONAL SPECIFICATIONS	
Section A1010 - Standard Foundations	3

DRAWINGS

5215074 - C00	COVER PAGE
5215074 - C01	DRAWING INDEX
5215074 - C02	LEGEND
5215074 - C03	PLAN
5215074 - C04	PROFILE
5215074 - C05	EXISTING CROSS-SECTIONS
5215074 - C06	CULVER PLAN AND SECTIONS
5215074 - C07	CULVERT DETAILS
5215074 - C08	BANK STABILIZATION PLAN
5215074 - C09	LANDSCAPE DETAILS AND NOTES
5215074 - C10	ROAD GRADING PLAN

END OF TABLE

DIVISION 00

1.1 Method of Measurement

.1 Unless otherwise indicated in the Contract Documents:

.1 Earthwork materials will be measured in cut or net in place, with no allowance for bulking, shrinkage, compression, foundation settlement, or waste.

.2 Products will be measured net, with no allowance for waste.

.3 Dimensions used in calculating quantities will be rounded to the nearest unit of dimension as follows:

Quantity	Dimension
Volume	Cubic meter
Area	Square meter

.4 Contours are based on survey in 2015. Actual ground elevations and location co-ordinates will be determined in the field during the course of the Work for measurement purposes.

.5 Measurements and payment will not be made for work carried out beyond measurement and payment lines and limits specified in the Contract Documents

.2 When boundaries between different items of Work are not specified in the Contract Documents, such boundaries will be established by the Departmental Representative.

.1 Area:

1. For rectangular and regular shaped objects, area will be measured using mean length and width or radius.
2. For irregular areas, areas will be computed using survey data input to Civil 3D software program.

.2 Volume:

1. Unless otherwise indicated, volume will be measured using mean length, width, and height or thickness.
2. Excavation and fill volumes will be computed using survey data input to Civil 3D software program.

.3 Time:

3. Construction Equipment to be paid for on a time basis will be measured in hours of actual working time, and necessary travelling time, when under its own power to the nearest tenth thereof.
4. Hauling equipment to be paid for on a time basis will be measured in hours of actual working time to the nearest tenth thereof.

.4 Number of items will be measured on a per item basis.

.5 Lump Sum:

5. Breakdown of each lump sum item will be submitted to the Departmental Representative to allow for accurate project scheduling and progress payments.
6. The lump sum breakdown will be subject to Departmental's Representative's approval.

1.2 Measurement Computation

- .1 Formulae and computer programs used for measurement computation will be as specified or, when not specified, as selected by the Departmental Representative.

1.3 Measurement of Work

- .1 Unless otherwise specified, the Departmental Representative will measure the Work for the purpose of determining payment to the Contractor.
- .2 The Departmental Representative will request the Contractor to attend with the Departmental Representative in making measurements.
- .3 If the Contractor does not attend pursuant to Paragraph 1.4.2, measurements made or approved by the Departmental Representative will be considered to be the correct measurement for such part of the Work.
- .4 If, after attending pursuant to Paragraph 1.4.2 or 1.4.4, the Contractor disagrees with such measurements or records or drawings, they will nevertheless be considered correct until the Contractor notifies in writing the Departmental Representative of the aspects in which they are considered incorrect. On receipt of such notice, the Departmental Representative will review the measurements or records or drawings and either confirm or vary them.

1.4 Quantities

- .1 Unless otherwise indicated, quantities specified in the Schedule of Prices for Unit Price Work are estimated quantities and will not be considered as actual quantities of Work to be performed. Subject to the Contract terms, unit prices stated in the Schedule of Prices will be applied to actual quantities of Work performed as measured in accordance with the Contract Documents.
- .2 When it is stated that the Contractor will be paid only for the quantity specified for an item of Work, such quantity will be considered as a fixed quantity and the Contractor will be paid for the quantity specified, regardless of the actual quantity performed. If a change in the Work directed by the Departmental Representative results in a change in a fixed quantity, the quantity will be adjusted in accordance with the Contract Documents and payment will be made for the adjusted quantity.

1.5 Schedule of Prices

- .1 The Schedule of Prices is divided into items for purposes of measurement and payment of Work. Price each item in accordance with the methods of measurement specified in the Contract.

-
- .2 Item names in the Schedule of Prices identify the work covered by the respective item, but do not define the size or nature of the unit.
 - .3 Read item names in the Schedule of Prices as part of the item scope, measurement, and payment requirements to which they apply in the Measurement Schedule.
 - .4 For each price specified in the Schedule of Prices include all costs and charges required to perform the Work including overhead charges and profit, and all costs of all related Work for which payment is not specified elsewhere.
 - .5 Subject to the provisions of the Contract Documents, the total amount of the Schedule of Prices shall cover all of the Contractor's obligations under the Contract and all matters and things necessary for performance of the Work in accordance with the Contract Documents.
 - .6 Payment will be made only for items specified in the Schedule of Prices. Costs and charges not directly provided for in the Schedule of Prices will be deemed to be included therein.
 - .7 Work or material included in any one item will not also be measured for payment under another item. No item will be paid for more than once.
 - .8 Omissions or errors in any item including quantities in the Schedule of Prices will not invalidate the Contract nor release the Contractor from any of his obligations or liabilities under the Contract.

1.6 Breakdown of Lump Sum Items

- .1 If requested, submit to the Departmental Representative a breakdown of each Lump Sum item included in the Schedule of Prices, within 21 days after the commencement date of the Contract.
- .2 Provide sufficient details to identify the principal components of the Work and to permit ready valuation of Work performed.
- .3 Unless otherwise identified in the measurement schedule below, progress payments for lump sum items will be based upon estimates of the percentage complete at the time of the progress payment.

1.7 Measurement Schedule

ITEM NO.	ITEM NAME	SECTION	SCOPE, MEASUREMENT, AND PAYMENT
1.	Mobilization and Demobilization	Division 1 Specifications	<p>Scope: Provide all labour, equipment and material required for mobilization, demobilization, disposal of existing structures off-site, disposal of waste material off-site, construction layouts, quality control, temporary construction access and facilities, traffic control, temporary barriers, environmental requirements, permit requirements, and cleaning.</p> <p>Payment: Lump Sum for this line item is to be paid in accordance with the following schedule. The total amount of such payments shall not exceed the amount bid for this item. Payment for the first 50% of the Lump Sum amount will be made after completion of at least 5% of the total Work. Payment of the final 50% of this line item will be made after completion of all Work of the Contract, excluding warranty maintenance items, but including full removal of Contractor facilities and equipment from the site.</p>
2.	Excavation	Section 31 23 33.01	<p>Scope: Provide all labour, equipment and materials necessary to excavate, transport and place material, as shown on the Contract drawings.</p> <p>This work shall include, but is not limited to the following: excavating, loading, hauling, unloading, temporary stockpiling and placing of gravel, as well as the disposal of any waste excavation materials off site. It shall also include all related work and materials for which payment is not included elsewhere.</p> <p>Payment: 100% of this line item will be paid out after certificate of substantial completion is issued.</p>
3.	Erosion Control Barrier	Section 01 35 73.00	<p>Scope: Provide all temporary sediment and erosion control measures including but not limited to supply, installation and removal of all temporary erosion and sediment control measures as required. This item does not include the specific permanent erosion control measures which are paid elsewhere.</p> <p>Placement of all erosion and sediment control measures are to be coordinated with the Departmental Representative.</p> <p>Payment: 100% of this line item will be paid out after certificate of substantial completion is issued.</p>
4.	Shelter Demolition	Section 01 35 73.00	<p>Scope: Provide all labour, equipment and materials necessary to demolish, remove and dispose of the Shelter adjacent to the creek. The entire structure above the elevation of the concrete is to be demolished, removed, and disposed at an approved landfill. Shelter contains lead paint. Analytical samples of the paint are attached. Any picnic tables in the shelter will be temporarily removed outside the</p>

ITEM NO.	ITEM NAME	SECTION	SCOPE, MEASUREMENT, AND PAYMENT
			<p>shelter during the demolition, and placed on the concrete floor after demolition.</p> <p>Measurement: Shall be the entire structure with the exception of the concrete floor.</p> <p>Payment: Lump sum paid upon completion of the demolition and disposal of the structure.</p>
5.	Precast Reinforced Footing	Section 03 41 00.00	<p>Scope: Provide all labour, equipment and materials necessary to supply and install precast reinforced concrete footing under the culvert, as shown on the Contract drawings.</p> <p>Measurement: Shall be the length of the precast reinforced footing as measured by the Departmental Representative</p> <p>Payment: Unit price per meter.</p>
6.	20mm Crushed Gravel	Section 31 23 33.01	<p>Scope: Provide all labour, equipment, and material necessary to complete supply, loading, and hauling of the crush gravel from a suitable off-site source; preparing receiving surfaces, dumping, spreading, grading, and levelling the crush over the areas shown on the Contract drawings or as directed by the Departmental Representative. Crushed gravel shall be placed to specific thickness at locations as per contract drawing.</p> <p>Crushed gravel shall be placed on native soil and shall be placed evenly within the area. It shall also include all related work and materials for which payment is not included elsewhere.</p> <p>Measurement: Shall be the compacted volume as measured by the Departmental Representative</p> <p>Payment: Unit price per cubic meter.</p>
7.	Corrugated Steel Multi-plate Culvert Supply	Section 33 42 13.00	<p>Scope: Provide all labour, equipment and material necessary to supply and install corrugated steel multi-plate culvert as per the Contract drawings. Stamped shop drawing shall be provided by the Contractor.</p> <p>This work shall include, but is not limited to the following: supplying, loading, hauling, unloading, protecting and maintaining as per suppliers specifications. It shall also include all related work and materials for which payment is not included elsewhere.</p> <p>Measurement: Shall be per meter length as measured by the Departmental Representative. The culvert must be placed as specified in the contract drawing.</p> <p>Payment: Unit price per length meter.</p>

ITEM NO.	ITEM NAME	SECTION	SCOPE, MEASUREMENT, AND PAYMENT
8.	Class II Rip Rap, 800mm thk	Section 33 42 13.00	<p>Scope: Provide all labour, equipment and materials necessary to place the Class I rip rap, as shown on the Contract drawings.</p> <p>This work shall include, but is not limited to the following: loading, hauling, unloading, temporary stockpiling, foundation excavation and placing of rip rap. It shall also include all related work and materials for installing geotextile and salvaged bedding material, and related work for which payment is not included elsewhere.</p> <p>Measurement: Shall be the area of rip rap placed as measured by the Departmental Representative. The rip rap must be placed to the thicknesses specified in the Contract drawings.</p> <p>Payment: Unit price per square meter.</p>
9.	Class I Rip Rap, 600mm thk	Section 33 42 13.00	<p>Scope: Provide all labour, equipment and materials necessary to place the Class I rip rap, as shown on the Contract drawings.</p> <p>This work shall include, but is not limited to the following: loading, hauling, unloading, temporary stockpiling, foundation excavation and placing of rip rap. It shall also include all related work and materials for installing geotextile and salvaged bedding material, and related work for which payment is not included elsewhere.</p> <p>Measurement: Shall be the area of rip rap placed as measured by the Departmental Representative. The rip rap must be placed to the thicknesses specified in the Contract drawings.</p> <p>Payment: Unit price per square meter</p>
10.	Topsoil, 150 mm thick	Refer to Drawing	<p>Scope: Provide all labour, equipment, and material necessary to complete supply, loading, and hauling of the topsoil from a suitable off-site source; preparing receiving surfaces; dumping, spreading, grading, and scarifying the topsoil over the areas shown on the Contract drawings or as directed by the Departmental Representative. Topsoil shall be placed to a minimum thickness of 150 mm. This item shall also include removing and disposing of rocks or other deleterious materials from the topsoiled areas.</p> <p>Measurement: Shall be the area of topsoil as measured by the Departmental Representative</p> <p>Payment: Unit price per square meter.</p>
11	Geotextile – non-woven	Section 33 42 13.00	<p>Scope: Provide all labour, equipment, and material necessary to install geotextile as shown on the Contract drawings.</p> <p>Measurement: Shall be the area of geotextile,</p>

ITEM NO.	ITEM NAME	SECTION	SCOPE, MEASUREMENT, AND PAYMENT
			excluding overlaps, as measured by the Departmental Representative Payment: Unit price per square meter.
12.	Gravel Road Re-construction	Section 31 23 33.01	<p>Scope: Provide all labour, equipment and materials necessary to excavate, transport and construct the road structure consisting of crushed gravel, pit run gravel and compacted subgrade, as shown on the Contract drawings.</p> <p>This work shall include, but is not limited to the following: excavating, loading, hauling, unloading, temporary stockpiling, subgrade preparation and compaction. It shall also include all related work and materials for which payment is not included elsewhere.</p> <p>Measurement: Shall be the area of the reconstructed road as measured by the Departmental Representative</p> <p>Payment: Unit price per square meter.</p>
13.	Backfill - native	Section 31 23 33.01	<p>Scope: Provide all labour, equipment and materials necessary to backfill and compact areas as shown on the Contract drawings. The backfill includes native soil according to the Contract drawings.</p> <p>This work shall include, but is not limited to the following: loading, hauling, unloading, temporary stockpiling, and placing of backfills. It shall also include all related work and materials for which payment is not included elsewhere.</p> <p>Measurement: Shall be the compacted volume as measured by the Departmental Representative.</p> <p>Payment: Unit price per cubic meter.</p>
14.	Rip Rap, 450mm+/- 150mm	Section 33 42 13.00	<p>Scope: Provide all labour, equipment and materials necessary to place the rip rap 450 mm +/- 150mm, as shown on the Contract drawings.</p> <p>This work shall include, but is not limited to the following: loading, hauling, unloading, temporary stockpiling, foundation excavation and placing of rip rap. It shall also include all related work for which payment is not included elsewhere.</p> <p>Measurement: Shall be the weight of rocks per tonne of rip rap placed as measured by the Departmental Representative. The rip rap must be placed according to the Contract drawings.</p> <p>Payment: Unit price per Tonne.</p>
15.	Backfill – 75mm pit run (imported)	Section 31 23 33.01	<p>Scope: Provide all labour, equipment and materials necessary to backfill and compact areas as shown on the Contract drawings. The backfill includes 75 mm pit run imported from appropriate sources approved</p>

ITEM NO.	ITEM NAME	SECTION	SCOPE, MEASUREMENT, AND PAYMENT
			<p>by Departmental Representative.</p> <p>This work shall include, but is not limited to the following: loading, hauling, unloading, temporary stockpiling, and placing of backfills. It shall also include all related work and materials for which payment is not included elsewhere.</p> <p>Measurement: Shall be the compacted volume as measured by the Departmental Representative.</p> <p>Payment: Unit price per cubic meter.</p>
16.	Backfill – 75mm pit run obtained on-site	Section 31 23 33.01	<p>Scope: Provide all labour and equipment necessary to backfill and compact areas as shown on the Contract drawings. Backfill to consist of pit run obtained from approved locations from the creek bed as directed by the Department Representative.</p> <p>This work shall include, but is not limited to the following: loading, hauling, unloading, temporary stockpiling, and placing of backfills. It shall also include all related work and materials for which payment is not included elsewhere.</p> <p>Measurement: Shall be the compacted volume as measured by the Departmental Representative.</p> <p>Payment: Unit price per cubic meter.</p>
17.	Topsoil, 150mm thk	Refer to drawing	<p>Scope: Provide all labour, equipment, and material necessary to complete supply, loading, and hauling of the topsoil from a suitable off-site source; preparing receiving surfaces; dumping, spreading, grading, and scarifying the topsoil over the areas shown on the Contract drawings or as directed by the Departmental Representative. Topsoil shall be placed to a minimum thickness of 150 mm. This item shall also include removing and disposing of rocks or other deleterious materials from the topsoiled areas.</p> <p>Where topsoil is placed on riprap, the topsoil shall be placed within all openings, and shall be placed evenly within the riprap. It shall also include all related work and materials for which payment is not included elsewhere.</p> <p>Measurement: Shall be the area of topsoil as measured by the Departmental Representative</p> <p>Payment: Unit price per square meter.</p>
18	Seeding	Refer to drawing	<p>Scope: Provide all labour, equipment, and material necessary for preparation, installation, fertilization, warranty and maintenance of seeding including watering as required until establishment.</p> <p>Measurement: Shall be the area seeded as measured by the Departmental Representative</p> <p>Payment: Unit price per square meter.</p>

ITEM NO.	ITEM NAME	SECTION	SCOPE, MEASUREMENT, AND PAYMENT
19	Live Willow Cuttings (salix spp)	Refer to drawing	<p>Scope: Provide all labour, equipment and materials necessary to supply and install live willow stakes, as shown on the Contract drawings.</p> <p>This work shall include, but is not limited to the following: supplying, loading, hauling, unloading, protecting and maintaining as per suppliers specifications, installing and watering during the construction period. It shall also include all related work and materials for which payment is not included elsewhere.</p> <p>Measurement: Shall be per each root stake feature placed as measured by the Departmental Representative. The stake must be placed as specified in the contract drawing.</p> <p>Payment: Unit price per each stake.</p>
20	Straw coconut matting	Refer to drawing	<p>Scope: Provide all labour, equipment and materials necessary to supply and install live willow staking, as shown on the Contract drawings.</p> <p>This work shall include, but is not limited to the following: supplying, loading, hauling, unloading, protecting and maintaining as per suppliers specifications, and installing. It shall also include all related work and materials for which payment is not included elsewhere.</p> <p>Measurement: Shall be the area of matting as measured by the Departmental Representative</p> <p>Payment: Unit price per square meter.</p>

DIVISION 01

Part 1 General**1.1 Description**

1. The work, unless specifically stated otherwise, shall include the furnishing of all materials, products, plants, labour, equipment and transportation necessary to complete the work. The intent is that the **Contractor** provides a complete job.
2. The work shall not be deemed complete until all components are placed in operation by the **Contractor**, and are operating satisfactorily.
3. Any minor item of the work not called for in the specifications or shown on the drawings but clearly required to meet the intent of design and normally provided for the proper operation of the work shall be provided as if specifically called for in the contract documents.
4. The complete work under this contract shall be governed by the dictates of good practice in all details, materials and workmanship even if not minutely specified. The components of the work shall be properly co-ordinated to provide a complete system.

1.3 Existing Surface Conditions

1. The **Contractor** shall examine the site of the proposed work, prior to submitting a tender, and ascertain that the location, size and depth of surface structures, including roadway and concrete structures, landscaping and utilities, as shown on the drawings and described in these documents, represent the actual conditions.
2. The **Contractor** shall report immediately any discrepancies between the details shown on the drawings and the actual field conditions or any omissions to the drawings and/or other documents to the **Departmental Representative**.

1.4 Site Inspection During Tendering

1. Inspection
 1. The **Contractor** shall inspect the site and note all existing conditions.
 2. Make note of the arrangements needed for access during construction, traffic control, maintenance of supplies and interference with existing utilities.
 3. Carry out subsurface investigation if deemed necessary by the **Contractor** and acceptable to the **Departmental Representative**.
- .2 Drawings and Documents
 1. Obtain clarification from the **Departmental Representative** when the meaning of the drawings and the documents is in doubt, prior to submitting the tender.
 2. After submission of the tender, no claim will be considered on the grounds that there was any misunderstanding with respect to the conditions imposed by the contract documents.
 3. Verbal conversation or agreement made at any time with the officer, agency or employee of the **Departmental Representative** shall not affect or modify any of the terms or obligations under the contract.

1.5 Documents Required

1. Maintain at the job site at least one copy of each of the following to be available at all times to the consultant and his representatives:
 - Contract Drawings
 - Specifications
 - Addenda
 - Change Orders
 - Reviewed Shop Drawings
 - Modifications to the Contract
 - Field Test Reports
 - Construction Schedule
 - Manufacturer's Installation and Application Instructions
 - Occupational Health and Safety Regulations;
and have readily available the Standard Specifications.

1.6 Direction of the Work

1. The **Departmental Representative** will not be responsible for the **Contractor's** means, methods, techniques, sequences or procedures of construction, or for the supervision of the **Contractor's** performance of this contract, or for the **Contractor's** failure to perform the work in accordance with the contract. However, if at any time the **Departmental Representative** is of the opinion that the number of workmen, pieces of equipment or quality of machinery, tools, plant and equipment or articles are insufficient to meet the schedule, he may so advise the **Contractor**. The **Contractor** shall promptly make the necessary changes to ensure that the schedule is adhered to.
2. Pursuant to the provisions of the General Conditions of the contract, while it is intended that the **Contractor** shall be allowed in general to carry out the contract in such a manner that may appear to him to be the most desirable, the **Departmental Representative** at his discretion may direct the order in which and points at which the work shall be undertaken. This control shall be exercised in the interest of the **Departmental Representative** and it is intended that an agreement be reached between all parties prior to the commencement of the contract.

1.7 Standard Specifications

1. Wherever standard specifications (i.e., CSA, ASTM and such) are referred to in these contract documents the current edition at the date of closing of tenders shall apply.
2. Where there is a clear conflict between the Standard Specifications and the contract documents, the contract documents shall apply.
3. Where there is an ambiguity between the Standard Specifications and any term of these contract documents, the **Departmental Representative** shall, in the first instance, give an interpretation of the intent of the contract.

1.8 Security

1. The **Departmental Representative** will not be responsible for any loss or damage to property of the **Contractor**.

The **Contractor** shall furnish any additional watchmen as he deems necessary.

END OF SECTION

Part 1 General**1.1 ADMINISTRATIVE**

- .1 Submit to **Departmental Representative** submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Where item or information is not produced in SI Metric Units, converted values are acceptable.
- .4 Review submittals prior to submission to the **Departmental Representative**. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .5 Notify **Departmental Representative**, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .6 Verify field measurements and affected adjacent Work is co-ordinated.
- .7 Contractor's responsibility for errors and omissions in submission is not relieved by the **Departmental Representative's** review of submittals.
- .8 **Contractor's** responsibility for deviations in submission from requirements of Contract Documents is not relieved by the **Departmental Representative's** review.
- .9 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by **Contractor** to illustrate details of a portion of Work.
- .2 Submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in the Province of British Columbia, Canada.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 15 days for the **Departmental Representative** review of each submission.

-
- .5 Adjustments made on shop drawings by **Departmental Representative** are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the **Departmental Representative** prior to proceeding with Work.
 - .6 Make changes in shop drawings as the **Departmental Representative** may require, consistent with Contract Documents. When resubmitting, notify the **Departmental Representative** in writing of revisions other than those requested.
 - .7 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
 - .8 Submissions include:
 - .1 Date and revision dates
 - .2 Project title and number
 - .3 Name and address of:
 - .1 Subcontractor
 - .2 Supplier Manufacturer
 - .4 **Contractor's** stamp, signed by **Contractor's** authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances
 - .3 Setting or erection details
 - .4 Capacities
 - .5 Performance characteristics
 - .6 Standards
 - .7 Operating weight
 - .8 Wiring diagrams
 - .9 Single line and schematic diagrams
 - .10 Relationship to adjacent work
 - .9 The **Contractor** shall, after the **Departmental Representative's** review, distribute copies.
 - .10 Submit six copies of shop drawings for each requirement requested in specification Sections and as the **Departmental Representative** may reasonably request.
 - .11 Submit six copies of product data sheets or brochures for requirements requested in specification Sections and as requested by the **Departmental Representative** where shop drawings will not be prepared due to standardized manufacture of product.

-
- .12 Submit six copies of test reports for requirements requested in specification Sections and as requested by the **Departmental Representative**.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .13 Submit six copies of certificates for requirements requested in specification Sections and as requested by the **Departmental Representative**.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
 - .14 Submit six (6) copies of manufacturers instructions for requirements requested in specification Sections and as requested by the **Departmental Representative**.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
 - .15 Submit six (6) copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by The **Departmental Representative**. Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
 - .16 Submit six (6) copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by the **Departmental Representative**.
 - .17 Delete information not applicable to project.
 - .18 Supplement standard information to provide details applicable to project.
 - .19 If upon review by the **Departmental Representative**, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.3 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to the **Departmental Representative**.
- .3 Notify the **Departmental Representative** in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.

- .5 Adjustments made on samples by the **Departmental Representative** are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the **Departmental Representative** prior to proceeding with Work.
- .6 Make changes in samples which the **Departmental Representative** may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.

END OF SECTION

Part 1 General**1.1 REFERENCES**

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS)
- .3 Province of British Columbia
 - .1 Occupational Health and Safety Regulation, B.C. Reg. 30/2015, August 4, 2015.

1.2 SUBMITTALS

- .1 Prepare submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within seven days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan
- .3 Submit three copies of **Contractor's** authorized representative's work site health and safety inspection reports to **Departmental Representative** on a weekly basis.
- .4 Submit copies of incident and accident reports.
- .5 The **Departmental Representative** will review **Contractor's** site-specific Health and Safety Plan and provide comments to **Contractor** within five days after receipt of plan. Revise plan as appropriate and resubmit plan to the **Departmental Representative** within five (5) days after receipt of comments from **Departmental Representative**.
- .6 The **Departmental Representative's** review of **Contractor's** final Health and Safety plan should not be construed as approval and does not reduce the **Contractor's** overall responsibility for construction Health and Safety.
- .7 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to the **Departmental Representative**.
- .8 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.3 FILING OF NOTICE

- .1 File Notice of Project with Provincial authorities prior to beginning of Work.

1.4 SAFETY ASSESSMENT

- .1 Perform site specific safety hazard assessment related to project.

1.5 MEETINGS

- .1 Schedule and administer Health and Safety meeting with **Departmental Representative** prior to commencement of Work.

1.6 GENERAL REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 **Departmental Representative** may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.7 RESPONSIBILITY

- .1 The **Contractor** shall be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 The **Contractor** shall comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.8 COMPLIANCE REQUIREMENTS

- .1 Comply with Occupational Health and Safety Act, General Safety Regulation, Province of British Columbia.
- .2 Comply with Occupational Health and Safety Regulations, 2003.
- .3 Comply with Occupational Health and Safety Act, General Safety Regulations, O.I.C.
- .4 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.9 UNFORSEEN HAZARDS

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of the Province of British Columbia and advise the **Departmental Representative** verbally and in writing.

1.10 HEALTH AND SAFETY CO-ORDINATOR

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
 - .1 Have site-related working experience specific to activities associated with site servicing works.
 - .2 Have working knowledge of occupational safety and health regulations.

- .3 Be responsible for completing **Contractor's** Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
- .4 Be responsible for implementing, enforcing daily and monitoring site-specific **Contractor's** Health and Safety Plan.
- .5 Be on site during execution of Work and report directly to and be under direction of the site supervisor.

1.11 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of the Province of British Columbia, and in consultation with the **Departmental Representative**.

1.12 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by the **Departmental Representative**.
- .2 Provide the **Departmental Representative** with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 The **Departmental Representative** may stop Work if non-compliance of health and safety regulations is not corrected.

1.13 WORK STOPPAGE

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS****1.2 DEFINITIONS**

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.3 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.
- .3 Address topics at level of detail commensurate with environmental issue and required construction task[s].
- .4 Environmental protection plan include:
 - .1 Name of person responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Name and qualifications of person responsible for manifesting hazardous waste to be removed from site.
 - .3 Name and qualifications of person responsible for training site personnel.
 - .4 Descriptions of environmental protection personnel training program.
 - .5 Erosion and sediment control plan which identifies type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
 - .6 Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
 - .7 Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plans include measures to

minimize amount of mud transported onto paved public roads by vehicles or runoff.

- .8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.
- .9 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
- .10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
- .11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.
- .12 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .13 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.
- .14 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.
- .15 Pesticide treatment plan: to be included and updated, as required.

1.4 DISPOSAL OF WASTES

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

1.5 DRAINAGE

- .1 Provide erosion and sediment control plan that identifies type and location of erosion and sediment controls to be provided. Plan: include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sedimentations control plan.
- .3 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

- .4 Do not pump water containing suspended materials into waterways, sewer or drainage systems.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 SITE CLEARING AND PLANT PROTECTION

- .1 Protect trees and plants on site and adjacent properties where indicated.
- .2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil and vegetation.
- .5 Restrict tree removal to areas indicated or designated by Departmental Representative.

1.7 WORK ADJACENT TO WATERWAYS

- .1 Do not operate construction equipment in waterways.
- .2 Do not use waterway beds for borrow material without Departmental Representative's approval.
- .3 Do not dump excavated fill, waste material or debris in waterways.
- .4 Design and construct temporary crossings to minimize erosion to waterways.
- .5 Do not skid logs or construction materials across waterways.
- .6 Avoid indicated spawning beds when constructing temporary crossings of waterways.
- .7 Do not blast under water or within 100 m of indicated spawning beds.

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 and waterways 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.

1.9 HISTORICAL / ARCHAEOLOGICAL CONTROL

- .1 Provide historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in area are discovered during construction.
- .2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.

1.10 NOTIFICATION

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section [01 33 00 - Submittal Procedures].
- .2 Section [01 35 29.00 - Health and Safety Requirements].
- .3 Section [01 35 43 - Environmental Procedures].
- .4 Section [01 56 00 - Temporary Barriers and Enclosures].
- .5 Section [01 35 73.00 - Procedures For Deconstruction Of Structures].

1.2 REFERENCES

- .1 Canadian Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0-[December 2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System For New Construction and Major Renovations.
- .2 Federal Legislation
 - .1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).
 - .2 Canadian Environmental Assessment Act, 1992, c. 37 (CEAA).
 - .3 Transportation of Dangerous Goods Act 1992, c. 34 (TDGA).
 - .4 Motor Vehicle Safety Act 1993, c. 16 (MVSA).

1.3 DEFINITIONS

- .1 Deconstruction: systematic dismantling of structure to salvage materials for reuse. What cannot be reused is considered subsequently for recycling. Ultimate objective is to recover potentially valuable resources while diverting from landfill what has traditionally been significant portion of waste stream.
- .2 Demolition: rapid destruction of structure with or without prior removal of hazardous materials.
- .3 Disassembly: physical detachment of materials from structure and may include: prying, pulling, cutting, and unscrewing.
- .4 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.
- .5 Processing: tasks which are subsequent to disassembly and may include: moving materials, denailing, cleaning, separating and stacking.

- .6 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse by others.
- .7 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .8 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .9 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 - .1 Salvaging reusable materials from remodelling projects before the demolition stage, for resale, reuse on current project or for storage for use on future projects.
 - .2 Returning reusable items may include pallets and unused products to vendors.
- .10 Salvage: removal of structural and non-structural structure materials from industrial, commercial and institutional structure deconstruction/disassembly projects for purpose of reuse or recycling.
- .11 Source Separation: acts of keeping different types of waste materials separate beginning from first time they become waste.
- .12 Waste Management Co-ordinator (WMC) : contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.
- .13 Waste Reduction Work plan (WRW): written report which outlines actions to be taken to reduce, reuse and recycle materials during course of deconstruction. Actions based on finding of the Waste Audit (WA).

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 WMC is responsible for fulfillment of reporting requirements.
- .3 Prior to start of Work on site, submit detailed Waste Audit indicating descriptions of and anticipated quantities of materials to be reused, recycled and landfilled in accordance with Section 01 35 73.00 - Procedures For Deconstruction Of Structures.
- .4 Based on findings of Waste Audit submit Waste Reduction Work plan indicating schedule of selective demolition, material descriptions and quantities to be salvaged, number and location of bins, anticipated frequency of tip page, and names and addresses of facilities in accordance with Section 01 35 73.00 - Procedures For Deconstruction Of Structures.
- .5 Submit copies of certified used building material receipts from authorized disposal sites and reuse and recycling facilities for material removed from site to Departmental Representative on weekly basis.

- .1 Written authorization from Departmental Representative is required to deviate from facilities listed in Waste Reduction Work plan.
- .6 Workers, haulers and subcontractors must possess current, applicable Certificates of permits to remove, handle and dispose of wastes categorized provincially municipally as hazardous.
 - .1 Provide proof of compliance within 24hours upon receipt of written request of Departmental Representative.
- .7 Keep copies of submittals on file for minimum of one year after completion of project.

1.5 SITE CONDITIONS

- .1 Existing Conditions:
 - .1 Should materials resembling spray or trowel applied asbestos or other designated substance listed as hazardous be encountered in course of deconstruction, stop work, take preventative measures, and notify Departmental Representative immediately. Do not proceed until written instructions have been received.
 - .2 Base structures to be deconstructed on their condition on date of contract award . Be responsible for provision of services required for deconstruction.
- .2 Storage:
 - .1 Store materials salvaged for reuse and recycling, designated for alternate disposal in locations as indicated by Departmental Representative.
 - .2 Maximum permitted duration of material storage on site 6 months determined in consultation with Departmental Representative after project completion.

1.6 ENVIRONMENTAL PROTECTION

- .1 Ensure Work is done in accordance with Section 01 35 43 - Environmental Procedures.
- .2 Ensure deconstruction work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air noise pollution.
- .3 Fires and burning of waste or materials is not permitted on site.
- .4 Do not bury waste or materials on site unless approved in writing by Departmental Representative.
- .5 Do not dispose of waste or volatile materials into watercourses, storm or sanitary sewers.
 - .1 Ensure proper disposal procedures in accordance with CEPA and applicable Provincial.
- .6 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties in accordance with authorities having jurisdiction.
- .7 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction as directed by Departmental Representative.

- .8 Protect trees, plants and foliage on site and adjacent properties where indicated.
- .9 Prevent extraneous materials from contaminating air beyond deconstruction area, by providing temporary enclosures during Work.
- .10 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on temporary roads.
- .11 Designate worker to protect salvaged materials from vandalism, theft, adverse weather, or inadvertent damage by heavy machinery.
- .12 Use natural lighting to do Work where possible.
 - .1 Shut off lighting except those required for security purposes at end of each day.
- .13 Organize site and workers in manner which promotes efficient flow of materials through disassembly, processing, stockpiling, and removal.

1.7 SCHEDULING

- .1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion. In event of unforeseen delay notify Departmental Representative in writing.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 SELECTIVE DEMOLITION

- .1 Reuse of Existing Structure Elements: this project has been designed to result in end of project rates for reuse of structure elements as follows: Do not demolish building elements beyond what is indicated on drawings without approval by Departmental Representative.

3.2 SITE VERIFICATION OF CONDITIONS

- .1 Employ necessary means to assess site conditions and structures to determine quantity and locations of hazardous materials.
- .2 Investigate site and structures to determine dismantling, processing and storage logistics required prior to beginning of Work.
- .3 Develop strategy for deconstruction to facilitate optimum salvage of reusable and recyclable materials.

3.3 PREPARATION

- .1 Obtain necessary permits and approvals including demolition.
 - .1 Provide copies to Departmental Representative prior to start of Work on site within 24 hours of written request.
- .2 Post signs in visible locations and appropriate languages which indicate to workers, subcontractors, haulers, and public, location of processing.

3.4 STORAGE, HANDLING AND PROTECTION

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Protect structural components not removed for demolition from movement or damage.
- .6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.
- .7 Protect surface drainage, mechanical and electrical from damage and blockage.
- .8 Separate and store materials produced during dismantling of structures in designated areas.
- .9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
 - .1 On-site source separation is recommended.
 - .2 Remove co-mingled materials to off-site processing facility for separation.
 - .3 Provide waybills for separated materials.

3.5 DISPOSAL OF WASTES

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste, volatile materials, mineral spirits into waterways, storm, or sanitary sewers.
- .3 Keep records of construction waste including:
 - .1 Number and size of bins.
 - .2 Waste type of each bin.
 - .3 Total tonnage generated.
 - .4 Tonnage reused or recycled.

- .5 Reused or recycled waste destination.
- .4 Remove materials from deconstruction as deconstruction/disassembly Work progresses.
- .5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.

3.6 REMOVAL FROM SITE

- .1 Transport material designated for alternate disposal using approved facilities listed in Waste Reduction Work plan and in accordance with applicable regulations.
 - .1 Written authorization from Departmental Representative is required to deviate from facilities listed in Waste Reduction Work plan.
- .2 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
 - .1 Disposal facilities must be those approved of and listed in Waste Reduction Work plan.
 - .2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Work plan.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS****1.2 REFERENCES AND CODES**

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

1.3 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions and municipal by-laws.

1.4 NATIONAL PARKS ACT

- .1 Perform Work in accordance with National Parks Act when projects are located within boundaries of National Park.

END OF SECTION

Part 1 General**1.1 INSPECTION**

- .1 Allow the **Departmental Representative** access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by the **Departmental Representative**, instructions, or law of Place of Work.
- .3 If **Contractor** covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 The **Departmental Representative** will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, the **Departmental Representative** shall pay cost of examination and replacement.

1.2 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by the **Departmental Representative** for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the **Departmental Representative**.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by the **Departmental Representative** at no cost to the **Departmental Representative**. Contractor shall pay costs for re-testing and re-inspection.

1.3 ACCESS TO WORK

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

1.4 PROCEDURES

- .1 Notify appropriate agency and the **Departmental Representative** in advance of requirement for tests, in order that attendance arrangements can be made.

-
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
 - .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.5 REJECTED WORK

- .1 Defective work, whether the result of poor workmanship, use of defective products or damage through carelessness or other acts or omission of the Contractor and whether incorporated in Work or not, which has been rejected by the **Departmental Representative** as failing to conform to Contract Documents shall be removed promptly from the Place of the Work by the Contractor and replaced or re-executed promptly in accordance with Contract Documents at the Contractor's expense.
- .2 Other Contractor's work destroyed or damaged by such removals or replacements shall be made good promptly at the Contractor's expense.
- .3 If in the opinion of the **Departmental Representative**, it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, the **Departmental Representative** may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined in the first instance by the **Departmental Representative**.

1.6 REPORTS

- .1 Submit four (4) copies of inspection and test reports to the **Departmental Representative**.
- .2 Provide copies to subcontractor of work being inspected or tested, and to the manufacturer or fabricator of material being inspected or tested.

1.7 TESTS AND MIX DESIGNS

- .1 Furnish test results and mix designs as requested.
- .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by the **Departmental Representative** and may be authorized as recoverable.

1.8 EQUIPMENT AND SYSTEMS

- .1 Submit adjustment and balancing reports for mechanical systems.

END OF SECTION

Part 1 General**1.1 SUBMITTALS**

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

1.2 INSTALLATION AND REMOVAL

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

1.3 DEWATERING

- .1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

1.4 WATER SUPPLY

- .1 The **Contractor** shall provide and pay all cost for water required for the performance of the work, this includes flushing and testing of the water line, in accordance with governing regulations and ordinances.
- .2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.

1.5 TEMPORARY HEATING AND VENTILATION

- .1 **Contractor** shall provide and pay for all cost for temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 **Contractor** to provide temporary heat and ventilation in enclosed areas as required to:
 - .1 Facilitate progress of Work.
 - .2 Protect Work and products against dampness and cold.
 - .3 Prevent moisture condensation on surfaces.
 - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
 - .5 Provide adequate ventilation to meet health regulations for safe working environment.
- .3 Ventilating:
 - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
 - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
 - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
 - .4 Ventilate storage spaces containing hazardous or volatile materials.

- .5 Ventilate temporary sanitary facilities.
- .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- .4 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .1 Conform to applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.
 - .5 Vent direct-fired combustion units to outside.
- .5 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.6 TEMPORARY POWER AND LIGHT

- .1 The **Contractor** shall provide and pay all cost for temporary power during construction for temporary lighting and operation of power tools at no cost to the **Departmental Representative**.
- .2 Furnish and install all necessary temporary wiring, distribution boxes, panels, etc and upon completion of work, remove all such temporary materials.
- .3 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.
- .4 Provide and maintain temporary lighting throughout project.

1.7 TEMPORARY COMMUNICATION FACILITIES

- .1 **Contractor** shall provide and pay all cost for temporary telephone, fax or data hook up, lines and equipment necessary for his own use.

1.8 FIRE PROTECTION

- .1 Provide and pay all cost for and, maintain temporary fire protection equipment during performance of Work required by organization having jurisdiction and governing codes, regulations and bylaws.
- .2 Burning rubbish and construction waste materials is not permitted on site.

Part 2 Execution

2.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

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

- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

Part 1 General**1.1 REFERENCES**

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.

1.2 SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by **Contractor**, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Identify areas which have to be gravelled to prevent tracking of mud.
- .3 Provide construction facilities in order to execute work expeditiously.
- .4 Remove from site all such work after use.

1.4 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms and temporary stairs.
- .3 On major structures, employ a qualified professional engineer registered in the province of British Columbia for the design of temporary works.

1.5 HOISTING

- .1 Provide, operate and maintain hoist and cranes required for moving of workers, materials and equipment as required on site. Make financial arrangements with Subcontractors for their use of hoist.
- .2 Hoist and cranes shall be operated by qualified operator.

1.6 SITE STORAGE/LOADING

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.7 CONSTRUCTION PARKING

- .1 Parking will be permitted on site provided it does not disrupt performance of Work.
- .2 Provide and maintain adequate access to project site.

1.8 OFFICES

- .1 Subcontractors shall provide their own offices as necessary. The **Contractor** shall direct location of these offices on site.
- .2 Provide marked and fully stocked first-aid case in a readily available location.

1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE

- .1 **Contractor** to provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.10 SANITARY FACILITIES

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

1.11 CLEAN-UP

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

1.12 WINTER CONSTRUCTION

- .1 Special construction methods required to perform the work in severe weather shall be the responsibility of the **Contractor**.
- .2 Where the specifications call for work to be performed within a given temperature range or above a minimum temperature, it shall be the **Contractor's** responsibility to provide all temporary enclosures and heat necessary to provide the conditions specified.
- .3 Where compaction of backfill is specified, the **Contractor** shall perform the work in a manner such that compaction can be achieved.

-
- .4 Where weather conditions are such that compaction of backfill consisting of excavated materials is not possible, the Contractor shall provide unfrozen granular material for backfill, at the **Contractor's** expense.

1.13 ACCESS ROADS

- .1 Construct temporary access roads as necessary to perform the work, and maintain temporary access roads until construction is over or until permanent access is established.
- .2 Locations and drainage facilities for temporary access roads are subject to the approval of the **Departmental Representative**.
- .3 No direct payment will be made to the **Contractor** for construction of temporary access roads and removal and restoration after construction completion.

1.14 EXISTING UTILITIES AND STRUCTURES

- .1 Existing utilities and structures include the following: pipes, culverts, ditches or other items which are part of an existing sewerage, drainage or water system; or which are part of a gas, electrical, telephone, television, telecommunications or other utility systems. Also included are streets, sidewalks, curbs, gutters, swales, poles, fences or any other structures encountered during construction.
- .2 The **Contractor** shall be responsible for protection, removal or replacement of existing utilities and structures, or for repair of any damage, which may occur during construction.
- .3 Existing utilities and structures may be shown on the drawings, or described in the specifications. Such information is shown for design purposes and the existence, location and detail given is information that is obtained during the design period and is not necessarily complete, correct or current.
- .4 The **Contractor** shall pay for all cost and is responsible for establishing locations and state of use of all existing utilities that may affect the work. The **Contractor** shall make satisfactory arrangements with the utility companies involved for the location, protection and inspection of existing utilities.
- .5 Notices in writing shall be given by the **Contractor** to the utility companies 48 hours before work commences in the vicinity of the existing utilities.
- .6 The **Contractor** shall pay all the cost involved in protection of utilities, inspection of utilities, and all cost due to delays because of existing utilities and structures.
- .7 The **Contractor** shall provide for the uninterrupted flow of all water courses, sewers and drains encountered during the work.
- .8 Access shall be maintained to all existing structures such as valves, hydrants, meter chambers and control structures at all times during construction.
- .9 If interruption of service provided by an existing utility is necessary, the planned shutdown shall be approved by the utility companies. Request for shutdown shall be made by the **Contractor** in writing at least 48 hours in advance.

- .10 The **Contractor** shall notify all customers or make arrangements with the utility company to notify all customers 24 hours in advance of a shut-down.
- .11 Unless otherwise specified the **Contractor** shall make arrangements of relocation of existing utilities that the **Contractor** request to be relocated; and the actual relocation shall be constructed by the owner of the utility. The **Contractor** will be reimbursed the invoiced cost of the relocation. No extra payment is permitted for delays, or standby time.

1.15 CONSTRUCTION SIGNAGE AND SAFETY

- .1 This project is located within a residential and commercial area. The **Contractor** shall be responsible for the regulation of traffic during construction, and shall perform the work in a manner that will cause the least disruption of traffic.
- .2 The **Contractor** shall coordinate the work with the **Departmental Representative** to reduce traffic problems.
- .3 Provisions of flagmen, traffic signs and other traffic controls shall be the **Contractor's** responsibility and shall be in accordance with the RTAC Manual of Uniform Traffic Control Devices and shall be located to the satisfaction of the **Departmental Representative**.
- .4 The **Contractor** shall supply and maintain at no extra cost all barriers, warning signs, detours, fences, flagmen and all other devices to protect the workers and general public against accidents or injury. All applicable safety standards shall be followed. All excavations and obstructions shall be clearly marked between sunset and sunrise with proper warning flares or lights.

1.16 MAINTENANCE OF UTILITY SERVICES

- .1 The **Contractor** shall be responsible for providing, maintaining and repairing temporary utility services. The cost for providing temporary utility services shall be included in the overall tender price and no extra payment will be allowed.
- .2 During construction and warranty periods, if the **Contractor** fails to respond to request for remedial works regarding maintaining or repairing temporary utility services, within reasonable time, the **Departmental Representative** shall have the right to carry out the necessary remedial works and shall charge the cost of the remedial works done to the **Contractor**.

1.17 TRAFFIC REGULATION

- .1 The **Contractor** shall be responsible for the regulation of traffic during construction, and shall perform the work in a manner that will cause the least disruption of traffic.
- .2 The **Contractor** shall coordinate the work with the **Departmental Representative** to reduce traffic problems.
- .3 Provisions of flagmen, traffic signs and other traffic controls shall be the **Contractor's** responsibility and shall be in accordance with the RTAC Manual of Uniform Traffic Control Devices.
- .4 The **Contractor** shall supply barriers, barricades, warning signs, detours, fences, flagmen and all other devices to protect the public. All applicable safety standards shall be followed.

-
- .5 The **Contractor** shall obtain approval to block traffic temporarily if it is necessary to do so to perform the work. Obtain written approval of applicable municipal departments and the **Departmental Representative**. At least two (2) weeks prior to actually blocking traffic notify the following:
- .1 Local RCMP Detachment
 - .2 Local Fire Department
 - .3 Public Work Department
 - .4 Utility Companies
 - .5 Abutting Property Owners
- .6 The **Contractor** shall maintain/provide access to all residential and commercial property adjacent to the work at all times.
- .7 Alternate access to residents and businesses to be provided in accordance with Contract Drawings. The **Contractor** shall provide two days advance notification of access changes to residents and businesses, and shall coordinate changes with the Owner and the affected residents and business community.
- .8 Adequate constructions parking meeting local regulations shall be provided by the **Contractor**.
- .9 Haul routes shall be maintained by **Contractor**. They shall be kept open to traffic and shall be clean at all times.

1.18 CONSTRUCTION SIGNAGE

- .1 No other signs or advertisements, other than warning signs, are permitted on site.
- .2 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project.

Part 3 Execution

1.19 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion in accordance with Section 01 35 43 – Environmental Procedures.

END OF SECTION

Part 1 General**1.1 INSTALLATION AND REMOVAL**

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

1.2 SITE ENCLOSURE

- .1 Erect temporary site enclosures using new 1.2 m high snow fence wired to roll steel "T" bar fence posts spaced at 2.4 m on centre. Maintain fence in good repair.
- .2 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.3 GUARD RAILS AND BARRICADES

- .1 Provide secure, rigid guard rails and barricades around deep excavations and open shafts.
- .2 Provide as required by governing authorities, weather enclosures.
- .3 Provide weather tight closures to tops of shafts.
- .4 Design enclosures to withstand wind pressure and snow loading.

1.4 ACCESS TO SITE

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

1.5 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 public.

1.6 FIRE ROUTES

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

1.7 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 The Contractor shall be responsible for damage incurred due to lack of or improper protection.

1.8 PROTECTION OF BUILDING FINISHES

- .1 Provide necessary screens, covers, and hoardings.
- .2 Confirm with **Departmental Representative** locations and installation schedule three days prior to installation.
- .3 The Contractor shall be responsible for damage incurred due to lack of or improper protection.

Part 2 Part 2.0 - Products**2.1 .1 MATERIALS**

- .1 Fabric Type (Polyethylene Safety Fence)
 - .1 High density polyethylene fencing material with; 33 mm x 33 mm square or diamond shaped mesh, minimum height of 1200 mm, orange colour. Tensar Safety Grid-GS as manufactured by Nilex Inc. or approved alternate.
- .2 Posts
 - .1 Studded Steel T-Posts
 - .1 Minimum length - 900 mm longer than the fabric width.
 - .2 Portable Posts
 - .1 The Contractor shall submit details for approval.
- .3 Gates
 - .1 The Contractor shall submit details for approval for gates for access to working area.
- .4 Flagging/Ribbons
 - .1 Fluorescent orange or yellow as approved by the Consultant.

Part 3 Part 3.0 - Execution**3.1 .1 GRADING**

- .1 Remove debris and grade between posts to provide ground clearance between 40 mm and 100 mm.

3.2 .2 POST SPACING

- .1 Space T-posts at 3.0 m centre to centre. If portable posts are used, reduce spacing to suit.

3.3 .3 POST SETTING - T-POSTS

- .1 Drive T-posts into the ground, at specified spacing.
- .2 Set posts in line and plumb so that the fence forms a straight line between corner posts.
- .3 Install straining posts where required.

3.4 .4 FABRIC INSTALLATION

- .1 Set braces for gates and corners.
- .2 Install fabric in accordance with the manufacturers instructions.
- .3 Fasten fabric to posts and bracing wire with nylon ties.
- .4 Stretch fabric and secure using steel bars in accordance with the manufacturer's instructions.

3.5 .5 FLAGGING/RIBBON INSTALLATION

- .1 Attach ribbon to trees around environmental reserve and protected areas.

3.6 .6 CLEAN-UP

- .1 Clean up debris and trim all areas disturbed.

END OF SECTION

Part 1 General**1.1 REFERENCES**

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

1.2 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

1.3 AVAILABILITY

- .1 Within 10 days of award of contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify the **Departmental Representative** of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify the **Departmental Representative** at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the **Departmental Representative** reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

-
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
 - .3 Store products subject to damage from weather in weatherproof enclosures.
 - .4 Store cementitious products clear of earth or concrete floors, and away from walls.
 - .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
 - .6 Store sheet materials 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 Remove and replace damaged products at own expense and to satisfaction of the **Departmental Representative**.
 - .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.

1.5 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by **Departmental Representative** will be paid for by the **Departmental Representative**. Contractor to unload, handle and store such products.

1.6 MANUFACTURER'S INSTRUCTIONS

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

1.7 QUALITY OF WORK

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify the **Departmental Representative** if required Work is such as to make it impractical to produce required results.

- .2 Do not employ anyone unskilled in their required duties. The **Departmental Representative** reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with the **Departmental Representative**, whose decision is final.

1.8 CO-ORDINATION

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

1.9 CONCEALMENT

- .1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
- .2 Before installation inform the **Departmental Representative** if there is interference. Install as directed by **Departmental Representative**.

1.10 REMEDIAL WORK

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

1.11 LOCATION OF FIXTURES

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
- .2 Inform the **Departmental Representative** of conflicting installation. Install as directed.

1.12 FASTENINGS

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

-
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
 - .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.13 FASTENINGS - EQUIPMENT

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

1.14 PROTECTION OF WORK IN PROGRESS

- .1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of **Departmental Representative**.

1.15 EXISTING UTILITIES

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

END OF SECTION

Part 1 General**1.1 SURVEY REFERENCE POINTS**

- .1 Existing base horizontal and vertical control points are designated on drawings.
- .2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .3 Make no changes or relocations without prior written notice to **Departmental Representative**.
- .4 Report to **Departmental Representative** when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- .5 Require surveyor to replace control points in accordance with original survey control.

1.2 SURVEY REQUIREMENTS

- .1 Establish permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
- .2 The **Contractor** shall provide detailed layout for water, storm, concrete, roadwork signalization, illumination, landscaping and all appurtenances and installations in accordance with the requirements of the applicable specifications.
- .3 The **Contractor** shall provide all necessary survey instruments, stakes and other material required to establish lines and levels and layout of the Work, by instrumentation.
- .4 The **Contractor** shall give forty-eight hours advance notice to the **Departmental Representative** before the respective construction starts. The **Departmental Representative's** check on the **Contractor's** survey work and grade sheets shall not relieve the **Contractor's** responsibility for the survey work.
- .5 The **Contractor** shall locate, confirm and protect the control points and legal pins or he shall be charged with the resulting expense and shall be responsible for any mistakes that may be caused by their loss or disturbance.
- .6 The **Contractor** shall not proceed with the work until he has received from the **Departmental Representative** such base horizontal and vertical control points and instructions required for the execution of the work.
- .7 The **Contractor** shall, before commencing work at any point, satisfy himself to the meaning and correctness of all stakes and instructions. No claims shall be considered for any allowance based on alleged inaccuracies, failure to read reference points correctly, or failure to interpret instructions correctly.
- .8 If the **Contractor**, in the course of work, finds any discrepancy between the drawings and the physical conditions of the locality or any errors or omissions in the drawings or in the layout as given by points and instructions, he shall inform the **Departmental**

Representative immediately in writing, and the **Departmental Representative** shall promptly verify the same and issue appropriate instructions. Any work done after such discovery, before further work is authorized, will be done at the **Contractor's** risk.

- .9 The layout of the work shall be done in accordance with the approved work schedule prepared by the **Contractor**, as updated from time to time.

1.3 EXISTING SERVICES

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify the **Departmental Representative** of findings.
- .2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by the **Departmental Representative**.

1.4 LOCATION OF EQUIPMENT AND FIXTURES

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

1.5 RECORDS

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.
- .3 Record locations of maintained, re-routed and abandoned service lines.

1.6 SUBMITTALS

- .1 Submit name and address of Surveyor to the **Departmental Representative**. On request of **Departmental Representative**, submit documentation to verify accuracy of field engineering work.
- .2 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform to Contract Documents.

END OF SECTION

Part 1 General**1.1 SUBMITTALS**

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit written request in advance of cutting or alteration which affects:
 - .1 Structural integrity of elements of project.
 - .2 Integrity of weather-exposed or moisture-resistant elements.
 - .3 Efficiency, maintenance, or safety of operational elements.
 - .4 Visual qualities of sight-exposed elements.
 - .5 Work of **Departmental Representative** or separate contractor.
- .3 Include in request:
 - .1 Identification of project.
 - .2 Location and description of affected Work.
 - .3 Statement on necessity for cutting or alteration.
 - .4 Description of proposed Work, and products to be used.
 - .5 Alternatives to cutting and patching.
 - .6 Effect on Work of **Departmental Representative** or separate contractor.
 - .7 Written permission of affected separate contractor.
 - .8 Date and time work will be executed.

1.2 MATERIALS

- .1 Required for original installation.
- .2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.3 PREPARATION

- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of Work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.
- .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.4 EXECUTION

- .1 Execute cutting, fitting, and patching including excavation and fill to complete Work.
- .2 Fit several parts together, to integrate with other Work.
- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .8 Restore work with new products in accordance with requirements of Contract Documents.
- .9 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

END OF SECTION

Part 1 General**1.1 PROJECT CLEANLINESS**

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by **Departmental Representative** or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by the **Departmental Representative**. Do not burn waste materials on site, unless approved by the **Departmental Representative**.
- .3 Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Provide and use marked separate bins for recycling.
- .7 Dispose of waste materials and debris off site.
- .8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.2 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris other than that caused by **Departmental Representative** or other Contractors.

- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by the **Departmental Representative**. Do not burn waste materials on site.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .8 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .9 Remove dirt and other disfiguration from exterior surfaces.
- .10 Clean and sweep gutters, areaways, and sunken wells.
- .11 Sweep and wash clean paved areas.
- .12 Clean drainage systems.
- .13 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .14 Remove snow and ice from the completed Work.

END OF SECTION

DIVISION 02

Part 1 General**1.1 REFERENCES**

- .1 Canadian Environmental Protection Act, 1999 (CEPA 1999).
 - .1 Export and Import of Hazardous Waste Regulations (SOR/2002-300).
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 British Columbia Building Code Regulation including Book I (General) Division of the National Building Code of Canada 2012.
- .4 Transportation of Dangerous Goods Act (TDG Act) (1999), (c. 34).
- .5 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2003-400).

1.2 DEFINITIONS

- .1 Dangerous Goods: product, substance, or organism that is specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
- .2 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 environment or adversely affect health of persons, animals, or plant life when released into the environment.
- .3 Hazardous Waste: any hazardous material that is no longer used for its original purpose and that is intended for recycling, treatment or disposal.
- .4 Workplace Hazardous Materials Information System (WHMIS): Canada-wide system designed to give employers and workers information about hazardous materials used in workplace. Under WHMIS, information on hazardous materials is provided on container labels, material safety data sheets (MSDS), and worker education programs. WHMIS is put into effect by combination of federal and provincial laws.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit to **Departmental Representative** current Material Safety Data Sheet (MSDS) for each hazardous material required prior to bringing hazardous material on site.
 - .2 Submit hazardous materials management plan to **Departmental Representative** that identifies hazardous materials, their use, their

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Co-ordinate storage of hazardous materials with **Departmental Representative** and abide by internal requirements for labelling and storage of materials and wastes.
- .2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
- .3 Store and handle flammable and combustible materials in accordance with current National Fire Code of Canada requirements.
- .4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.
 - .1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval
 - .2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the **Departmental Representative**.
- .5 Transfer of flammable and combustible liquids is prohibited within buildings.
- .6 Do not transfer of flammable and combustible liquids in vicinity of open flames or heat-producing devices.
- .7 Do not use flammable liquids having flash point below 38 degrees C, such as naphtha or gasoline as solvents or cleaning agents.
- .8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
- .9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.
- .10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
 - .1 Store hazardous materials and wastes in closed and sealed containers.
 - .2 Label containers of hazardous materials and wastes in accordance with WHMIS.
 - .3 Store hazardous materials and wastes in containers compatible with that material or waste.
 - .4 Segregate incompatible materials and wastes.
 - .5 Ensure that different hazardous materials or hazardous wastes are not mixed.
 - .6 Store hazardous materials and wastes in secure storage area with controlled access.
 - .7 Maintain clear egress from storage area.
 - .8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.

- .9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.
- .10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.
- .11 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.
- .12 Report spills or accidents immediately to **Departmental Representative**. Submit a written spill report to **Departmental Representative** within 24 hours of incident.

1.5 TRANSPORTATION

- .1 Transport hazardous materials and wastes in accordance with federal Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
- .2 If exporting hazardous waste to another country, ensure compliance with federal Export and Import of Hazardous Waste Regulations.
- .3 If hazardous waste is generated on site:
 - .1 Co-ordinate transportation and disposal with **Departmental Representative**.
 - .2 Ensure compliance with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.
 - .3 Use licensed carrier authorized by provincial authorities to accept subject material.
 - .4 Prior to shipping material obtain written notice from intended hazardous waste treatment or disposal facility that it will accept material and that it is licensed to accept this material.
 - .5 Label container(s) with legible, visible safety marks as prescribed by federal and provincial regulations.
 - .6 Ensure that trained personnel handle, offer for transport, or transport dangerous goods.
 - .7 Provide photocopy of shipping documents and waste manifests to **Departmental Representative**.
 - .8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide a photocopy of completed manifest to **Departmental Representative**.
 - .9 Report discharge, emission, or escape of hazardous materials immediately to Owner and appropriate provincial authority. Take reasonable measures to control release.

Part 2 Products**2.1 MATERIALS**

- .1 Only bring on site quantity of hazardous materials required to perform work.
- .2 Maintain MSDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

Part 3 Execution**3.1 DISPOSAL**

- .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
- .2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.
- .3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.
- .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
- .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.
- .6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.
- .7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.
- .8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
 - .1 Hazardous wastes recycled in manner constituting disposal.
 - .2 Hazardous waste burned for energy recovery.
 - .3 Lead-acid battery recycling.
 - .4 Hazardous wastes with economically recoverable precious metals.

END OF SECTION

DIVISION 3

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section [A1010 - Standard Foundations]
- .2 Section [03 41 00.00 - Precast Structural Concrete]

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A185-[05], Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - .2 ASTM D260-[86(2001)], Standard Specification for Boiled Linseed Oil.
 - .3 ASTM D1751-[04], Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types).
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-19.24-[M90], Multicomponent, Chemical-Curing Sealing Compound.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2-[2004], Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CAN/CSA-A3000-[03], Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .1 CSA-A3001-[03], Cementitious Materials for Use in Concrete.
 - .3 CAN/CSA-G30.18-[M92(R2002)], Billet-Steel Bars for Concrete Reinforcement.

1.3 DESIGN REQUIREMENTS

- .1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1 and 2, and CAN/CSA-A23.3, except where specified otherwise.
- .2 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1 and specific CSA material specifications.
- .3 Provide certification and test results showing that mix proportions selected will produce concrete of specified quality, durability, volume stability and yield and that strength will comply with CAN/CSA-A23.2 prior to placing concrete. Aggregate tests and mix designs shall be included in the tender price.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Concrete hauling time: maximum allowable time limit for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.

- .1 Modifications to maximum time limit must be agreed to by the Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
- .2 Deviations to be submitted for review by the Departmental Representative.
- .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Section [02 62 00.01 - Hazardous Materials].
- .2 Section [01 56 00 - Temporary Barriers and Enclosures].
- .3 Section [01 35 43 - Environmental Procedures].
- .4 Section [01 35 29.00 - Health and Safety Requirements].

Part 2 Products

2.1 MATERIALS

- .1 Portland cement conforming to CAN/CSA-A5 type 50 - sulphate resistant for all concrete. Submit to the **Departmental Representative** a copy of cement test results from the cement supplier as requested.
- .2 Aggregates: to CAN/CSA-A23.1; coarse aggregate to contain no more than 1.0% ironstone by mass; fine aggregate to contain no more than 1.5% ironstone by mass as determined by ASTM C295, Petrographic Examination of Aggregates for Concrete. Supply proof to Departmental Representative that aggregate from the proposed source complies with these requirements at least 10 days prior to intended use. Do not use aggregate without approval.
- .3 Water: clear and free from injurious amount of oil, acid, alkali, organic matter, sediment, or other deleterious substance to CAN3-A23.1.
- .4 Air Entraining Admixture: to CAN3 A266.1.
- .5 Chemical Admixtures: to CAN3 A266.2M.
- .6 Non-shrink Grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents. Plastic consistency and a compressive strength of 50 MPa at 28 days.
- .7 Grout for reinforcing steel dowels or anchor bolts to be Set 45 as supplied by Master Builders or approved equal.
- .8 Supplementary Cementing Materials (fly ash, etc.): to CAN/CSA-A23.5M
 - .1 After September 15 no portion of the specified minimum cement content shall be replaced with fly ash.

- .2 .1 Fly ash shall conform to Type C, CAN/CSA-A23.5M. Submit to the Departmental Representative together with the concrete mix design, the results of tests on the fly ash according to ASTM C311 performed by an independent testing laboratory acceptable to the Departmental Representative.
- .9 Bonding Agent: 100% solids polysulphide epoxy compound.
- .10 Admixtures
 - .1 Obtain written authorization of Departmental Representative before using admixtures.
 - .2 Use only compatible admixtures.
 - .3 Use of calcium chloride is not permitted.
 - .4 Use an air entraining admixture in all concrete.
- .11 Curing Compound: resin based impervious membrane forming compound to ASTM C309, Type 2-0, Class B.
- .12 Air Entraining: comply with CAN3-A23.1 Table 8 for use of air entrainment.
- .13 Joint Fillers: Bituminous, non-extruding type, conforming to ASTM D1751, Sternson "Sternboard" or equal.
- .14 Joint Sealants: Two component polysulphide, polymer sealant conforming to CGSB 19-GP-3m Sika "2C/SL" or equal for horizontal joints. Primer as recommended by the sealant manufacturer for compatibility with sealant.

2.2 MIXES

- .1 Proportion normal density concrete to CAN/CSA-23.1.
- .2 Submit for Departmental Representative's review mix designs for the designated classes of concrete 10 days prior to commencement of concreting work. Place no concrete without reviewed mix design.
- .3 Provide satisfactory evidence to the Departmental Representative that the proportions in the mix designs will produce concrete of the quality specified. Include with submission the following:
 - .1 The preparation of trial mixes and satisfactory strength results therein at 7 days or as required.
 - .2 Proof that trial mixes were made under site conditions, and testing was carried out by an independent testing laboratory.
- .4 The approval of mix design does not relieve the Contractor of his responsibility for the quality of the concrete used in the work.

- .5 Provide satisfactory evidence to the Departmental Representative that the proportions in the mix designs will produce concrete of the quality specified. Include with submission the following:

Part 3 Execution\PREPARATION

- .1 Place concrete in accordance with CAN/CSA-A23.1.
- .2 Ensure reinforcement, inserts, and accessories are not disturbed during concrete placement.
- .3 Maintain accurate records of poured concrete items to indicate date, location of pour, quantity, air temperatures, and test sample taken.
- .4 Ensure that reinforcement and formwork are thoroughly clean before placing.
- .5 All concrete shall be watertight.
- .6 Clean and remove stains prior to application of concrete finishes.

3.2 CONSTRUCTION

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

3.3 INSERTS

- .1 Cast in sleeves, ties, slots, anchors, reinforcement, frames, conduit, bolts, waterstops, joint fillers and other inserts required to be built-in.
 - .1 Sleeves and openings greater than 100 mm x 100 mm not indicated, must be reviewed by Departmental Representative .

3.4 FINISHES

- .1 Formed surfaces exposed to view: in accordance with CSA-A23.1/A23.2.
- .2 Equipment pads: provide smooth trowelled surface.
- .3 Pavements, walks, curbs and exposed site concrete:
 - .1 Screed to plane surfaces and use wood floats.
 - .2 Provide round edges and joint spacings using standard tools.
 - .3 Trowel smooth to provide lightly brushed non-slip finish.

3.5 EXPANSION AND ISOLATION JOINTS

- .1 Install premoulded joint filler in expansion and isolation joints full depth of slab flush with finished surface to CSA-A23.1/A23.2.

3.6 CURING

- .1 Use curing compounds compatible with applied finish on concrete surfaces free of bonding agents and in accordance with CSA-A23.1/A23.2.

3.7 SITE TOLERANCES

- .1 Concrete floor slab finishing tolerance in accordance with CSA-A23.1/A23.2.

3.8 FIELD QUALITY CONTROL

- .1 Concrete testing: to CSA-A23.1/A23.2 by testing laboratory designated and paid for by Departmental Representative.

3.9 CLEANING

- .1 Use trigger operated spray nozzles for water hoses.
- .2 Designate cleaning area for tools to limit water use and runoff.
- .3 Cleaning of concrete equipment to be done in accordance with Section 01 35 43: Environmental Procedures.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section 03 30 00.01 - Cast-in-place Concrete Short Form.
- .2 Section A1010 - Standard Foundations

1.2 UNITE PRICE

- .1 Precast elements measured as individual units, will include cost, supply, delivery, storage and erection of bearing assemblies, anchor bolts, removal and patching of erection devices transverse connections, and field grouting of grout keys between precast members.

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM A 775/A 775M-[97e2], Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
 - .2 ASTM D 412-[98a], Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.
 - .3 ASTM D 2240-[97e1], Standard Test Method for Rubber Property - Durometer Hardness.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.40-[97], Anticorrosive Structural Steel Alkyd Primer.
 - .2 CAN/CGSB-1.181-[92], Ready Mixed Organic Zinc-Rich Coating.
 - .3 CAN/CGSB-51.20-[M87], Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .3 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A23.1/A23.2-[94], Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
 - .2 CAN3-A23.3-[94], Design of Concrete Structures for Buildings.
 - .3 CAN3-A23.4-[94], Precast Concrete - Materials and Construction.
 - .4 CSA-A251-[M1982R1998], Qualification Code for Manufacturers of Architectural and Structural Precast Concrete.
 - .5 CSA-G30.15-[M1983(R1991)(R1998)], Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
 - .6 CAN/CSA-G30.18-[M92(R1998)], Billet-Steel Bars for Concrete Reinforcement.
 - .7 CAN/CSA-G40.20/G40.21-[98], General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .8 CAN/CSA-G164-[M92(R1998)], Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .9 CSA-G279- [M1982(R1998)], Steel for Prestressed Concrete Tendons.

- .10 CAN/CSA-S6.1-[M1990], Design of Highway Bridges.
- .11 CSA-W47.1-[92(R1998)], Certification of Companies for Fusion Welding for Steel Structures.
- .12 CSA-W48.1-[M1991(R1998)], Carbon Steel Covered Electrodes for Shielded Metal Arc Welding.
- .13 CSA-W59-[M1989], Welded Steel Construction (Metal Arc Welding).
- .14 CSA-W186-[M1990(R1998)], Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.4 DESIGN REQUIREMENTS

- .1 Design precast elements to CAN3-A23.3 and CAN3-A23.4 to carry handling stresses.
- .2 Design precast elements in accordance with National Building Code of Canada (NBC).

1.5 PERFORMANCE REQUIREMENTS

- .1 Tolerance of precast elements to CAN3-A23.4, Section 10.

1.6 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide sample and sample number of each finish to be used on project to Departmental Representative.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 35 73.00 - Procedures for Deconstruction of Structures and Section 01 74 11.00 - Cleaning.
- .2 Ensure emptied containers are sealed and stored safely for disposal away from children.
- .3 Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions collect liquid or solidify liquid with an inert, non-combustible material and remove for disposal. Dispose of all waste in accordance with applicable local, provincial and national regulations.

Part 2 Products

2.1 MATERIALS

- .1 Cement, aggregates, water, admixtures: to CAN/CSA-A23.1 and CAN3-A23.4.
- .2 Reinforcing steel: to CAN/CSA-G30.18.
- .3 Prestressing steel tendons and bars: to CAN/CSA-S6 and CSA-G279.
- .4 Welded wire fabric: to CSA-G30.15.

- .5 Hardware and miscellaneous materials: to CAN/CSA-A23.1.
- .6 Forms: to CAN3-A23.4.
- .7 Anchors and supports: to CAN/CSA G40.21 Type [300 W] [[epoxy coated] [galvanized] [primed] after fabrication].
- .8 Welding materials: to CSA-W48.1.
- .9 Welding electrodes: to CSA-W48.1 and certified by Canadian Welding Bureau.
- .10 Galvanizing: hot dipped galvanizing with minimum zinc coating of 610 g/m² to CAN/CSA-G164.
- .11 Epoxy coating: to ASTM A 775/A 775M.
- .12 Steel primer: to CAN/CGSB-1.40.
- .13 Zinc-rich primer: to CAN/CGSB-1.181.
- .14 Post-tensioning ducts: to CAN/CSA-A23.1.

2.2 MIXES

2.3 MANUFACTURED UNITS

- .1 Manufacture units in accordance with CAN3-A23.4, and CSA-A251.
- .2 Provide hardware suitable for handling elements.

2.4 FINISHES

- .1 Finish units to standard grade to CAN3-A23.4, Section 24.

2.5 SOURCE QUALITY CONTROL

- .1 Provide Departmental Representative with certified copies of quality control tests related to this project as specified in CAN3-A23.4 and CSA-A251.
- .2 Inspect prestressed concrete tendons in accordance with CSA-G279.
- .3 Provide records from in-house quality control programme based upon plant certification requirements to Departmental Representative for inspection and review.
- .4 Precast plants should keep complete records of supply source of concrete material, steel reinforcement, prestressing steel and provide to Departmental Representative for review upon request.

Part 3 Execution**3.1 ERECTION**

- .1 Do precast concrete work in accordance with CAN3-A23.4 and CAN3-A23.3, CAN/CSA-S6.
- .2 Do welding in accordance with CSA-W59, for welding to steel structures and CSA-W186, for welding of reinforcement.
- .3 Erect precast elements within allowable tolerances as specified.
- .4 Non-cumulative erection tolerances in accordance with CAN3-A23-4, Section 10.
- .5 Set elevations and alignment between units to within allowable tolerances before connecting units.
- .6 Grout underside of unit bearing plates with shrinkage compensating grout.
- .7 Secure with bolts using lockwashers .
- .8 Uniformly tighten bolted connections with torque indicated.
- .9 Do not weld or secure bearing plates at sliding joints.
- .10 Install precast concrete closures between stems of flanged units where indicated.

3.2 CLEANING

- .1 Obtain approval of cleaning methods Departmental Representative before cleaning soiled precast concrete surfaces.

END OF SECTION

Part 1 General**1.1 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C127-04, Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
 - .2 ASTM D698-00a1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).
 - .3 ASTM D1557-02e1, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m³).
 - .4 ASTM D4253-00, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

1.2 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/m³.
 - .1 F1 = fraction (decimal) of total field sample passing 4.75 mm sieve
 - .2 F2 = fraction (decimal) of total field sample retained on 4.75 mm sieve (equal to 1.00 - F1)
 - .3 D1 = maximum dry density, kg/m³ of material passing 4.75 mm sieve determined in accordance with Method A, C of ASTM D698 and ASTM D1557.
 - .4 D2 = bulk density, kg/m³, of material retained on 4.75 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 the **Departmental Representative**.

END OF SECTION

Part 1 General**1.1 REFERENCES**

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.2 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.
- .6 Provide water, electric power and propane to **Departmental Representative** laboratory trailer at production site.

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
- .5 Where gravel material or crush aggregate material is specified, it shall consist of clean sand and gravel, complying with the following requirements:

Metric Sieve Size (CGSB 8-GP-2M)	Designation/Class		
	*Gravel Material Des 6 Class 80	Crushed Aggregate Material Des 2 Class 40	Crushed Aggregate Material Des 2 Class 25
Sieve Size µm	Percent Passing	Percent Passing	Percent Passing
125 000	--	--	
80 000	100	--	
50 000	55 - 100	--	
40 000	--	100	
25 000	38 - 100	70 - 94	100
20 000	--	--	82 - 97
16 000	32 - 85	55 - 85	70 - 94
10 000	--	44 - 74	52 - 79
5 000		32 - 62	35 - 64
1 250	--	17 - 43	18 - 43
630	--	12 - 34	12 - 34
315	6 - 30	8 - 26	8 - 26
160	--	5 - 18	5 - 18
80	2 - 10	2 - 10	2 - 10
% fractures by weight (2 faces)	N/A	50+	60+
Plasticity Index	NP - 8	NP - 6	NP - 6
L.A. Abrasion Loss Percent Maximum	N/A	50	50

*Note: Native Gravel Material may require processing in order to meet the gradation requirements.

2.2 SOURCE QUALITY CONTROL

- .1 Inform **Departmental Representative** of proposed source of aggregates and provide access for sampling at least four 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** four 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 Handling
 - .1 Handle and transport aggregates to avoid segregation, contamination and degradation.
- .2 Stockpiling
 - .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by **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 forty-eight 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.

END OF SECTION

Part 1 General**1.1 REFERENCES**

- .1 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 EXISTING CONDITIONS**Part 2 Execution****2.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

2.2 STRIPPING OF TOPSOIL

- .1 Ensure that procedures are conducted in accordance with applicable Provincial and Municipal requirements.
- .2 Remove topsoil before construction procedures commence to avoid compaction of topsoil.
- .3 Handle topsoil only when it is dry and warm.
- .4 Remove vegetation from targeted areas by non-chemical means and dispose of stripped vegetation off site.
- .5 Remove brush from targeted area by non-chemical means and dispose of off site.
- .6 Strip topsoil to depths as directed by the **Departmental Representative**.
 - .1 Avoid mixing topsoil with subsoil.
- .7 Pile topsoil in berms in locations as directed by the **Departmental Representative**.
 - .1 Stockpile height not to exceed 2.5 m.
- .8 Dispose of unused topsoil off-site.
- .9 Protect stockpiles from contamination and compaction.
- .10 Cover topsoil that has been piled for long term storage, with trefoil or grass to maintain agricultural potential of soil.

2.3 PREPARATION OF GRADE

- .1 Verify that grades are correct and notify the **Departmental Representative** if discrepancies occur. Do not begin work until instructed by the **Departmental Representative** .
 - .1 Grade area only when soil is dry to lessen soil compaction.
 - .2 Grade soil establishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage.

2.4 PLACING OF TOPSOIL

- .1 Place topsoil only after the **Departmental Representative** has accepted subgrade.
- .2 Spread topsoil during dry conditions in uniform layers not exceeding 150mm, over unfrozen subgrade free of standing water.
- .3 Establish traffic patterns for equipment to prevent driving on topsoil after it has been spread to avoid compaction.
- .4 Cultivate soil following spreading procedures.

2.5 CLEANING

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

END OF SECTION

Part 1 General**1.1 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM).
 - .1 ASTM D698-00a, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).

1.2 DEFINITIONS

- .1 Reshaping subgrade: scarifying, pulverizing, blading, reshaping and recompacting existing subgrade surface.

Part 2 Execution**2.1 SCARIFYING AND RESHAPING**

- .1 Scarify subgrade to full width as indicated and to minimum depth of 150 mm.
- .2 Pulverize and break down scarified material to 150 mm maximum soil clod size, except that stones larger than this size may be left intact as directed by **Departmental Representative**.
- .3 Blade and trim pulverized material to elevation and cross section dimensions as indicated.
- .4 Where deficiency of material exists, add and blend additional subgrade material as directed by **Departmental Representative**.
- .5 Re-use excess material in areas of material deficiency. Blade excess material over shoulder and trim.

2.2 COMPACTING

- .1 Compact to density not less than 100% corrected maximum dry density in accordance with ASTM D698.
- .2 Shape and roll alternately to obtain smooth, even and uniformly compacted subgrade surface.
- .3 Apply water as necessary during compaction to obtain specified density.
- .4 If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected to a value not greater than 98% moisture above optimum value for compaction in accordance with ASTM D698.

2.3 SITE TOLERANCES

- .1 Reshaped compacted surface to be within plus or minus 10 mm of elevation as indicated, but not uniformly high or low.

2.4 PROTECTION

- .1 Maintain reshaped surface in condition conforming to this section until succeeding material is applied or until **Departmental Representative's** acceptance.

2.5 CLEANING

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

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section [01 33 00 - Submittal Procedure.]
- .2 Section [01 35 29 – Health, Safety and Emergency Response Procedures.]
- .3 Section [01 56 00 - Temporary Barriers and Enclosures.]
- .4 Section [31 23 33.01 - Excavating, Trenching and Backfilling.]

1.2 DEFINITION

- .1 Rock is defined as any solid mass of igneous or metamorphic rock, which prior to its removal was integral with its paved mass, boulders or rock fragments having individual volume, in excess of 1.0 m³. Such rock shall be divided into two categories, Type A and Type B, contingent upon its hardness and difficulty experienced to excavate.
- .2 Rock Types
 - .1 Type A: shall be defined as fractured sandstone, shale, or ledge rock which can be removed by means of heavy duty mechanical excavation equipment, but in the opinion of the **Departmental Representative**, resulted in a substantial delay or decrease in the normal rate of excavation and/or significant damage or wear to the excavating equipment.
 - .2 Type B: shall be defined as material which requires drilling, blasting, wedging, or jack-hammering to remove as determined by the **Departmental Representative**.
- .3 Frozen material or material which can be ripped and excavated shall not be classified as rock.
- .4 Determination
 - .1 To determine the rock type, the **Contractor** shall pre-drill the site, and based on the speed of the penetration through different rock zones, the **Departmental Representative** shall decide whether the rock is Type A or Type B.
 - .2 Only Type B rock shall be blasted.
 - .3 Overlying Type A rock broken up during blasting shall still be considered as Type A rock.

1.3 BLASTING OPERATION PROPOSAL

- .1 The **Contractor** shall submit to the **Departmental Representative** for approval, a schedule of proposed operations for removal of rock by blasting, developed by a Registered Professional Engineer specializing in mining engineering or rock mechanics.
- .2 Indicate proposed method of carrying out work in proposal types and quantities of explosives to be used, loading charts and drill hole patterns, type of caps, blasting techniques, blast protection measures for items such as flying rock, vibration, dust and

noise control, include details on protective measures, time of blasting and other pertinent details.

Part 2 Products

2.1 MATERIALS

- .1 Not used.

Part 3 Execution

3.1 PROTECTION

- .1 Prevent damage to surroundings and injury to persons in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .2 Prevent damage to surroundings and injury to persons. Erect fencing, post guards, sound warnings and display signs when blasting to take place.

3.2 ROCK REMOVAL

- .1 The work for this section will be paid based on the actual quantities measured on site and the unit prices stated in the Bid and Acceptance Form.
- .2 Co-ordinate this Section with Section 01 35 29– Health, Safety and Emergency Response Procedures.
- .3 Excavate rock to alignments, profiles, and cross-section as required.
- .4 The work for this section will be paid based on the actual quantities measured on site and the unit prices stated in the Bid and Acceptance Form.
- .5 Standard trench width is defined as a trench with vertical walls at a width of 750 mm greater than the outside diameter of the pipe being installed.
- .6 The **Contractor** shall be responsible for all costs incurred as a result of exceeding the standard trench width.
- .7 Correct unauthorized rock removal at no extra cost, in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .8 Excavate rock for site grading to 300 mm below subgrade level.
- .9 Excavated rock bed to be level, sound, free of loose rocks or fragments, earth or debris.
- .10 Remove boulders and fragments, which may slide or roll into excavated areas.
- .11 Excavate trenches to lines and grades shown to minimum of 150 mm below pipe invert. Trim and shape trench bottoms and leave free of irregularities. Provide recesses from bell and spigot pipe to ensure bearing will occur along barrel of pipe.

END OF SECTION

Part 1 General**1.1 MEASUREMENT PROCEDURES**

- .1 Excavated materials will be measured in cubic metres in their original location.
 - .1 Unclassified excavation quantities measured will be actual volume removed within following limits:
 - .1 Width for trench excavation as required.
 - .2 Width for excavation for structures as required.
 - .3 Depth from ground elevation and surface of pavement or surface of sidewalk immediately prior to excavation to elevation required to install the culvert components and footings.
 - .2 Rock quantities measured will be actual volume removed within following limits:
 - .1 Width for trench excavation as required.
 - .2 Width for excavation for structures to be bounded by vertical planes up to 500 mm outside of and parallel to neat lines of footings as required.
 - .3 Depth from rock surface elevations immediately prior to excavation, to elevation as required.
 - .4 Where design elevation is less than 300 mm below original rock surface, depth will be considered to be 300 mm below original rock surface.
 - .5 Volume of individual boulders and rock fragments will be determined by measuring three maximum mutually perpendicular dimensions.
- .2 The work for this section will be paid based on the actual quantities measured on site and the unit prices stated in the Bid and Acceptance Form.
- .3 Shoring, bracing, cofferdams, underpinning and de-watering of excavation will not be measured separately for payment.
- .4 Backfilling to authorized excavation limits will be measured in cubic metres compacted in place for each type of material specified.
- .5 Placing and spreading of topsoil will be measured for payment in cubic metres calculated from cross sections taken in area of excavation from original location.
 - .1 If double handling of topsoil is directed by Departmental Representative stockpiling and later placing, then quantities will be measured twice; on excavation from original location and on excavation from stockpile.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

- .3 ASTM D422-63-2002, Standard Test Method for Particle-Size Analysis of Soils.
- .4 ASTM D698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m).
- .5 ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m).
- .6 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .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.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
 - .2 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .4 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3

DEFINITIONS

- .1 Rock: solid material in excess of 1.00 m³; and which cannot be removed by means of heavy duty mechanical excavating equipment with a 0.95 to 1.15 m³ bucket. Frozen material is not classified as rock.
- .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation including dense tills, sandstone, shale, hardpan, frozen materials and partially cemented materials which can be ripped and excavated with heavy construction equipment.
- .3 Topsoil: Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
- .4 Subgrade: is the soil immediately below a structure or slab.
- .5 Sub-base: is a bed of material laid under a structure on the subgrade or natural ground.
- .6 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .7 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .8 Unsuitable materials:

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

1.4 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures
- .2 Quality Control: in accordance with Section 01 45 00 - Quality Control
 - .1 Submit to **Departmental Representative** testing, inspection results and report as described in PART 3 of this Section.
- .3 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Inform **Departmental Representative** at least four weeks prior to beginning Work, of proposed source of fill and unshrinkable fill materials and provide access for sampling.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Divert excess aggregate materials from landfill to local quarry or facility for reuse as directed by **Departmental Representative**.
- .2 Separate and recycle waste materials in accordance with Section 01 35 73.00 - Procedures for Deconstruction of Structures and Section 01 74 11.00 - Cleaning.

1.6 EXISTING CONDITIONS

- .1 Buried services:
 - .1 Before commencing work verify and establish location of buried services on and adjacent to site.
 - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
 - .3 Prior to beginning excavation Work, notify applicable **Departmental Representative** and authorities having jurisdiction to establish location and state of use of buried utilities and structures. Request **Departmental Representative** and authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.

- .4 Maintain and protect from damage any structures encountered.
- .5 Where structures exist in area of excavation, obtain direction of **Departmental Representative** before removing/re-routing. Costs for such Work shall be paid by **Departmental Representative**.
- .6 Confirm locations of recent excavations adjacent to area of excavation.
- .2 Existing structures and surface features:
 - .1 Conduct, with **Departmental Representative**, condition survey of existing structures, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
 - .2 Protect existing structures and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by **Departmental Representative**.
 - .3 Where required for excavation, cut roots or branches as directed by **Departmental Representative**.

Part 2 Products

2.1 MATERIALS

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

Sieve Designation	% Passing	
	Type 1	Type 2
75 mm	-	100
50 mm	-	-
37.5 mm	-	-
25 mm	100	-
19 mm	75-100	-
12.5 mm	-	-
9.5 mm	50-100	-
4.75 mm	30-70	22-85
2.00 mm	20-45	-
0.425 mm	10-25	5-30
0.180 mm	-	-
0.075 mm	3-8	0-10

- .2 Type 3 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.

- .3 Type 4 fill: Clean sand or free draining granular fill, free from clay, friable and other deleterious materials.
- .4 Unshrinkable fill: proportioned and mixed to provide:
 - .1 Maximum compressive strength of 0.4 MPa at 28 days
 - .2 Maximum cement content of 25 kg/m³ with 40 % by volume fly ash replacement: to CSA-A3001, Type GU
 - .3 Minimum strength of 0.07 MPa at 24 h.
 - .4 Concrete aggregates: to CSA-A23.1/A23.2.
 - .5 Cement: Type GU.
 - .6 Slump: 160 to 200 mm.
- .5 Shearmat: honeycomb type bio-degradable cardboard 100 mm thick, treated to provide sufficient structural support for poured concrete until concrete cured.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways that comply with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 SITE PREPARATION

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- .2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3 PREPARATION/PROTECTION

- .1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

- .4 Protect buried services that are required to remain undisturbed.

3.4 STRIPPING OF TOPSOIL

- .1 Begin topsoil stripping of areas as required after area has been cleared of brush, weeds and grasses and removed from site.
- .2 Strip topsoil to depths required to remove all topsoil.
 - .1 Do not mix topsoil with subsoil.
- .3 Stockpile in locations as indicated or as directed by **Departmental Representative**.
 - .1 Stockpile height not to exceed 2 m and should be protected from erosion.
- .4 Dispose of unused topsoil off site or to a location as directed by the **Departmental Representative** .

3.5 STOCKPILING

- .1 Stockpiles fill materials in areas designated by the **Departmental Representative**.
 - .1 Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.
- .3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.6 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29 - Health and Safety Requirements, Health and Safety Act for the Province of British Columbia.
- .2 Obtain permit from authority having jurisdiction for temporary diversion of water course.
- .3 During backfill operation:
 - .1 Unless otherwise indicated or directed by **Departmental Representative**, remove sheeting and shoring from excavations.
 - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
 - .3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.
- .4 When sheeting is required to remain in place, cut off tops at elevations as indicated.
- .5 Upon completion of substructure construction:
 - .1 Remove cofferdams, shoring and bracing.
 - .2 Remove excess materials from site and restore watercourses as indicated.

3.7 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for **Departmental Representative** review and approval details of proposed dewatering method.
- .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water to approved collection, runoff areas and in a manner not detrimental to public and private property, or portion of Work completed or under construction.
 - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

3.8 EXCAVATION

- .1 Advise **Departmental Representative** at least seven days in advance of excavation operations for initial cross sections to be taken.
- .2 Depth of excavation shall be the depth required to install the precast concrete footing, the riprap and the arch culvert palates.
- .3 Width of excavation shall be constructed wide enough to permit proper placement of the material in the embedment zone.
- .4 In no case shall water be allowed to enter the excavation during construction. All water pumped or drained from the work shall have all the proper permits and approvals in place and shall be disposed in a suitable manner satisfactory without damage to the construction work, other property structures or persons.
- .5 Remove steel, concrete, masonry, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation in accordance with Section 01 35 73.00 - Procedures For Deconstruction Of Structures.
- .6 Excavation must not interfere with bearing capacity of adjacent foundations.
- .7 Do not disturb soil within branch spread of trees or shrubs that are to remain.
- .8 Do not disturb soil within branch spread of trees or shrubs that are to remain.
 - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .9 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by **Departmental Representative**.
- .10 Restrict vehicle operations directly adjacent to open trenches.
- .11 Dispose of surplus and unsuitable excavated material off site or at an approved location on site as directed by the **Departmental Representative**.

- .12 Do not obstruct flow of surface drainage or natural watercourses.
- .13 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .14 Notify **Departmental Representative** when bottom of excavation is reached.
- .15 Obtain **Departmental Representative** approval of completed excavation.
- .16 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by **Departmental Representative**.
- .17 Correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with concrete specified for footings (fill concrete), fill compacted to not less than 100% of corrected Standard Proctor maximum dry density in accordance with Section 31 05 10 - Corrected Maximum Dry Density for Fill.
 - .2 Fill under other areas with Type 2 fill compacted to not less than 95% of corrected Standard Proctor maximum dry density in accordance with Section 31 05 10 - Corrected Maximum Dry density for Fill.
- .18 Hand trim, make firm and remove loose material and debris from excavations:
 - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
 - .2 Clean out rock seams and fill with concrete mortar or grout to approval of **Departmental Representative** .

3.9 BACKFILLING

- .1 Vibratory compaction equipment: Use hand-operated plate type vibratory or other suitable hand tampers in areas not accessible to larger rollers or compactors.
- .2 Do not proceed with backfilling operations until completion of following:
 - .1 **Departmental Representative** has inspected and approved installations.
 - .2 **Departmental Representative** has inspected and approved of construction below finish grade.
 - .3 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .4 Do not use backfill material which is frozen or contains ice, snow or debris.
- .5 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to the grades indicated. Compact each layer before placing succeeding layer.
- .6 Backfilling around installations:
 - .1 Place bedding and surround material as specified elsewhere.

- .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
- .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 0.10 m.
- .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
 - .1 Permit concrete to cure for minimum fourteen (14) days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from **Departmental Representative** or:
 - .2 If approved by **Departmental Representative**, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by **Departmental Representative**.
- .7 Place unshrinkable and recycled fill in areas as indicated.
- .8 Consolidate and level unshrinkable fill with internal vibrators.
- .9 Install drainage filter system in backfill as indicated.

3.10 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 35 73.00 - Procedures For Deconstruction Of Structures, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Reinstate lawns to elevation which existed before excavation.
- .3 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .4 Clean and reinstate areas affected by Work as directed by **Departmental Representative**.
- .5 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.
- .6 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

Part 1 General**1.1 SECTION INCLUDES**

- .1 Materials and installation of polymeric geotextiles used in revetments, breakwaters, retaining wall structures, filtration, drainage structures, roadbeds and railroad beds 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 SECTIONS

- .1 Section [01 35 73 - Procedures for Deconstruction of Structures].
- .2 Section [31 23 33.01 - Excavating, Trenching and Backfilling].
- .3 Section [31 22 16.13 - Roadway Subgrade Reshaping].
- .4 Section [A1010 - Standard Foundations].

1.3 MEASUREMENT PROCEDURES

- .1 Measure geotextiles in square metres of surface covered by material. No allowance will be made for seams and overlaps.

1.4 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM D4491-[99a], Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - .2 ASTM D4595-[86(2001)], Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
 - .3 ASTM D4716-[01], Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
 - .4 ASTM D4751-[99a], Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-4.2 No. 11.2-[M89(April 1997)], Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
 - .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
 - .1 No.2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.
 - .2 No.3-M85, Methods of Testing Geosynthetics - Thickness of Geotextiles.

- .3 No.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.
 - .4 No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.
 - .5 No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.
- .3 Canadian Standards Association (CSA International)
- .1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .4 Ontario Provincial Standard Specifications (OPSS)
- .1 OPSS 1860-March 1998, Material Specification for Geotextiles.

1.5 DELIVERY, STORAGE AND HANDLING

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

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 35 73 - Procedures For Deconstruction Of Structures.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 MATERIAL

- .1 Geotextile: woven or non-woven synthetic fibre fabric, supplied in rolls.
 - .1 Width: 0.9 m minimum.
 - .2 Length: 90 m minimum.
 - .3 Composed of: minimum 85% by mass of polypropylene.
- .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 271 g/m².
 - .3 Geotextile installation shall be as per manufacture's recommendations.
 - .4 All geotextile sheets to have a minimum side lap of 400 mm and minimum end lap of 600 mm.
 - .5 The geotextile shall be 0.9 m wide including a minimum 0.2 m flap for proper anchorage at the base trench.

Part 3 Execution**3.1 INSTALLATION**

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated .
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 Overlap each successive strip of geotextile 600 mm over previously laid strip.
- .5 Join successive strips of geotextile by sewing.
- .6 Pin successive strips of geotextile with securing pins as per manufacturer recommendations at mid-point of lap.
- .7 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .8 After installation, cover with overlying layer within 4 h of placement.
- .9 Replace damaged or deteriorated geotextile to approval of Departmental Representative.
- .10 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.

END OF SECTION

Part 1 General**1.1 SECTION INCLUDES**

- .1 Materials and installation for open bottom pipe culverts.

1.2 PRODUCTS SUPPLY AND INSTALLATION

- .1 Contractor will supply following material: corrugated steel arch profile, precast concrete footing and riprap in addition to all materials required for backfilling, road work and site restoration .

1.3 RELATED SECTIONS

- .1 Section [01 33 00 - Submittal Procedures].
- .2 Section [01 35 73 - Procedures For Deconstruction Of Structures].
- .3 Section [01 61 00 - Common Product Requirements].
- .4 Section[03 30 00.01 - Cast-in-place Concrete]
- .5 Section [03 41 00.00 - Precast Structural Concrete]
- .6 Section [31 05 16 - Aggregate Materials].
- .7 Section [31 22 16.13 - Roadway Subgrade Reshaping].
- .8 Section [31 23 16.26 - Rock Removal]
- .9 Section [31 23 33.01 - Excavating, Trenching and Backfilling].
- .10 Section [A1010 - Standard Foundations]

1.4 UNIT PRICES

- .1 Measure excavation, bedding and backfill for culverts under Section 31 23 33.01 - Excavating Trenching and Backfilling and Section 31 22 16.13 - Roadway Subgrade Reshaping.
- .2 Measure supply of arch corrugated steel culvert in metres for each profile, type and class of plate profile supplied. Plates supply will be made at the unit price per meter length and thickness for standard arch as indicated in the drawing.
 - .1 No separate measurement will be made for couplings and fittings for steel plate culverts.
- .1 Installation of arch steel culvert payment will be made as lump sum.

- .2 Measure granular riprap for culvert and granular backfill in cubic metres, of material incorporated into the Work. Payment will be made at the unit price bid per cubic metre for "Riprap - Supply and Place". This payment shall be full compensation for supplying, processing, hauling and placing the material.
- .3 Supply and installation of geotextile will paid separately, geotextile will be measured in square metres of ground covered, excluding the area associated with laps or stitching.
- .4 Precast elements measured as individual units, will include cost, supply, delivery, storage and erection of bearing assemblies, anchor bolts, removal and patching of erection devices, and field grouting of grout keys between precast members.
- .5 Cost of supply and installation will include any necessary dewatering prior to placing of bedding and construction maintenance and removal of any temporary bypass roads.

1.5 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C14M-[99], Standard Specification for Concrete Sewer, Storm Drain and Culvert Pipe (Metric).
 - .2 ASTM C76M-[02], Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe (Metric).
 - .3 ASTM C117-[95], Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .4 ASTM C136-[01], Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .5 ASTM C144-[02], Standard Specification for Aggregate for Masonry Mortar.
 - .6 ASTM C443M-[02], Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).
 - .7 ASTM D698-[00a], Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - .8 ASTM D1248-[02], Standard Specification for Polyethylene Plastics Extrusion Materials For Wire and Cable.
 - .9 ASTM F667-[97], Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings.
- .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.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-A3000-[98(April 2001)], Cementitious Materials Compendium (Consists of A5-98, A8-98, A23.5-98, A362-98, A363-98, A456.1-98, A456.2-98, A456.3-98).
 - .1 CAN/CSA-A5-[98], Portland Cement.

- .2 CAN/CSA-A257 Series-[M92(R1998)], Standards for Concrete Pipe.
- .3 CSA-G401-[01], Corrugated Steel Pipe Products.

1.6 SUBMITTALS

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Inform **Departmental Representative** at least 1 week 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 1 week prior to beginning Work.
- .4 Certification to be marked on steel metal.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 35 73.00 - Procedures for Deconstruction of Structures.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .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 facility as approved by **Departmental Representative**.
- .6 Divert unused aggregate materials from landfill to facility for reuse as approved by **Departmental Representative**.
- .7 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 CORRUGATED STEEL ARCH PROFILE

- .1 Corrugated Steel Pipe: to CAN3-G401-M81 and CSA G40.20/G40.21 or latest edition thereof.

- .2 The corrugated steel arch profile shall be diameter as shown in drawings with a minimum wall thickness of 3.0 mm, 152 x 51 mm corrugations, galvanized, complete with couplers, in lengths to provide the clearances and geometry as detailed on the drawings. The couplers shall be corrugated and shall be of the same base metal and wall thickness as the pipe to be connected. All joints and couplers must ensure a watertight connection.
- .3 High strength bolts, nuts and washers: to ASTM A325M. Bolts to ASTM A490M approved by Departmental representative.
- .4 Anchor bolts, washers and nuts: to CSA G40.20/G40.21.

2.2 PRECAST CONCRETE FOOTING

- .1 Design precast elements to CAN3 A23.3 and CAN3 A23.4 to carry handling stresses.
- .2 Design precast elements to carry loads in accordance with National Building Code of Canada (NBC).
- .3 Carry out vibration analysis and test if and as required by **Departmental Representative**.

2.3 RIPRAP AND GEOTEXTILE

- .1 All riprap material shall be supplied by the Contractor and shall be resistant to weathering and water action and shall not consist of sandstone or shale. Where sources of rock riprap material exist within the right-of-way limits of the project, or in gravel pits, or other locations under the jurisdiction of the Department, the materials may, with the approval of the Departmental Representative, be provided free of cost to the Contractor.
- .2 Random rock riprap shall consist of a graded mixture of sound, durable stone or pit-run gravel. The gradation of the mixture shall be such that 50 percent of the riprap consists of material having a least minimum dimension of 250 mm.
- .3 Riprap class I meets the following requirements:

Percent Passing	Stone Size Diameter (mm)	Stone Mass (Kg)
100	450	130
30-80	350	70
20-50	300	40
5-20	200	10

- .4 Riprap class II meets the following requirements:

Percent Passing	Stone Size Diameter (mm)	Stone Mass (Kg)
100	800	700
30-80	600	300
20-50	500	200
5-20	300	4

- .5 Non-woven geotextile include:
- .1 Continuous monofilaments or staple fibers.
 - .2 Random fibers that are physically entangled by punching with needles.
 - .3 Random fibers that are pressed and melted together at the contact points.
- .6 The non-woven geotextile fabric shall meet the following requirements:

The non-woven geotextile fabric shall meet the following requirements:

Property	ASTM Test	Material Specification ¹ Average Roll Value		
		Type A ⁽²⁾	Type B ⁽³⁾	Type C ⁽⁴⁾
Grab Tensile Strength (N)	D4632	400 min	650 min	875 min
Grab Tensile Elongation (%)	D4632	50 % min	50 % min	50 % min
Mullen Burst (MPa)	D3786	1.2 min	2.1 min	2.7 min
Puncture (N)	D4833	240 min	275 min	550 min
Trapezoid Tear (N)	D4533	180 min	250 min	350 min
Ultraviolet Stability (% Retained Strength)	D4355	70 % @ 150 hr.	70 % @ 150 hr	70 % @ 150 hr
Apparent Opening Size (mm)	D4751	0.2 max	0.2 max	0.2 max
Permittivity (per sec)	D4491	2.1 min	1.5 min	1.2 min
Flow Rate (l/sec/m ²)	D4491	102 min	102 min	102 min
Minimum fabric lap shall be 300 mm				

Note 1: All numeric values except A.O.S. represent minimum average roll value as measured in the weaker principal direction;

2: Typically used with perforated pipe and similar applications;

3: Typically used in medium duty situations such as under Class 1M, 1 & 2 riprap;

4: Typically used in heavy duty applications such as under Class 3 riprap.

2.4 GRANULAR BEDDING AND BACKFILL

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

Sieve Designation	% Passing
200 mm	-
75 mm	[100]
50 mm	-
38.1 mm	-
25 mm	-
19 mm	-
12.5 mm	-
9.5 mm	-
4.75 mm	[25 - 85]
2.00 mm	-
0.425 mm	[5 - 30]
0.180 mm	-
0.075 mm	[0 - 10]

- .2 Concrete mixes and materials for bedding, cradles, encasement, supports: to Section 03 30 00.01 - Cast-in-place Concrete Short Form.

Part 3 Execution

3.1 EXCAVATION

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

3.2 INSTALLATION

- .1 Dewater excavation to allow placement of precast footings in dry condition.
- .2 Do footing installation Work in accordance to Section A1010 - Standard Foundations.
- .3 Placing stone riprap: The stones shall be placed with their beds at right angles to the slope, the larger stones being placed first in the bottom courses and graduating to the smaller stones at the top. Stones shall be laid in close contact so as to break joints, and in such manner that the weight is carried by the earth and not by the adjacent stones. The spaces between the larger stones shall be filled with spalls, securely rammed into place. The finished work shall present an even, tight surface as shown on the drawings.
- .4 Random riprap gravel shall be dumped over the area to be treated, until the required depth is attained. Manual handling of the material may be required.
- .5 Hand-laid riprap shall be placed at culvert inlets, outlets and weir and at other locations as directed by the Departmental Representative.

- .6 The material at the bottom of the arch culvert and at the weir shall be granular riprap as indicated in the drawings.
- .7 Place bedding in unfrozen condition.

3.3 BACKFILLING

- .1 Do backfilling in accordance with Section 31 23 33.01 Excavating Trenching and Backfilling.
- .2 Place backfill material, approved by **Departmental Representative**, in 150 mm layers to full width, alternately on each side of culvert, so as not to displace it laterally or vertically.
- .3 Compact each layer to 95% maximum density to ASTM D698 taking special care to obtain required density under haunches.
- .4 Protect installed culvert with minimum 500 mm cover of compacted fill before heavy equipment is permitted to cross. During construction, width of fill, at its top, to be at least twice diameter or span of pipe and with slopes not steeper than 1:2.
- .5 Do not place backfill in frozen conditions.

END OF SECTION

Approved: 2007-03-21

Part 1 General

1.1 SECTION INCLUDES

- .1 Materials and installation for constructing sub-drains with granular filter and/or geotextile filter material.

1.2 RELATED SECTIONS

- .1 Section [01 33 00 - Submittal Procedures].
- .2 Section [01 35 73 – Procedures for Deconstruction of Structures].
- .3 Section [31 32 19.01 - Geotextiles].
- .4 Section [31 23 33.01 - Excavating Trenching and Backfilling].
- .5 Section [31 05 16 - Aggregate Materials].

1.3 MEASUREMENT PROCEDURES

- .1 Excavation and backfill will be measured under Section [31 23 33.01 - Excavating Trenching and Backfilling].
- .2 Supply of sub-drain pipe will be measured in metres, of each type and size indicated and in authorized quantities delivered to designated storage area.
- .3 Geotextiles will be measured under Section [31 32 19.01 - Geotextiles].
- .4 Supply and installation of pipe sub-drains will be measured in metres of each type and size installed.
 - .1 In cases where drain pipe is not connected to manholes or catch basins measurement will be actual length in place.
- .5 Supply and installation of sub-drainage including, trenching, backfill, bedding, granular filter material and geotextile will be measured horizontally from manhole face to manhole face in metres of each pipe size and depth class installed.

1.4 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C4-[02], Standard Specification for Clay Drain Tile and Perforated Clay Drain Tile.
 - .2 ASTM C136-[01], Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

- .3 ASTM C444M-[95], Standard Specification for Perforated Concrete Pipe [Metric].
- .4 ASTM C654M-[99], Standard Specification for Porous Concrete Pipe [Metric].
- .5 ASTM D698-[00a], Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³(600 kN-m/m³)).
- .2 Bureau de normalisation du Québec (BNQ)
 - .1 BNQ 3624-115-[2002-02-04], Polyethylene (PE) Pipe and Fittings-Flexible Corrugated Pipes for Drainage-Characteristics and Test Methods.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-[88], Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-[M88], Sieves, Testing, Woven Wire, Metric.
- .4 Canadian Standards Association (CSA International)
 - .1 CSA B1800-[02], Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).
 - .1 CSA B182.1-[02], Plastic Drain and Sewer Pipe and Pipe Fittings.
 - .2 CSA-G401-[01], Corrugated Steel Pipe Products.

1.5 SUBMITTALS

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Inform Departmental Representative of proposed source of bedding and filter materials and provide access for sampling at least 2 weeks prior to commencing work.
- .3 Submit to Departmental Representative for testing, following samples of materials proposed for use at least 2 weeks prior to commencing work.
- .4 Submit manufacturer's test data and certification that drain pipe materials meet requirements of this Section at least 2 weeks prior to beginning Work.
- .5 Certification to be marked on pipe.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 35 73 – Procedures for Deconstruction of Structures].
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with 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 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .6 Divert unused concrete materials from landfill to local facility approved by Departmental Representative.
- .7 Divert unused aggregate materials from landfill to facility for reuse as approved by Departmental Representative.
- .8 Divert unused clay pipe materials from landfill to local facility approved by Departmental Representative.
- .9 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 MATERIALS

- .1 Perforated corrugated steel pipe:
 - .1 To [CSA-G401].
 - .2 [Asphalt coated, type AC].
 - .3 Metal thickness unless otherwise indicated, as follows:

Diameter	Thickness of metal
150 to 200 mm	1.2 mm
250 to 300 mm	1.6 mm
- .2 Clay drain tile: to [ASTM C4].
- .3 Plastic pipe and fittings: to [BNQ 3624-115], nominal inside diameter 100 mm.
- .4 Perforated plastic pipe and fittings: to [CAN/CSA-B182.1]. Nominal pipe sizes 100 mm.
- .5 Porous concrete pipe: to [ASTM C654M].
 - .1 Class: standard strength
 - .2 Internal diameter: 100 mm.
- .6 Bedding gravel or crushed stone; hard, durable particles, graded evenly in size from 16 to 8 mm.
- .7 Granular filter material in accordance with Section [31 05 16 - Aggregate Materials] and following requirements:
 - .1 Screened stone or gravel.

- .2 Gradations to be within limits specified when tested to [ASTM C136]. Sieve sizes to [CAN/CGSB-8.1] [CAN/CGSB-8.2].

.8 Table

Sieve Designation	% Passing
200 mm	-
75 mm	-
50 mm	-
38.1 mm	-
25 mm	-
19 mm	-
12.5 mm	[100]
9.5 mm	-
4.75 mm	[70-100]
2.00 mm	[60- 95]
0.425 mm	[15- 40]
0.180 mm	[0- 10]
0.075 mm	-

- .9 Geotextile filter: In accordance with Section 31 32 19.01 - Geotextiles.

Part 3 Execution

3.1 TRENCHING

- .1 Do excavating trenching and backfilling in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling.
- .2 Place bedding filter material after approval of excavation trench by Departmental Representative.

3.2 BEDDING

- .1 Place 100 mm layer of bedding filter material to full trench width and compact to minimum 95% of maximum density to ASTM D698.

3.3 INSTALLATION OF PIPE SUB-DRAINS

- .1 Lay pipe drains on prepared bed, true to line and grade with inverts smooth and free of sags or high points.
- .1 Ensure barrel of each pipe is in contact with bed throughout full length.
- .2 Begin laying at outlet and proceed in upstream direction.
- .3 Lay perforated pipes with perforations downwards at 4 o'clock and 8 o'clock positions.
- .4 Lay bell and spigot pipe with bell ends facing upstream.

- .1 Do not mortar joints.
- .5 Cover joints of [bell and spigot] [clay tile] pipe with two-ply tar paper strips not less than 150 mm wide.
 - .1 Use strips of sufficient length to permit ends to be laid flat on bedding and turned outward on either side of pipe for a minimum distance of 75 mm.
- .6 Make joints tight in accordance with manufacturer's instructions.
- .7 Make watertight connections to existing drains, new or existing manholes and catch basins where indicated or as directed by Departmental Representative.
- .8 Plug open upstream ends of pipes with watertight concrete, steel or wood bulkheads.
- .9 Surround pipe with bedding gravel and compact as directed by Departmental Representative.
- .10 Surround and cover drain with filter material in uniform 150 mm layers [as indicated] [to an elevation of at least 150 mm above top of drain] and compact to at least 95% maximum density to ASTM D698.
- .11 Wrap or sleeve perforated pipe with geotextile filter as indicated.
- .12 Backfill remainder of trench to Section 31 23 33.01 - Excavating Trenching and Backfilling as directed by Departmental Representative.
- .13 Do not place bedding surround and backfill materials in frozen condition.
- .14 Protect sub-drains against flotation during installation.
- .15 Install "Y" connections to surface as indicated, for flushing.
- .16 Seal top surface of backfilled excavation with asphalt seal in accordance with Section [33 46 16.01 - Sub-drain Backfill Sealing with Asphalt].

3.4 CONNECTIONS TO MUNICIPAL FACILITIES

- .1 Connect pipe sub-drains to municipal storm sewer system where indicated.

3.5 INSTALLATION OF FRENCH DRAINS

- .1 Install French drains as indicated.
- .2 Backfill remainder of trench to Section 31 23 33.01 - Excavating Trenching and Backfilling as directed by Departmental Representative
- .3 Install clay seal at top of French drain as directed Departmental Representative.

END OF SECTION

ADDITIONAL SPECIFICATIONS

Part 1 General**1.1 SUMMARY**

- .1 Section Includes:
 - .1 The performance and installation criteria for foundation types for structures.
 - .2 Strip Footings:
 - .1 Material: concrete, reinforced.
- .2 Sustainable requirements for construction and verification:
- .3 Related Sections:
 - .1 Section [01 33 00 - Submittal Procedures].
 - .2 Section [01 35 29.00 - Health and Safety Requirements].
 - .3 Section [01 35 73.00 - Procedures For Deconstruction Of Structures].

1.2 REFERENCES

- .1 American Association of State Highway and Transportation Officials (AASHTO)
 - .1 AASHTO M36-M-[98], Standard Specification for Corrugated Steel Pipe, Metallic-Coating, for Sewers and Drains.
- .2 American Concrete Institute (ACI)
- .3 American Society for Testing and Materials (ASTM)
 - .1 ASTM A252-[98(2002)], Specification for Welded and Seamless Steel Pipe Piles.
 - .2 ASTM A690/A690M-[00a], Specification for High-Strength Low-Alloy Steel H-Piles and Sheet Piling for Use in Marine Environments.
 - .3 ASTM D25-[99e1], Specification for Round Timber Piles.
 - .4 ASTM D1143-[81(1994)e1], Test Method for Piles Under Static Axial Compressive Load.
 - .5 ASTM D3689-[90(1995)], Standard Test Method for Individual Piles Under Static Axial Tensile Load.
 - .6 ASTM D3966-[90(1995)], Standard Test Method for Piles Under Lateral Loads.
- .4 American Wood Preservers Association (AWPA)
 - .1 AWPA C3-[99], Piles - Preservative Treatment by Pressure Process.
- .5 Canadian Standards Association (CSA International)
 - .1 CSA G401-[93], Corrugated Steel Pipe Products.

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

- .1 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.00 - Health and Safety Requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for in accordance with Section [01 35 73.00 - Procedures For Deconstruction Of Structures.
 - .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.
 - .3 Fold up metal and plastic banding, flatten and place in designated area for recycling.

Part 2 Products**2.1 CONCRETE FOOTINGS**

- .1 Reinforcement: deformed steel bars.
- .2 Concrete Materials: between 25-50 MPa 28 day compressive strength using Type 50 - Sulphate Resisting cement.

Part 3 Execution**3.1 INSTALLATION - CONCRETE FOOTINGS**

- .1 Footings to support and resist imposed loads.
- .2 Dimensions.
 - .1 Nominal Thickness: 500 mm.
- .3 Form for component configuration and dimensions.
- .4 Place reinforcing steel and concrete.
- .5 Trowel top surface smooth and level.

END OF SECTION