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**Part 1      General**

**1.1      DESCRIPTION OF WORK**

- .1      The work shall consist of the excavation of all materials from within the limits of drains, canals, ditches and floodways, hereinafter referred to as waterways, and the disposal of all excavated materials on one or both sides of the waterway, in spoil banks, roadways, dykes, embankments, or to a site designated by the Engineer, in accordance with the requirements of this Section and to the lines, grades and cross sections shown on the Plans or staked on the ground by the Engineer

**1.2      JOB CONDITIONS**

- .1      GUIDELINES AND REGULATION

- .1      All work adjacent to or crossing waterways, including creeks and ditches draining into waterways, is regulated federally by the Department of Fisheries and Oceans, provincially and locally. Obtain authorization prior to commencement of any excavation works and complete works in accordance to Federal, Provincial and Municipal Acts, Regulations and Guidelines.
- .2      Manitoba provincial Designations of Drains maps classify drains in terms of “order” that range in size from 1<sup>st</sup> order to 7<sup>th</sup> order. The higher the order number the larger the size of drain. Examples of first to third order drains include small swales, depressions or man-made ditches in which water runs only in spring or after heavy rainfall. Fifth order and higher drains typically have year-round flows and are large waterways such as the Assiniboine and Red River.

- .2      SEDIMENT CONTROL PLAN

Where required, sediment and erosion control plans shall be submitted as follows:

- .1      Do not complete any work that may impact water bodies or other areas under the jurisdiction of DFO and the Province until approval has been obtained from DFO and the Province.
- .2      Prepare an Erosion and Sediment Control Plan and Construction Schedule for the review of the Engineer.
- .3      Submit an Erosion and Sediment Control Plan that has been reviewed by the Engineer to DFO and the Province for approval.

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- .4 Prior to commencement of the works, submit applications and receive approval from the Department of Fisheries and Oceans and the Province for the proposed construction schedule, construction method, and Erosion and Sediment Control Plan.
  - .5 Construction activities within the water body will not be allowed during fish spawning periods between April 1 and June 30 or as otherwise stipulated.
  - .6 Schedule for specified work adjacent to or crossing waterways to be detailed and include the duration, start date, and resources for the works.
- .3 CROSSINGS AND DIVERSIONS
- .1 The Contractor shall be responsible for all the necessary temporary crossings, cofferdams, channels, diversions and all dewatering operations which might be required to complete the work under this Contract.
  - .2 The Contractor shall save harmless the Owner from any and all claims which may arise due to the flooding of adjacent lands as a result of the construction and operation of these temporary works.
- .4 GRADE TOLERANCES
- .1 The Contractor shall excavate the waterway and construct the embankment to the lines and grades shown on the Plans, as staked in the field or as requested by the Engineer.
  - .2 The final elevation shall be completed to within a tolerance of +/- 25 mm unless otherwise directed by the Engineer or specified in section 01 00 10, Special Provisions.
- .5 WEED CONTROL
- .1 The Contractor shall be responsible for the elimination of weed growth along the right-of-way during the one year warranty maintenance period. Elimination of weeds is to be undertaken in conformity with existing provincial and local weed control regulations and as directed by the Engineer.
- .6 EXISTING WORKS
- .1 The Contractor shall be responsible for and shall take all necessary precautions to preserve and protect all public utilities and existing drains, culverts, tile drains, sewers and other surface drains or parts thereof which may be affected by his operations and which, in the opinion of the Engineer shall continue to be operational during construction. The Contractor shall immediately repair at his own expense any and all damage to such facilities resulting from his operations.

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**.7 RUNOFF WATER**

- .1 On some types of waterway construction, such as new channels paralleling existing channels or enlarging existing channels there may be precipitation during the construction period which may necessitate the use of the newly constructed channel. The Contractor shall be prepared to construct any temporary channels, diversions or other works required to drain runoff water. Prior to completion, these temporary works shall be removed and the area left in a condition acceptable to the Engineer.

**1.3 STANDARDS**

- .1 The following organization publish Standards which have been referred to in this Section
- .1 Department of Fisheries and Oceans  
Central and Arctic Region  
Fish and Fish Habitat Protection Program
- .2 Canadian Coast Guard  
Central Arctic Guard  
Navigable Waters Protection Act
- .3 ASTM: - American Society for Testing and Materials  
100 Barr Harbor Drive  
West Conshohocken PA 19428-2959 USA

The Standards referred to shall be the most recent edition.

**1.4 REFERENCED STANDARD DETAILS**

- .1 SD-01 Silt Fence Detail

**Part 2 Products**

**2.1 MATERIAL**

- .1 The construction of waterways shall be the excavation of insitu on site material.

**2.2 SILT FENCING**

- .1 Material to be polypropylene synthetic fibre fabric with ultraviolet stabilizers Amoco 1198 or approved equal.

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- .2 The fabric shall be inert to commonly encountered soil chemicals, hydrocarbons, mildew and bacteria.
- .3 The minimum value (weakest principal direction) for strength properties of any individual roll tested from the manufacturing lot or lots of a particular shipment shall be in excess of the minimum value (weakest principal direction) stipulated herein.
- .4 Physical Properties (based on minimum average roll values):
  - .1 Grab tensile: to ASTM D4632, 1.33 kN in machine direction, 0.89 kN in cross machine direction.
  - .2 Grab Elongation: to ASTM D4632 15%
  - .3 Mullen Burst Strength: to ASTM D3786, 3100 kPa.
  - .4 Puncture Resistance: to ASTM D4833, 0.53 kN.
  - .5 Trapezoid Tear Strength: to ASTM D4533, 0.28 kN.
  - .6 UV Resistance: to ASTM D4355, 90% @ 500 hrs.
  - .7 Apparent Opening Size: to ASTM D4751, 0.43 mm.
  - .8 Permeability: to ASTM D4491, 1,420 l/min/m<sup>2</sup>
  - .9 Permittivity to ASTM D4491, 0.5 sec<sup>-1</sup>
- .5 Wood Posts: 38 mm x 89 mm pointed at one end and fabricated.

### **2.3 EROSION CONTROL BLANKET**

- .1 Biodegradable 70% straw and 30% coconut fibre erosion control blanket
  - .1 Blanket mass/unit area: 270 g/m<sup>2</sup>
  - .2 Netting – black UV stabilized polypropylene: 15.9 x 15.9 mm
  - .3 Netting weight: 14.6 grams/m<sup>2</sup>
  - .4 Thread: white or brown UV stabilized polypropylene 850 dtex
  - .5 Location: bottom of ditch
- .2 Grass seed in accordance with section 02 48 60, seeding or as otherwise specified by the Engineer
- .3 Wattle
  - .1 Photodegradable
    - .1 225 mm diameter

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**Part 3 Execution**

**3.1 CLEARING AND GRUBBING**

- .1 Where necessary, prior to commencing excavation operations, clearing or clearing and grubbing shall be undertaken as set forth in Section 02 11 60, Clearing and Grubbing.

**3.2 PLACING OF EXCAVATED MATERIAL**

- .1 All excavated material shall be placed on one or both sides of the waterway as shown on the Plans or as directed by the Engineer. Excavated material shall be placed uniformly and continuously except as hereinafter specified. It shall be placed in the embankment in successive layers of not more than 450 mm in depth thickness. Blading and levelling operations shall be required during the placing of each successive layer to ensure a uniformity of consolidation throughout the embankment. The embankment shall be trimmed and levelled to conform with the lines and grades shown on the Plans or as staked on the ground by the Engineer.

**3.3 DRAINAGE OPENINGS**

- .1 Drainage openings, where shown on the plans or as staked on the ground by the Engineer, shall be provided in embankments to permit the surface drainage of adjacent lands.

**3.4 REMOVAL OF UNSATISFACTORY MATERIALS**

- .1 All roots, stumps or other deleterious material on the slopes or bottoms of embankments of waterways shall be removed and voids backfilled with suitable materials as directed by the Engineer.

**3.5 FROZEN MATERIALS**

- .1 Frozen material is not to be placed in the embankment unless approved otherwise by the Engineer

**3.6 DRAINAGE**

- .1 The work shall be performed and maintained so that it shall be drained at all times.

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### 3.7 SILT FENCES

- .1 Silt fencing is to be installed on either side of all drainage paths intersecting the construction zone and at the embankment adjacent to in stream works to minimize the potential for sediments from erosion to enter the water stream.
- .2 Posts shall be spaced a maximum of 2.5 m apart, and shall be driven vertically into the ground to a minimum depth of 600 mm.
- .3 A trench measuring approximately 200 mm wide by 200 mm deep shall be excavated along the entire line of stakes. The trench shall be on the side of the stakes where grading work is to be conducted.
- .4 The filter fabric from the silt fence shall extend into the trench a minimum of 300 mm. The prefabricated silt fence shall be installed without sags and have an overlap of 450 mm wherever its length is extended.
- .5 The trench shall be backfilled and tamped to existing grade so as to hold the base of the filter fabric firmly in place. The completed silt fence barrier shall have a minimum height of 600 mm above the ground surface.
- .6 MAINTENANCE
  - .1 All silt fences shall be inspected immediately after runoff event and at least daily during prolonged rainfall. Any required repairs shall be made immediately. The silt fence barriers shall be maintained in place, without gaps, and without undermining, so as to prevent sediment passage through or under the barrier. Silt fence barriers shall be maintained vertical without tears and without sagging and maintain a 450 mm overlap on seams.
  - .2 Accumulated sediment shall be removed at the direction of the Engineer in a manner that avoids escape to the downstream side of the barriers. Sediment shall be removed to the level of the grade existing at the time of barrier installation and shall conform to the following:
    - .1 accumulated sediment shall be removed when it reaches a depth of one-half the height of the silt fence barrier;
    - .2 accumulated sediment shall be removed as necessary to perform maintenance repairs;
    - .3 accumulated sediment shall be removed immediately prior to the removal of the silt fence.
- .7 REMOVAL
  - .1 Silt fence barriers shall be removed when, in the opinion of the Engineer, the measure is no longer required.

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- .2 Silt fence barriers shall be removed in a manner that:
  - .1 Avoids entry of equipment, other than hand held equipment, to any water course.
  - .2 Prevents release of sediment and debris to any water course.
  - .3 Areas disturbed by the installation and removal shall be restored to the original grade or to the satisfaction of the Engineer and seeded.

### **3.8 EROSION CONTROL BLANKET**

- .1 Complete restoration works immediately after excavation and backfilling (if applicable) is completed. Re-seed previously vegetated areas with compatible seed/mulch mixtures ensuring potential flows from storm runoff do not erode areas affected by construction.
- .2 Install biodegradable coconut fibre erosion control blanket over excavated area/sideslopes disturbed by construction immediately upon completion of the works.
- .3 Install erosion control blanket as per manufacturers' recommendations by stapling in place and details shown on the plans.

### **3.9 WATTLE**

- .1 Install the wattle over a minimum 1.2m width of erosion control blanket, ensuring that no gaps exist between the soil (blanket) and the bottom of the wattle. Place wattle at 1/3 from upstream edge of erosion control blanket.
- .2 Extend wattle from across for width of area being protected. For ditches, extend from 1m beyond top of ditch, across ditch to 1 m beyond top of ditch.
- .3 Install wooden stakes in the wattle at 1.2 metre on centre leaving less than 3-5 cm of stake exposed above the wattle.
- .4 Install erosion control blanket as per manufactures recommendations by stapling in place and details shown on plans.

### **3.10 TRIMMING**

- .1 When any portion of the embankment or waterway has, in the opinion of the Engineer, been sufficiently completed so that final grading is feasible, the Contractor shall commence grading operations and shall continue such operations at all times to the required grading tolerances specified by the Engineer or as required in Section 01 00 10 of the Special Provisions in the Contract except when specifically exempted from such work by the Engineer.

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- .2 Before final acceptance of the work, the embankment and waterway shall, if required by the Engineer, be re-trimmed.

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