

Part 1 General

1.1 DESCRIPTION OF WORK

- .1 This work shall consist of the removal of all materials of whatever nature, necessary for the proper placement of structure foundations, the supply and placement of all backfill materials and the final disposal of surplus and unsuitable materials. It shall include the construction of all cofferdams, cribs, caissons, shoring or other protective works necessary for excavation and backfill of the structure, together with all the necessary drainage and dewatering of the site. It shall also include the removal of all falsework, piling, cofferdams, cribs, shoring or other protective work, unless otherwise specified on the plans or as directed by the Engineer.

1.2 CLASSIFICATION OF WORK

- .1 EXCAVATION A - Excavation A shall include general excavation for the structure to the grade or grades shown on the plans and the disposal of this excavated material.
- .2 EXCAVATION B – Excavation B shall be the excavation for the construction of cut-off walls, curtain walls, or footing keys as may be necessary for the structure and this excavation shall be to the outlines of that portion of the structure as shown on the plans, and shall include disposal of all excavated material.
- .3 BACKFILL - Backfill shall include the supply and placing of any or all of the materials listed hereunder:
 - .1 Common Backfill
 - .2 Compacted Common Backfill
 - .3 Compacted Impervious Backfill
 - .4 Compacted Select Granular Backfill
 - .5 Filter Gravel
 - .6 Filter Sand

1.3 STANDARDS

The following organization publishes Standards which have been referred to in this section:



- .1 A.S.T.M. – American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken PA 19428-2959 USA
- .2 Manitoba Workplace Safety and Health Act and Regulations

The standards referred to shall be the most recent edition.

1.4 SUBMITTALS

- .1 In the event that cofferdams are required, and when requested by the Engineer, the Contractor shall submit drawings showing the proposed method of cofferdam construction.
- .2 The submittal of these drawings shall not in any way relieve the Contractor of his responsibility to provide a safe and satisfactory cofferdam.

1.5 JOB CONDITIONS

- .1 **OVER EXCAVATION, EXCAVATION A** - The Contractor shall excavate only such materials as shall be necessary for the construction of the structure and must not excavate outside the limits of excavation indicated on the plans or as set out in the field. Where excavation is beyond the lines and grades shown on the plan, the Contractor shall replace the excavated material with appropriate backfill material as directed by the Engineer at the Contractor's expense.
- .2 **OVER EXCAVATION, EXCAVATION B** - Over excavation of excavation B and the use of inside wood forms shall only be permitted with the approval of the Engineer. The forms shall be removed prior to any backfilling taking place. Excavation beyond the neat outline of the structure as shown on the plans shall be backfilled with material approved by the Engineer. The work of forming, backfilling and tamping shall be at the Contractor's expense. This class of excavation shall not be commenced until Excavation A is completed.
- .3 **UNSUITABLE COMMON BACKFILL** - In the event that the Engineer deems the excavated material to be unsuitable for Common Backfill or for Compacted Common Backfill, and if the excavated material is unsuitable through no action of the Contractor, the Owner will supply suitable backfill material or shall require the Contractor to supply suitable backfill material to the excavation site which shall be paid for in accordance with the General Conditions attached hereto. The unsuitable excavation material shall be designated as surplus material and shall be disposed of to a site designated by the Engineer.

- .4 SITE ALTERATIONS - In the event that the Engineer shall permit the excavation of access ramps, trenches or borrow pits within the limits of construction to facilitate the execution of the work, the Contractor shall, on completion of the work and at the Contractors expense, backfill such access ramps, trenches or borrow pits to the elevation of the original ground surface existing prior to the excavation, or as directed by the Engineer.
- .5 RIVER AND CHANNEL PRESERVATION - The Contractor shall execute construction excavation and backfill procedures in accordance with the requirements of Manitoba Conservation guidelines and as outlined below.

- .1 OFF-CHANNEL STRUCTURES - Excavation spoil piles shall be placed above the high water mark of the river or channel and run off shall be controlled to reduce the volume of sediment entering the river or channel. The Contractor shall submit a sediment control plan to the Engineer, for approval, at least two weeks prior to construction. A sediment pond to limit sediment from washing into the river or channel may be required. All data with respect to anticipated discharge rates and sediment size shall be submitted to the Engineer with the proposed sediment pond sizing. Maintenance of the sediment pond shall include periodic excavation of trapped sediment from the pond and sediment removal from the site to a location approved by the Engineer. Sediment trapped along the excavation slopes of the river or channel shall also be removed.

Discharge from the excavation shall be pumped to the sediment control pond. The sediment control pond shall be sized to settle sediment from the pump discharge and shall be based upon the anticipated discharge rate to the pond and the size of the sediment within the discharge. Table 1 below is to be used as a guideline for sizing the pond. Discharge at the inlet to the pond shall be protected by a rip rap scour pad to distribute flow and to ensure that the settling pond base does not erode.

Following construction, all sediment control materials associated with the sediment pond shall be removed and the site restored to the original contour and vegetative cover. Collected sediment shall be removed and disposed of at an approved spoil site.

Excavated river or channel slopes shall be revegetated and protected for long term stability against surface erosion. The Contractor shall be responsible for establishing short and long term erosion control on the excavated slopes. Acceptable short term procedures include, rip rap, silt

fences, straw bales or brush filters. In the long term, the slope shall be ripped or revegetated to the satisfaction of the Engineer.

TABLE 1
REQUIRED SURFACE AREA FOR DISCRETE PARTICLE SETTLING
(m² POND AREA PER m³/sec OF FLOW TO POND)

PARTICLE CLASSIFICATION	PARTICLE DIAMETER (MICRONS)	WATER TEMPERATURE				
		0°C	5°C	10°C	15°C	20°C
Coarse sand	1000	3	3	3	3	3
medium sand	500	8	7	6	5	5
fine sand	250	40	33	28	23	19
coarse silt	62	620	530	460	400	460
medium silt	31	2486	2111	1819	1583	1389
fine silt	16	9332	7924	6829	5943	5213
very fine silt	8	37327	31697	27318	23773	20853
coarse clay	4	149310	126788	109271	95091	83413
medium clay	2	597239	507153	437085	380364	333653
fine clay	1	2388956	2028611	1748342	1521458	1334612

- .2 IN-CHANNEL STRUCTURES - For in-channel structures, the natural stream bed adjacent to the structure shall not be disturbed without permission from the Engineer. If any excavation or dredging is made at the site of the structure before caissons, cribs, or cofferdams are placed, the Contractor shall, without extra charge, after the foundation base is in place, backfill all such excavation to the original ground surface of the channel, stream or river bed with material satisfactory to the Engineer. Material deposited within the stream area from foundation or other excavation or from the filling of cofferdams, shall be removed and the stream area freed from obstructions.
- .3 MITIGATION MEASURES - The following measures shall be taken to mitigate environmental concerns:



- .1 The Contractor shall not permit wastewater containing toxic material such as cement, concrete, lime or other construction materials to enter the river or channel.
- .2 Debris entering the river or channel from clearing and construction activity shall be removed immediately by the Contractor.
- .3 The Contractor shall not permit refuelling or servicing of construction equipment within 100 metres of surface water bodies.
- .4 The Contractor shall ensure the collection and disposal of waste oil products from construction equipment is in accordance with Manitoba Laws and Regulations.
- .5 The Contractor shall not permit construction activity between April 1 and June 15 that would disturb fish habitat or migrations.
- .6 The Contractor shall minimize the time and extent of bare ground exposure.
- .7 The Contractor shall revegetate the river banks and disturbed areas.
- .8 The Contractor shall use rock rip rap for shoreline erosion control where necessary.

1.6 INSPECTION

- .1 EXCAVATION - After each excavation is completed the Contractor shall notify the Engineer, and no further work shall be commenced until the Engineer has approved the depth of the excavation and the suitability of the foundation material.
- .2 BACKFILL - Backfill material shall be tested by the Engineer at the Owner's expense, during placement, to ensure conformance with these Specifications. The Contractor shall supply the required samples for testing at no cost to the owner.

Part 2 PRODUCTS

2.1 MATERIAL

- .1 EXCAVATION - Material to be excavated is the in situ material at the structure site.

- .2 BACKFILL – Unless noted otherwise on the drawings, backfill shall be Common Backfill.

All material used for backfill shall be of a quality acceptable to the Engineer and shall be free from large or frozen lumps, roots, and rocks no greater than 75mm in diameter, sod, brush or metallic trash or other unsuitable materials.

Unless specified otherwise in Section 01001, Special Provisions, backfill shall be one of the following six classes of material:

- .1 Common Backfill - shall consist of material obtained from the excavation or suitable borrow area without restriction as to soil type.
- .2 Compacted Common Backfill - shall consist of material obtained from the excavation or suitable borrow areas without restriction as to soil type.
- .3 Compacted Impervious Backfill - shall consist of clays, silty clays or sandy clays obtained from the excavation or suitable borrow areas .
- .4 Compacted Select Granular Backfill - shall meet the following gradation:

SIEVE	% PASSING
75mm	100
25 mm	80-100
4.75mm	40-70
75um	0-15

- .5 Filter Gravel shall meet the requirements of concrete coarse aggregate:

SIEVE	% PASSING
25mm	100
19mm	90-100
12.50mm	30-75
9.50mm	20-55
4.75mm	0-10
2.36mm	0-5



- .6 Filter Sand - shall meet the requirements of concrete fine aggregate:

SIEVE	% PASSING
9.50mm	100
4.75mm	95-100
2.36mm	80-100
1.18mm	50-85
600um	25-60
300um	10-30
150um	2-10

Part 3 EXECUTION

3.1 CLEARING AND GRUBBING

- .1 Where necessary, prior to commencing excavation operations, clearing and grubbing shall be undertaken as set forth in Section 021160, Clearing and Grubbing.

3.2 PLACING OF EXCAVATED MATERIAL

- .1 All excavated material shall be placed in disposal areas where shown on the plans or as directed by the Engineer. In no case shall the Contractor be permitted to place excavated material in the area adjacent to the top of any excavation.
- .2 The disposal areas shall be trimmed and left in a neat, tidy, free draining condition with an evenly graded surface.

3.3 EXCAVATION DEPTH

- .1 The excavation shall be to the elevations shown on the plans, or to such other elevations as may be directed by the Engineer in order to provide firm, stable foundation support.
- .2 The Contractor shall remove all unsuitable material from the excavation as directed by the Engineer. Unsuitable excavated material shall be replaced with

material approved by the Engineer. The work involved for additional excavation and replacement of unsuitable material shall be paid as extra work unless otherwise shown on the Plans or indicated in Section 01001, Special Provisions.

- .3 The width and length of the excavation and the angle of excavated side slopes shall take into consideration the stability of the material. No extra payment or scheduling will be allowed for improper excavation methods which result in material sliding back into the bottom of the excavation.

3.4 WINTER EXCAVATION

- .1 Under winter conditions and for concrete structures the Contractor must prevent frost from penetrating the base of the excavation and shall maintain the excavation in a satisfactory, frost-free condition.

3.5 SHORING

- .1 For structures where space constraints prohibit the use of sloped side walls for the excavation, and where the excavation is deeper than 1.8 m, the structure excavations shall be shored and braced. The interior dimensions of clearance shall allow for the construction of forms and the inspection of their exteriors, driving piles where applicable, and for water drainage collection and pumping outside of the forms.
- .2 Unless otherwise provided, shoring and bracing shall be removed by the Contractor after the completion of the foundation sub-structure. The removal shall be undertaken in such a manner as not to disturb or damage the structure.

3.6 DEWATERING

- .1 The Contractor shall construct, supply, maintain and operate all necessary dykes, cofferdams, drains, sumps, well points and pumps and any other equipment that may be required to keep the work area free from all sources of water damage which may affect the work.
- .2 The Contractor's method of removing water from foundation excavations shall be subject to the Engineer's approval. All dewatering shall be achieved in a manner which shall prevent the loss of fines from the foundation, shall maintain the stability of the excavated slopes and the bottom of the excavations, and shall result in all construction operations being performed in the dry. The cost of dewatering shall be considered incidental to excavation.



3.7 COMPACTION OF BACKFILL

- .1 The six classes of backfill shall be placed and compacted in accordance with the following methods:
 - .1 Common Backfill - shall be placed in 150 mm lifts and compacted with the wheels or tracks of construction equipment.
 - .2 Compacted Common Backfill - shall be placed in 150 mm lifts and mechanically compacted to 95% of maximum Standard Proctor dry density (ASTM D698) at moisture content between 0.9 and 1.2% of optimum.
 - .3 Compacted Impervious Backfill - shall be placed in 150 mm lifts and mechanically compacted to 95% of maximum Standard Proctor dry density (ASTM D698) at a moisture content between 0.9 and 1.2% optimum.
 - .4 Compacted Select Granular - shall be placed in 150 mm lifts and mechanically compacted to 100% of maximum Standard Proctor dry density (ASTM D698).
 - .5 Filter Gravel - where filter gravel is located under a structure it shall be placed in 150 mm lifts and compacted with mechanical compaction equipment. Where filter gravel is located under backfill it may be placed without compaction.
 - .6 Filter sand - where filter sand is located under a structure it shall be placed in 150 mm lifts and compacted with mechanical compaction equipment. Where filter sand is located under backfill, it may be placed without compaction.

3.8 WINTER BACKFILLING

- .1 Unless otherwise stated in Section 01001, Special Provisions, the placing of frozen backfill of any type shall not be permitted. The placing of backfill on frozen ground shall not be permitted. All types of backfill, when placed, shall be kept from freezing until all backfill operations are complete.

3.9 BACKFILL PROCEDURES

- .1 Care shall be taken to avoid damage to pipes or portions of structures embedded in the backfill.



- .2 All backfill within 600 mm of the surface of a structure shall be compacted by hand operated mechanical plate tampers to the density specified for the class of backfill involved.
- .3 Upon completion of backfilling, the Contractor shall shape and trim the area in accordance with the lines and grades shown on the plans or as staked on the ground by the Engineer.
- .4 Special precautions shall be taken to prevent wedging action against abutments and retaining walls. The slope bounding the excavation shall be altered by stepping or serrating to prevent wedge action.
- .5 Fill placed around structures shall be brought up uniformly at approximately the same elevation on all sides of the structure.
- .6 Surplus excavated material and material which is unsuitable for backfill shall be hauled to, stockpiled, or spread at locations approved by the Engineer. Such locations shall not be greater than two kilometres away from the point of excavation. In the event that such material is required to be hauled more than two kilometres, the Contractor shall be compensated for the overhaul on the basis of Extra Work in accordance with the General Conditions attached hereto, or as specified in Section 01001, Special Provisions.