Part 1

1.1 DESCRIPTION OF WORK

.1 This work shall consist of the excavation of all materials within the work area to the lines and grades shown on the plans or as set out in the field by the Engineer, and the control of excavated material either by stockpiling for later use or by placing in the compacted embankment and by wasting surplus and unsuitable materials in spoil piles. If the pond and drainage ditch excavation do not produce a sufficient volume of embankment material, then additional material shall be obtained from borrow areas identified in Section 01 00 10, Special Provisions. The work shall also include the supply (unless otherwise indicated in Section 01 00 10, Special Provisions) and installation of all required pipe, couplers, valves, splash, inlet and outfall pads, support blocks, rip rap (if required), and septic waste dump station (if required) as detailed on the plans.

1.2 STANDARDS

The following organizations publish Standards which have been referred to in this Section:

.1 CSA International
178 Rexdale Boulevard
Etobicoke, ON M9W 1R3

.2 ASTM: - American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken PA 19428-2959 USA

.3 A.W.W.A. – American Water Works Association

6666 W. Quincy Avenue
Denver, Colorado 80235 USA

The Standards referred to shall be the most recent edition.

1.3 REFERENCED STANDARD DETAILS

.1 SD-03 Septic Waste Dump Station

1.4 OTHER CONTRACTORS

.1 The Contractor shall note that a forcemain and splash pad or other works may be installed by a forcemain contractor prior to or during the wastewater stabilization pond works. The Contractor shall protect the installed works from damage, and shall be responsible for any damage by his operations. If the works are being installed while construction is in progress the Contractor shall provide access to the site and shall co-operate with the forcemain contractor in carrying out his work.

1.5 MANITOBA ENVIRONMENT ACT LICENCE REQUIREMENTS

.1 The Contractor is advised that all sewage lagoons are constructed under a Licence issued by the Regulator in accordance with the Manitoba Environment Act. The Licence contains conditions, which have to be fulfilled prior to the introduction of any raw sewage to new cells. The Contractor is not to add any sewage without approval from the Engineer.

1.6 TOLERANCE LIMITS

.1 The excavation, the embankment and the perimeter drain shall be graded to the following tolerance limits.

Excavation	- $\pm$ 25 mm
Embankment	- $\pm$ 25 mm
Ditching	- $\pm$ 25 mm

1.7 QUALITY CONTROL

.1 The Contractor is responsible for the quality of the completed product and all related work.

.2 The Contractor is responsible for the quality control and shall perform such inspections and tests as are necessary to ensure that the work conforms to the requirements of the contract documents, at his cost.

.3 During the progress of the work, a sufficient number of tests shall be performed by the Contractor to determine that material, product and installation meet the specified requirements.

.4 Minimum requirements regarding quality control are specified in various sections of the Specifications, however, the Contractor shall perform as many inspections and tests necessary to ensure that the work confirms to the requirements of the contract documents.

.5 Testing shall be in accordance with pertinent codes and regulations, and with selected standards of the American Society Testing and Materials (ASTM) and Canadian Standards Association (CSA).

.6 Product testing, mill tests and laboratory reports to demonstrate that product and material supplied by the Contractor meet the specifications are specified under various sections of the contract documents.

Part 2 Products

2.1 APPROVED PRODUCTS

.1 Products shall be supplied in accordance with the Listing of Approved Products in the attached Appendix, as shown on the plans or as specified in Section 01 00 10, Special Provisions.

2.2 EXCAVATED MATERIAL

.1 The excavated material shall be the insitu material at the pond site, the perimeter drains and if required the borrow areas.

2.3 EMBANKMENT MATERIAL

.1 The embankment material shall be the insitu material obtained from the various sources of excavation, or imported impervious material from borrow areas. It shall be placed in the embankment in the zones shown on the plans or as directed by the Engineer. Material used for embankment shall not contain frozen lumps, weeds, sod, roots, logs, stumps, trash or any other objectionable material. Embankment material shall be one of the following:

.1 COMMON BACKFILL: Shall be sands, silts, gravels, clays or combinations of sands, silts, gravels and clays, and any of these may include organic material.

.2 IMPERVIOUS BACKFILL: Shall be any inorganic, impervious clay, silty clay, sandy clay or gravelly clay approved by the Engineer.

2.4 MISCELLANEOUS APPURTENANCES

.1 PIPE, COUPLERS, VALVES AND ACCESSORIES – Shall be supplied in accordance with Section 02 70 30, sewers, Section 02 70 60 Pressure Pipelines

and as shown on the plans and described in Section 01 00 10, Special Provisions. Deviations shall not be permitted without the written approval of the Engineer.

.2 CONCRETE - Cement used in the manufacture of concrete splash pads, pipe supports and truck dump stations shall meet the requirements of the current CSA Standard A5, Portland Cement, sulphate resistant Type 50. Concrete shall have a 28 day compressive strength of 20 MPa.

2.5 BENTONITE AND SYNTHETIC LINERS

.1 The Contractor may be required to utilize bentonite or synthetic liner systems for the construction of the wastewater stabilization pond. The supply and installation of these systems shall be as shown on the Plans and in accordance with Section 01 00 10, Special Provisions.

Part 3 Execution

3.1 CLEARING AND GRUBBING

.1 Where necessary, prior to commencing the construction of the wastewater stabilization pond, clearing and grubbing shall be undertaken as set forth in Section 02 11 60, Clearing and Grubbing.

3.2 FOUNDATION PREPARATION

.1 The Contractor shall strip and remove topsoil to the depth and limits shown on the plans or as otherwise directed by the Engineer. The topsoil shall be stockpiled at a site designated by the Engineer or placed at the locations designated by the Engineer.

.2 Prior to placement of the embankment material, the foundation shall be scarified to a depth of 150 mm and compacted with adequate passes of a sheepsfoot roller or suitable compaction equipment to achieve the density specified in Section 01 00 10, Special Provisions. Completed foundation preparation shall be approved by the Engineer before any embankment material shall be placed.

3.3 EXCAVATION

.1 Excavations shall be made to the lines and grades shown on the plans and as staked on the ground by the Engineer. Pond and borrow area excavations shall be worked in a manner that shall result in good surface drainage during periods of precipitation. Generally, all excavated material from the cells and from borrow areas shall be used in the construction of embankments. The placing of all

materials shall be subject to the approval of the Engineer. Where unsuitable materials are encountered at the lagoon bottom, such material shall be removed and replaced with suitably compacted clay to provide an impermeable seal as required by the Engineer, and to meet the specified hydraulic conductivity requirements in Section 01 00 10, Special Provisions.

3.4 EMBANKMENT COMPACTION

.1 Embankment material, both common backfill and impervious backfill shall be compacted in maximum 150 mm compacted lifts utilizing approved compaction equipment. The Contractor shall compact each lift until the density achieved is 98 percent of Standard Proctor Dry Density in accordance with (ASTM D698) or as specified in Section 01 00 10, Special Provisions or as required by the Engineer. The Engineer may perform field density testing on each lift compacted by the Contractor. The Contractor shall scarify and recompact any material placed and compacted which does not meet the density required by the Engineer. The Contractor shall supply all the equipment of the necessary size and weight to ensure that adequate compaction of the embankment material is achieved to the specified density.

3.5 MOISTURE CONTENT

.1 The moisture content of both common backfill and impervious backfill shall be within the range of 0.9 to 1.2 percent of optimum moisture content as determined by the Standard Proctor Test (ASTM D698).

.2 If the surface of any portion of the embankment during construction should become too dry, it shall be scarified, watered and compacted. If the embankment material should become too wet, it shall be disced and dried before compaction. The Contractor shall not place material, which is frozen, or place material on frozen surfaces.

3.6 CLAY CORE AND CUTOFF

.1 Clay core and cut-off walls where shown on the plans or directed by the Engineer shall be constructed from impervious materials approved by the Engineer. The selected material may be excavated from the pond cell bottom or a designated borrow area and shall meet the requirements of these Specifications or as set out in the Section 01 00 10, Special Provisions.

3.7 RIPRAP AND RIPRAP BEDDING

.1 The Contractor shall supply riprap and riprap bedding in accordance with Section 02 28 40, Supply and Placement of Riprap and Riprap Bedding.

3.8 MISCELLANEOUS APPURTENANCES

.1 Miscellaneous appurtenances shall be installed in accordance with Section 02 70 30, Sewers and Section 02 70 60, Pressure Pipelines of these Specifications, and as shown on the plans and described in Section 01 00 10, Special Provisions.

.1 EXCAVATION: Excavation for miscellaneous appurtenances shall be to the lines and grades shown on the plans. The bottom of the excavation shall be free from unsuitable materials such as soft areas or stones. Pipes shall be uniformly supported along their entire length.

.2 BACKFILL - Backfill around miscellaneous appurtenances shall be compacted to a minimum of 300 mm above the top of the pipe, or to within 600 mm adjacent to valve boxes or other appurtenances. Remaining backfill in the trenches shall be backfilled in accordance with Clause 3.04 of this Section. Material for backfill around pipes shall be carefully selected clay free of stones or hard lumps.

3.9 TRIMMING

.1 All areas affected by construction operations shall be finished by blading the worked area to form a surface free of depressions or protrusions.

3.10 SURFACE WATER AND SEWAGE

.1 The Contractor shall be responsible for the removal of surface water and sewage from all sources required to facilitate the construction of the wastewater stabilization ponds. He shall construct and maintain all drains, sumps, pumps and/or, any other equipment or facilities that may be required to keep the work area free from water. The Contractor shall conform with Section MWSB 1000, Clauses 4.45, 4.46, and 4.47, Sewage Handling, of the General Conditions, when handling raw or treated sewage on site and in accordance with Section 02 20 10 “Construction of Waterways” for removal of surface water.

3.11 SEEDING

.1 The Contractor shall seed all areas affected by the construction operations, excepting borrow areas and interior pond cell surfaces which would normally be submerged at full design storage level. Seeding shall be in accordance with

Section 02 48 60, Seeding of these Specifications, or as specified in Section 01 00 10, Special Provisions. The Contractor shall monitor seeded areas and areas with unsatisfactory grass growth or areas overtaken by weeds shall be corrected.

3.12 PERIMETER DITCHING

.1 The Contractor shall construct perimeter ditches to the lines and elevations as shown on the plan or as directed by the Engineer.

3.13 SOIL SAMPLE COLLECTION AND TESTING

.1 The Contractor shall supply all materials and equipment necessary to collect soil samples at the depths directed by the Engineer and in accordance with the Environmental Licence and Section 01 00 10, Special Provisions. The Contractor shall collect and transport Shelby Tube Soil Samples in accordance with the following standards:

.1 ASTM D1587 - Standard Practice for Thin Walled Tube Sampling of Soils.

.2 ASTM D4220 - Standard Practice for Preserving and Transporting Soil Samples.

.2 The Shelby Tube Soil Samples shall be tested for hydraulic conductivity in accordance with the following standard:

.1 ASTM D5084 - Standard Test Method of Measurement of Hydraulic Conductivity of Saturated Porous Materials using a Flexible Wall Permeameter.

.3 A complete laboratory report for each soil sample taken shall be provided by the Contractor to the Engineer. The Contractor shall schedule the collection of samples to ensure that a Manitoba Conservation Officer and the Engineer are on site during the sample collection. The Contractor shall provide a drilling rig that is equipped with both standard and hollow stem augers and with the capacity to drill a minimum 125 mm hole in the dike or cell bottom to the maximum depth of the cell liner. The drilling rig shall be capable of extracting a Shelby tube sample up to the maximum depth of the liner. The equipment utilized for Shelby tube sampling shall press and extract the tube in a straight line motion along the centre axis line of the sample tube without lateral displacement. The Contractor shall complete Shelby Tube sampling at all locations required by the Manitoba Conservation Officer and/or the Engineer. All samples shall be sealed and delivered to the laboratory. The samples shall be labelled, dated, location

identified and all holes remaining in the dike shall be sealed with a bentonite and clay mixture.

3.14 SEPTIC WASTE DUMP STATION

.1 When required by the Contract, the Contractor shall construct a septic waste dump station at the location shown on the Plans. The station shall be constructed in accordance with SD-03 Septic Waste Dump Station Detail in the Standard Construction Drawing Appendix or as shown on the Plans.

.2 Unless otherwise specified on the Plans or in Section 01 00 10 Special Provisions, the Contractor shall ensure that the concrete pad and channel is constructed on a subgrade compacted to 100% Standard Proctor dry density in accordance with ASTM D698. Welded Wire Fabric (No. 6), or 10M steel at 300 mm centres each way, shall be embedded in the concrete as reinforcement. The concrete strength shall be 20 MPa and shall utilize sulphate resistant Type 50 cement.