

Part 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 31 23 33 - Excavation, Trenching and Backfilling.

1.2 MEASUREMENT PROCEDURES

- .1 Measure following items in hectares within limits as indicated:

- .1 Clearing.
- .2 Grubbing.
- .3 Close cut clearing.
- .4 Underbrush clearing.

- .2 Measure and number of isolated stumps grubbed.

1.3 DEFINITIONS

- .1 Clearing consists of cutting off trees and brush vegetative growth to not more than a specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.
- .2 Close-cut clearing consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.
- .3 Clearing isolated trees consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.
- .4 Underbrush clearing consists of removal from treed areas of undergrowth, deadwood, and trees smaller than 50 mm trunk diameter and disposing of all fallen timber and surface debris.
- .5 Grubbing consists of excavation and disposal of stumps and roots boulders and rock fragments of specified size to not less than a specified depth below existing ground surface.

1.4 STORAGE AND PROTECTION

- .1 Prevent damage to existing items such as: fencing, shrubs and trees (including root systems), landscaping, natural features, bench marks, building, pavement, utility lines, water courses, and site features, which are to remain.
 - .1 Repair any damaged items to approval of Contract Administrator.
 - .2 Replace any shrubs or trees designated to remain, if damaged, as directed by Contract Administrator.

Part 2 PRODUCTS

2.1 MATERIALS

- .1 Not used.

Part 3 EXECUTION

3.1 PREPARATION

- .1 Inspect site and verify with Contract Administrator, items designated to remain.
- .2 Locate and protect utility lines. Preserve in operating condition active utilities traversing site.
- .3 Notify any utility authorities before starting clearing and grubbing.

3.2 CLEARING

- .1 Clear by cutting at a height of not more than 300 mm above ground. In areas to be subsequently grubbed, height of stumps left from clearing operations to be not more than 1000 mm above ground surface.

3.3 GRUBBING

- .1 Grub out stumps and roots to not less than 200 mm below ground surface.
- .2 Grub out visible rock fragments and boulders, greater than 300 mm in greatest dimension, but less than 0.25 m³.

3.4 REMOVAL AND DISPOSAL

- .1 Remove cleared and grubbed materials off site to disposal area as indicate.
- .2 Chip or mulch and spread cleared and grubbed vegetative material on site as directed by Contract Administrator.
- .3 Remove diseased trees identified and dispose of this material to the approval of the Contract Administrator.

3.5 FINISHED SURFACE

- .1 Leave ground surface in condition suitable for immediate grading operations, stripping of topsoil to approval of Contract Administrator.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D698-91(1998), Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³), latest edition.
 - .2 City of Winnipeg Standard Construction Specifications, latest edition.

1.2 EXISTING CONDITIONS

- .1 Refer to Geotechnical report for this project, attached to this Specification.
- .2 Any known underground or surface utility lines, and buried objects, are shown on the drawings, but do not include any unknown items.

1.3 PROTECTION

- .1 Protect existing pavement and surface or underground utility lines, which are to remain as indicated on the drawings. If damaged, restore to original or better condition.
- .2 Maintain access roads to prevent accumulation of construction related debris on roads.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Fill material: as specified in Section 31 23 33.
- .2 Excavated or graded material existing on-site may be suitable to use as fill for grading Work, if reviewed by the Contract Administrator. Submit samples upon request.

PART 3 EXECUTION

3.1 STRIPPING OF TOPSOIL

- .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected as determined by Contract Administrator.
- .2 Commence topsoil stripping of areas as indicated after area has been cleared of grasses and removed from the Site.
- .3 Strip topsoil to depths as indicated. Rototill weeds and grasses and retain as topsoil on-site. Avoid mixing topsoil with subsoil.
- .4 Stockpile in approved locations. Stockpile height not to exceed 2 m.
- .5 Dispose of unused topsoil off-site.

3.2 GRADING

- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .2 Rough grade to following depths below finish grades:
 - .1 as indicated for grassed areas and asphalt paving, concrete paving, walks, and precast paving units.
- .3 Slope rough grade away from building as indicated and at a minimum of 2% generally.
- .4 Grade ditches to depth required for maximum run-off.
- .5 Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.
- .6 Unless otherwise noted, compact filled and disturbed areas to maximum dry density to ASTM D698, as follows:
 - .1 85% under landscaped areas.
 - .2 95 % under paved and walk areas.
- .7 Do not disturb soil within branch spread of trees or shrubs to remain.

3.3 TESTING

- .1 The inspection and testing of soil compaction will be carried out by a testing agency, designated and paid for by The City, through the Cash Allowances. The Contractor shall coordinate the timing of this testing in an efficient way.

3.4 SURPLUS MATERIAL

- .1 Remove surplus material and material unsuitable for fill, grading or landscaping, to approved facilities off-site.

END OF SECTION

PART 1

GENERAL

1.1

RELATED SECTIONS

- .1 Section 31 22 00 - Site Grading
- .2 Section 32 16 15 – Concrete Walks, Curbs, & Gutters
- .3 Section 32 71 00 – Weeping Tile
- .4 Geotechnical Report in this Specification

1.2

REFERENCES

- .1 American Society for Testing and Materials (ASTM), latest edition.
 - .1 ASTM C117, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing
 - .2 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
 - .3 ASTM D422, Standard Test Method for Particle-Size Analysis of Soils
 - .4 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³)
 - .5 ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2,700 kN-m/m³)
 - .6 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- .2 Canadian General Standards Board (CGSB), latest edition.
 - .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series
 - .2 CAN/CGSB-8.2-M, Sieves, Testing, Woven Wire, Metric
- .3 Canadian Standards Association (CSA), latest edition.
 - .1 CAN/CSA-A3000-98-A5, Portland Cement
 - .2 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction
- .4 City of Winnipeg Standard Construction Specifications, latest edition.

1.3

DEFINITIONS

- .1 Excavation classes (two classes of excavation will be recognized): common excavation and rock excavation.
 - .1 Rock: any solid material in excess of 0.25 m³, which cannot be removed by heavy duty excavating equipment, with a 0.95 to 1.15m³ bucket. Rock is not classified as frozen material. Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
 - .2 Common excavation: excavation of materials of whatever nature, which are not included under definition of rock excavation.
- .2 Unclassified excavation: excavation of deposits of unknown character.

- .3 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
- .4 Waste material: excavated material unsuitable for use in the Work or surplus to requirements.
- .5 Borrow material: material obtained from outside the Site area to be graded, as required for construction of fill areas or for other portions of the Work.
- .6 Unsuitable materials:
 - .1 Weak, compressible, or frost susceptible materials under excavated areas.
 - .2 Frost susceptible materials:
 - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318 or latest, and gradation within limits specified when tested to ASTM D422 or latest and ASTM C136, latest edition: Sieve sizes to CAN/CGSB-8.1, latest edition.
 - .2 Table

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

1.4 SUBMITTALS

- .1 At least 3 weeks prior to commencing Work, submit documentation on proposed source of fill materials for each type to Contract Administrator and provide access for sampling.

1.5 QUALITY ASSURANCE

- .1 The inspection and testing of soil compaction will be carried out by a testing agency designated and paid for by the The City, through the Cash Allowances. The Contractor shall coordinate the timing of this testing in an efficient way.
- .2 When necessary, the Contractor shall engage the services of a qualified Professional Contract Administrator, registered in the Province of the Work, to design and inspect cofferdams, shoring, bracing and underpinning, if required for the Work. Any design and supporting data shall be submitted at least 2 weeks prior to the Work and bear the stamp and signature of this Professional Contract Administrator.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials. Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Section 01 74 21.

- .2 Place materials defined as hazardous or toxic in designated containers. Ensure containers are sealed and stored safely.

1.6 PROTECTION OF EXISTING FEATURES

- .1 Protect existing features in accordance with Section 01 56 00 and applicable local regulations.
- .2 Existing buried utilities and structures:
 - .1 Sizes, depths and locations of existing utilities and structures indicated on drawings, are for guidance only. Their completeness and accuracy shall be confirmed on site by the Contractor.
 - .2 Prior to commencing any excavation Work, notify all applicable utility authorities, having jurisdiction, to clearly mark related locations on-site and prevent the disturbance of these markers during the Work. Establish the location and state of use of all buried utilities and structures.
 - .3 Confirm the locations of all buried utilities by careful test excavations.
 - .4 Maintain and protect water, sewer, gas, electric, telephone and other utilities and structures encountered, from damage.
 - .5 Where utility lines or structures exist in area of excavation, notify the Contract Administrator before re-routing.
 - .6 Carefully record the location, size, type, and depth of all maintained, re-routed, and abandoned underground lines on the Project Record Set.
 - .7 Confirm the locations of all recent excavations adjacent to the area of excavation.
- .3 Existing buildings and surface features:
 - .1 Conduct a condition survey of all existing, trees and other plants, lawns, fencing, service poles, wires, pavement, survey bench marks and monuments, which may be affected by Work of this Contract.
 - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repairs to the approval of the Contract Administrator.
 - .3 Only where required in the area of excavation, carefully trim roots or branches to the approval of the Contract Administrator.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Granular fill: Crushed, pit run or screened stone, gravel or sand, unless otherwise noted. Aggregate shall be clean, sound, durable, and not contain thin elongated particles, sod, topsoil, roots or plants.
 - .1 Gradations to be within limits specified, when tested to latest editions of: ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1, latest edition.
 - .2 Unless noted otherwise in the Geotechnical Report, all granular fill types and accessories shall meet the gradations in City of Winnipeg Specification CW3110.

- .2 Bridging fill material: unfrozen, 100mm (4") or 150mm (6"), clean imported crushed limestone; provide documentation for an L.A. abrasion loss of 25% minimum, or provide documentation by independent source that this material is suitable for bridging purposes.
- .3 Backfill material: suitable for general backfill as approved by Contract Administrator; clean, unfrozen, and free from rocks larger than 75mm, cinders, ashes, sods, refuse, or other deleterious materials.
- .4 Unshrinkable fill: proportioned and mixed to provide:
 - .1 Maximum compressive strength of 0.4 MPa at 28 days.
 - .2 Maximum Portland cement content of 25 kg/m³ with 40% fly ash replacement: to CAN/CSA-A3000-A5, Type 10 or latest.
 - .3 Minimum strength of 0.07 MPa at 24 h.
 - .4 Concrete aggregates: to CAN/CSA-A23.1 or latest.
 - .5 Portland cement: Type 10.
 - .6 Slump: 160 to 200 mm.
- .5 Natural sand: clean and free of deleterious materials.
- .6 Shearmat void form: as specified in Section 03 30 00.
- .7 Geotextile fabric separator: high quality, woven; Amoco #2016 or approved equal in accordance with B7.

PART 3 EXECUTION

3.1 SITE PREPARATION

- .1 Remove obstructions, ice, and snow, from surface areas to be excavated.
- .2 Cut pavement or sidewalks neatly along the limits of the proposed excavation, in order that surfaces will break evenly and cleanly.

3.2 STRIPPING OF TOPSOIL

- .1 Commence topsoil stripping at excavation areas, after the area has been cleared of weeds and grasses and removed from site.
- .2 Strip topsoil to depths as indicated and do not mix topsoil with subsoil. Stockpile in locations as coordinated with The City. Stockpile height not to exceed 2 m.
- .3 Dispose of unused topsoil as directed by Contract Administrator.

3.3 STOCKPILING

- .1 Stockpile separate fill materials in areas, as approved by The City. Stockpile granular materials in manner to prevent segregation. Protect fill materials from contamination.

3.4 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

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- .1 Construct temporary work to depths, heights and locations as indicated.
 - .2 During backfill operation:
 - .1 Unless otherwise as indicated or as directed by Contract Administrator, remove sheeting and shoring from excavations when safe to do so.
 - .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 an elevation at least 500 mm above toe of sheeting.
 - .3 When sheeting is required to remain in place, cut off tops at elevations as indicated.
 - .4 Upon completion of substructure construction:
 - .1 Remove cofferdams, shoring and bracing.
 - .2 Remove excess materials from the Site and restore watercourses as indicated and as directed by Contract Administrator.
- 3.5 DEWATERING AND HEAVE PREVENTION
- .1 Keep excavations free of water while Work is in progress.
 - .2 Submit for Contract Administrator's review details of proposed dewatering or heave prevention methods, such as dikes, well points, and sheet pile cut-offs.
 - .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur. Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
 - .4 Protect open excavations against flooding and damage due to surface run-off.
 - .5 Dispose of water in accordance with Section 01 35 43 and in manner not detrimental to public and private property, or any portion of Work completed or under construction.
- 3.6 EXCAVATION - GENERAL
- .1 Strip organics, silts, fill soils, and other deleterious material from areas intended for foundations and concrete floor slabs (see Geotechnical Report). Stockpile for reuse on the Site as specified in this Section. Any old structures or foundations exposed shall be completely removed to a 0.5m depth below design subgrade elevations or as noted in Geotechnical Report.
 - .2 Minimize disturbance of native subgrade and use a smooth-bladed bucket from the edge of the excavation. Excavate to achieve new design sub-grades as intended on the drawings and to depths noted in the Geotechnical Report for granular fill layers. Do not over-excavate or interfere with the bearing capacity of any adjacent foundations to remain.
 - .3 Protect the exposed subgrade from frost, dessication, drying and inundation. If these conditions occur, moisture condition the native sub-grade as appropriate, scarify and recompact to 98% SPMDD. After excavation, notify the Contract Administrator to arrange for inspections by Geotechnical personnel.

- .4 Proof roll the sub-grade with a fully loaded tandem axle truck with multiple passes to detect weak or soft areas. Repair any such areas found by sub-excavating to a depth up to 400mm (16") below the design sub-grade elevation, unless noted otherwise.
 - .5 Place the geotextile fabric down over exposed sub-grade surfaces where soft/weak spots occur, achieving lapped joints of 150 (6") minimum. Without operating construction equipment directly on the sub-grade or the geotextile, place bridging fill material to cover the entire area of geotextile repair and to achieve the sub-grade level intended. Use non-vibratory equipment to provide sufficient but not excessive compaction.
 - .6 Bridging fill to be well graded, clean, granular bridging fill specified, placed in maximum 200mm lifts and compacted to 98% SPMDD. Coordinate inspection of sub-grade repair areas by Geotechnical personnel.
 - .7 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
 - .8 Unless otherwise authorized by Contract Administrator in writing, do not excavate more than 30m of trench excavation in advance of installation operations and do not leave trenches open more than 15m at the end of day's operation.
 - .9 Keep excavated and stockpiled materials a safe distance away from edge of trenches. Restrict vehicle operations directly adjacent to open trenches.
 - .10 Dispose of surplus/unsuitable excavated material to approved locations.
 - .11 Bottom of excavations shall be undisturbed soil, level, and free from loose, soft, or organic matter. Remove unsuitable material from trench bottoms to extent and depth.
 - .12 Unless otherwise noted in the Geotechnical Report, correct unauthorized over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with concrete fill as specified for foundations.
 - .2 Fill under other areas with 'bridging fill' specified and compact to 98% SPMDD.
 - .13 Hand trim, make firm, and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact sub-grade soil to density at least equal to undisturbed soil. Clean out rock seams and fill with concrete mortar or grout to approval of Contract Administrator.
- 3.7 GENERAL WORK UNDER BUILDING AREAS, EXCEPT FOR SLABS ON GRADE AND HARD SURFACE LANDSCAPED AREAS (and as noted in Geotechnical Report)
- .1 Under all Structural slabs and crawlspace areas as indicated on the drawings, generally excavate to depths to achieve the design sub-grades intended.
 - .2 Perform general excavation and proof roll exposed subgrade area using fully loaded tandem axle trucks, to identify weak or soft spots. Repair weak or soft areas as specified with geotextile fabric and bridging fill as specified.
 - .3 Below structural slab areas, allow for thicknesses of vapour barrier, rigid insulation, levelling sand, and void shearmat, as specified and indicated on the drawings.

- .4 Below crawlspace areas, allow for thicknesses of vapour barrier and protective sand cover over vapour barrier.
 - .5 Protect all fill materials from freezing before and during compaction.
 - .6 Retaining walls: use Type 2 sub-base fill to subgrade level on high side for minimum 500 mm from wall and compact to 95% SPMDD. For remaining portion, use general backfill material compacted to 95% SPMDD.
- 3.8 GENERAL WORK UNDER EXTERIOR/INTERIOR SLABS ON GRADE AND HARD SURFACE LANDSCAPED AREAS
- .1 Unless otherwise detailed, under all hard landscaped areas indicated on the drawings, minimize disturbance of native subgrade and carefully excavate to a minimum 300mm (12") below the underside of sidewalks, slab on grade areas, paver areas, curbs, seating walls, retaining walls, etc. (refer to drawings for details and design grades intended).
 - .2 Tamp the native subgrade area and compact to about 95% SPMDD. Carefully place a 150 (6") thick layer of Type 2 C-subbase and a 150 (6") thick layer of Type 1 A-base. compact to a minimum 200mm (8") thickness and to 98% SPMDD. Place each layer in maximum lifts of 150mm (6") thick and compact each layer to 100% SPMDD at $\pm 3\%$ of optimum moisture content.
 - .3 Place unshrinkable fill in areas indicated.
 - .4 Protect fill materials from freezing before and during compaction.
- 3.9 BEDDING AND SURROUND OF UNDERGROUND SERVICES
- .1 Unless otherwise noted, place clean material in trenches for base and bedding surround of underground services. At the bottom of the trench, compact a 20 minus A-base course to 90% SPMDD and to a minimum 150mm (6") thickness. Carefully place a minimum 150mm (6") thickness of clean bedding sand all around service piping typically, taking care not to damage the piping.
 - .2 Place base and bedding surround material in unfrozen condition.
- 3.10 BACKFILLING
- .1 Coordinate and schedule weeping tile work as specified.
 - .2 Areas to be backfilled and imported backfill material shall be free of debris, snow, ice, water and frozen material.
 - .3 Do not proceed with backfilling operations until Contract Administrator has inspected and approved installations.
 - .4 Place backfill material in uniform layers not exceeding 150mm thick compacted lifts, up to design grades indicated. Compact each layer before placing succeeding layer.
 - .5 Backfilling around installations:
 - .1 Place bedding and surround material as specified elsewhere.

- .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
- .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 1m.
- .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
 - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Contract Administrator
 - .2 If approved by Contract Administrator, erect bracing or shoring to counteract unbalance, and leave in place until ready for removal.
- .6 Consolidate and level unshrinkable fill with internal vibrators.

3.11 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris.
- .2 Replace topsoil as directed by Contract Administrator.
- .3 Reinstall pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .4 Clean and reinstall areas affected by Work as directed by Contract Administrator.
- .5 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 51 00 – Temporary Utilities
- .2 Section 01 56 00 – Temporary Barriers and Enclosures.

1.2 REFERENCES

- .1 United States EPA document 832-R-92-005 Storm Water Management for Construction Activities – Chapter 3, 1992 or latest
- .2 LEED™ - Canada-NC version 1 .0 or latest
- .3 City of Winnipeg By Laws (most recent version)

1.3 REQUIREMENTS

- .1 Prevent the loss of soil during construction (and demolition) by storm water runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.
- .2 Prevent sedimentation of storm sewer or receiving streams.
- .3 Prevent polluting the air with dust and particulate matter.
- .4 Eliminate the transport of sediment into public right of ways.
- .5 One or more erosion control measures may be required for the Site. Refer to Site Plan drawings for locations and areas.

1.4 DEFINITIONS

- .1 Temporary Sediment Basin: A temporary sediment basin is a retention container designed to retain or detain runoff sufficiently to allow excess sediment to settle.
- .2 Temporary Construction Site Access Entrance/Exit: a stabilized pad of compacted crushed stone or a purpose made mat, at any access point where traffic enters or leaves the Site onto a public right-of-way, street, alley, sidewalk or parking area.
- .3 Curb Inlet Sediment Barriers: temporary barriers constructed from concrete block and gravel or gravel filled sandbags.

1.5 DOCUMENTATION

- .1 All inspections and maintenance must be documented in writing and with pictures.

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION

3.1 SEDIMENTATION BASIN

- .1 Provide storage tank for use as sedimentation basin during dewatering of site.
- .2 Use an electric pump to remove water from the top of the tank where the sediment has settled out.
- .3 Use additional filters as needed to ensure water being pumped out of the tank is free of sediment.
- .4 Construction operations shall be carried out in such a manner that erosion and water pollution will be minimized.

3.2 TEMPORARY CONSTRUCTION SITE ACCESS ENTRANCE / EXIT

- .1 The aggregate size for construction of the pad shall be 2-3 inch (50-75 mm) stone. Place the gravel to the specific grade and dimensions shown on the plans, and smooth it.
- .2 Pad thickness shall not be less than 6 inches (152 mm). Use geotextile fabrics, if as required, to improve stability of the foundation in locations subject to seepage or high water table.
- .3 Pad width shall not be less than the full width of all points of ingress or egress and in any case shall not be less than 12 feet (3.6 m) wide.
- .4 Pad length shall be as required, but not less than 50 feet (15.2 m) unless indicated otherwise.
- .5 Locate construction entrances and exits to limit sediment leaving the Site and to provide for maximum utility by all construction vehicles. Avoid entrances which have steep grades and entrances at curves in public roads
- .6 The entrance shall be maintained in a condition that will prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand, and repair and/or maintenance of any measures used to trap sediment.
- .7 All sediment spilled, dropped, washed or tracked onto public rights-of-way shall be removed immediately.
- .8 Provide drainage to carry water to a sediment trap or other suitable outlet.
- .9 Vehicle wheels shall be cleaned to remove sediment prior to entrance onto public rights-of-way as required. When washing is required, it shall be done on an area stabilized with crushed stone that drains into an approved sediment trap or sediment basin. When freezing temperatures prevent washing, manual scraping excess soil from vehicles is required.

- .10 All sediment shall be prevented from entering any storm drain, ditch or watercourse through use of sand bags, gravel, straw bales, or other approved methods.
- .11 Place the barriers on gently sloping streets where water can pond.
- .12 The barriers must allow for overflow from a severe storm event. Slope runoff shall be allowed to flow over blocks and gravel and not be bypassed over the curb. A spillway shall be constructed with the sandbag structures to allow overflow.
- .13 The sandbag should be of woven-type geotextile fabric.
- .14 Sandbags shall be filled with 3/4 inch (19 mm) drain rock or 1/4 inch (6 mm) pea gravel.
- .15 The sandbags shall be placed in a curved row from the top of curb at least 3 feet (0.9 m) into the street. The row should be curved at the ends, pointing uphill.
- .16 Several layers of bags shall be overlapped and packed tightly.
- .17 Leave a one-sandbag gap in the top row to act as a spillway.

3.3 BLOCK / GRAVEL TYPE BARRIERS

- .1 Place two concrete blocks on their sides perpendicular to the curb at either end of the inlet opening. These will serve as spacer blocks.
- .2 Place concrete blocks on their sides across the front of the inlet and abutting the spacer blocks. The openings in the blocks should face outward, not upward.
- .3 Cut a 2 by 4 inch (51 by 102 mm) stud the length of the curb inlet plus the width of the two spacer blocks. Place the stud through the outer hole of each spacer block to help keep the front blocks in place.
- .4 Place wire mesh over the outside vertical face (open ends) of the concrete blocks to prevent stone from being washed through the blocks.
- .5 Use chicken wire, hardware cloth with 1/2 inch (13 mm) openings, or filter fabric.
- .6 Place 3/4 - 1 1/3 inch (19-34 mm) gravel against the wire to the top of the barrier.

3.4 TEMPORARY PERIMETER DRAINAGE TRENCH

- .1 The intent of this trench is to retain runoff water within the construction site area.
- .2 Construct a shallow trench approx. 300mm wide, around the perimeter of the Site that slopes to a collection point to enable pumping into the sediment basin.

3.5 TEMPORARY SOIL STOCKPILE / SILT FENCE

- .1 The intent of this fence is to retain stockpiled soil on the Site and not to allow water or wind to remove topsoil.
- .2 Install a silt fence around the perimeter of the stockpile. The silt fence is to be constructed of impervious geotextile material with 300mm above grade and 200mm set vertically into the soil. Stake at 1500mm intervals and attach geotextile to stakes.

3.6 INSPECTION AND MAINTENANCE

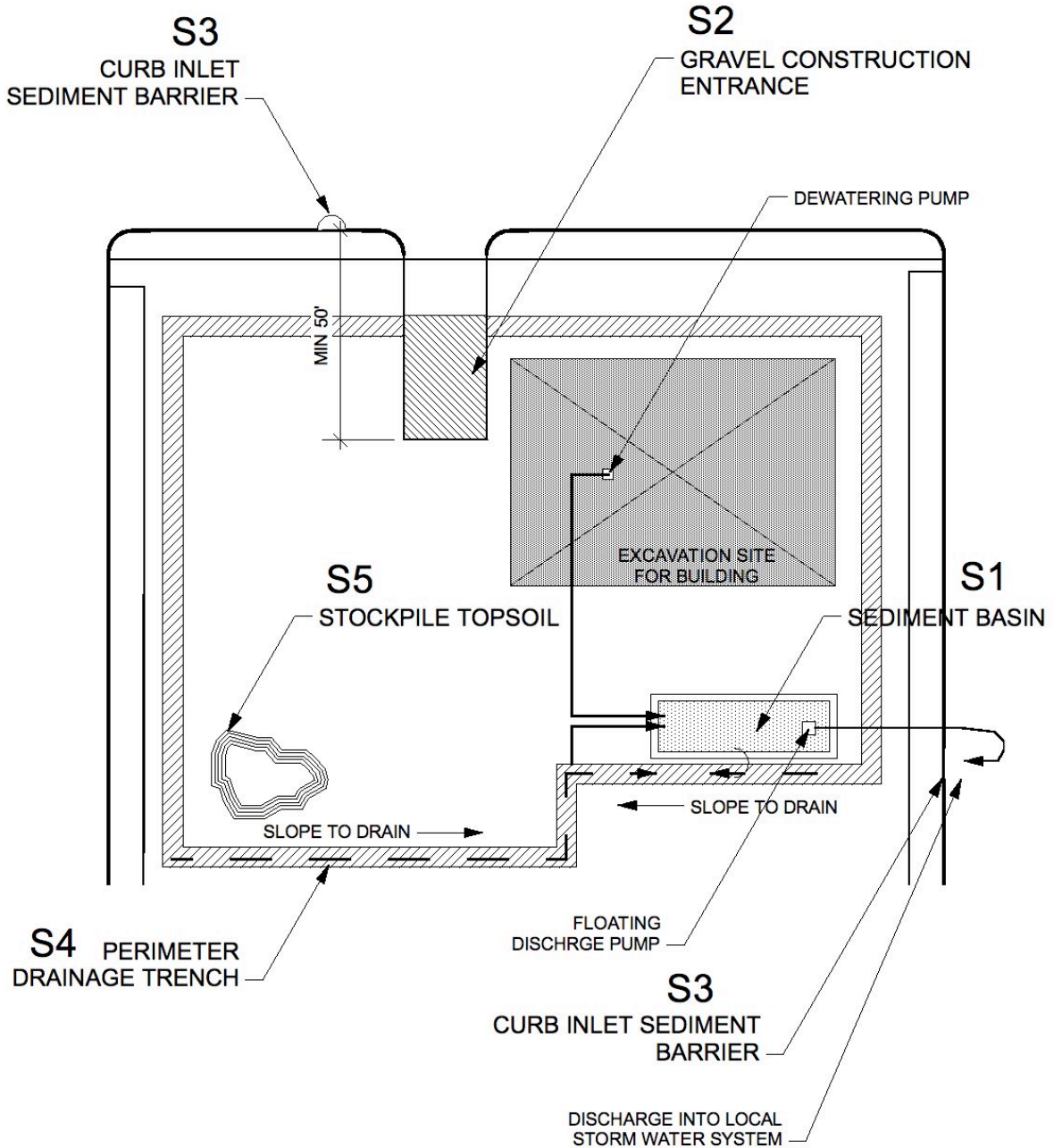
- .1 Inspect erosion control measures every three days or more frequently, and after each rain.
- .2 All damages caused by soil erosion or construction equipment shall be repaired before the end of each working day.
- .3 Remove sediment when the sediment storage tank is half full. This sediment shall be placed in such a manner that it will not erode from the Site. The sediment shall not be deposited downstream from the embankment or in or adjacent to a stream or floodplain.
- .4 Immediately remove all objectionable materials spilled, washed, or tracked onto public roadways. Remove all sediment deposited on paved roadways within 24 hours.
- .5 At sediment traps:
 - .1 After each rainfall, inspect all trap structures and clean them out as necessary.
 - .2 Replace gravel material when surface voids are visible.
- .6 At block / gravel type barriers:
 - .1 Inspect and clean barrier during and after each significant storm and remove sediment from behind sandbag structure after every storm
 - .2 Any sediment and gravel shall be immediately removed from the traveled way of roads.
 - .3 The removed sediment shall be placed where it cannot enter a storm drain, stream, or be transported off site.
 - .4 If the gravel becomes clogged with sediment, it must be carefully removed from the inlet and either cleared or replaced.
- .7 The LEED coordinator will make random inspections.
- .8 Total Suspended Solids (TSS) testing may be required during the project. Testing to be paid by The City. In the event sedimentation control measures do not meet the required discharge level of 350 mg/L additional sedimentation control measures will be required to be implemented.

3.7 EROSION CONTROL REMOVAL

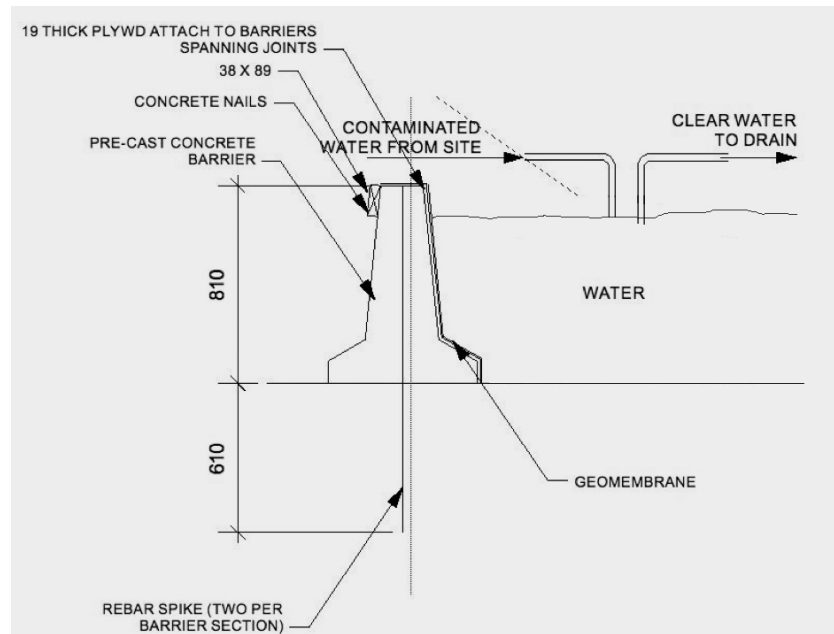
- .1 When temporary structures have served their intended purpose and the contributing drainage area has been properly stabilized, the embankment and resulting sediment deposit shall be leveled or otherwise disposed of in accordance with the approved erosion and sediment control plan, or as directed by the Contract Administrator.

Appendix A

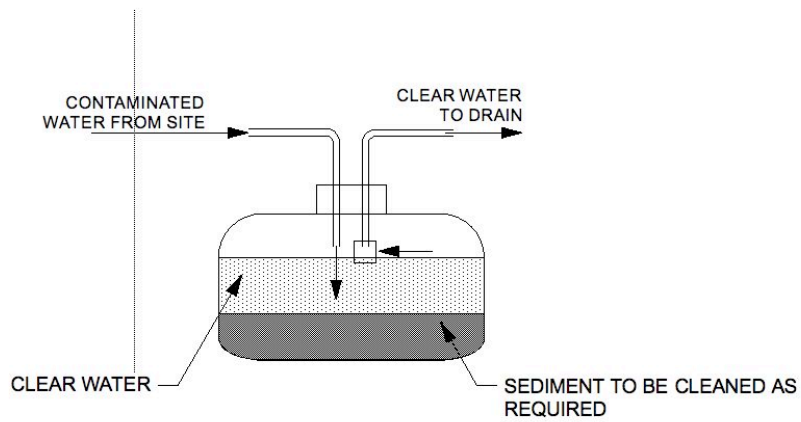
TYPICAL SITE REMEDIATION SEDIMENT
AND EROSION CONTROL



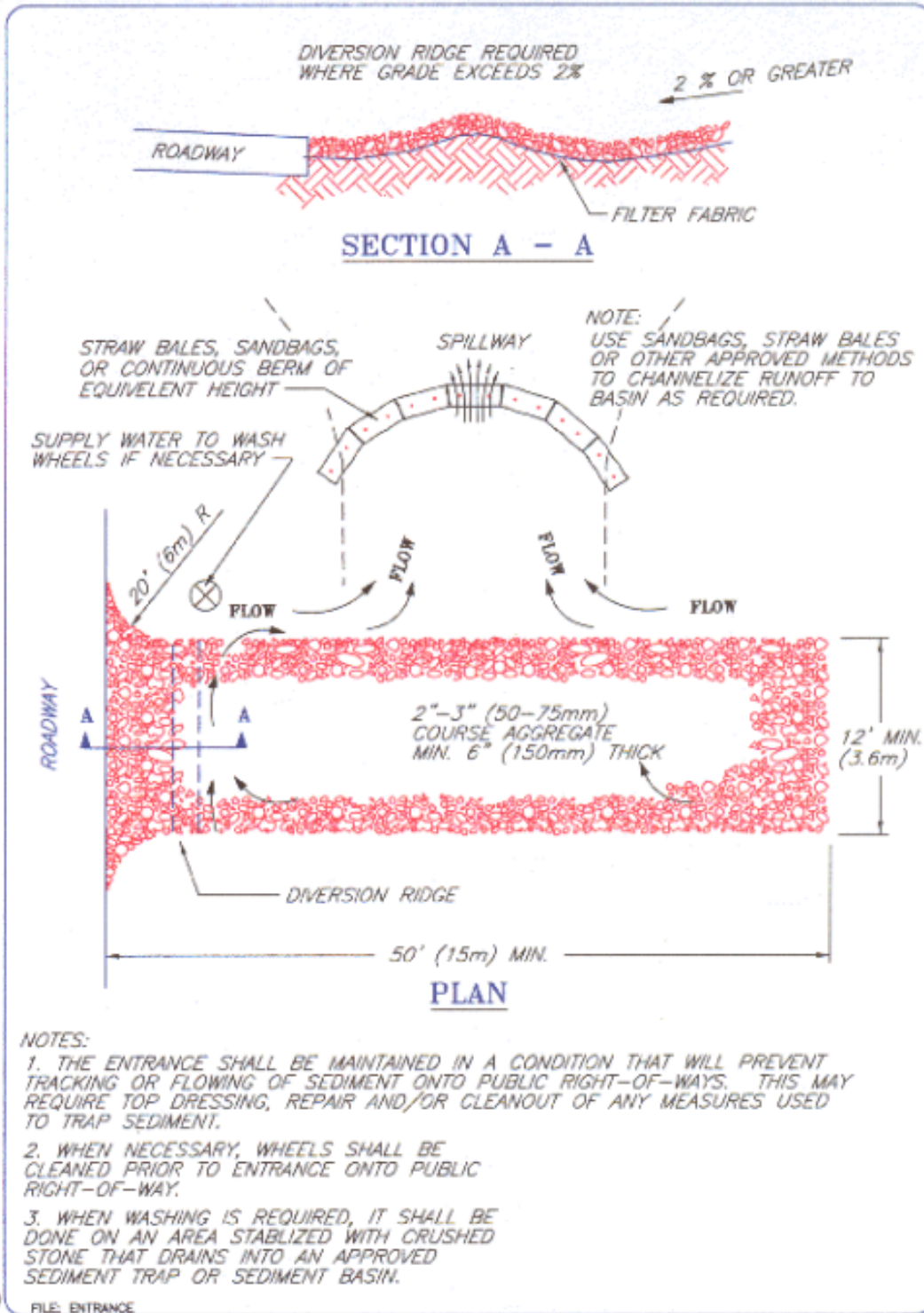
S1A: SEDIMENT BASIN DETAIL AND CONCRETE BARRIERS



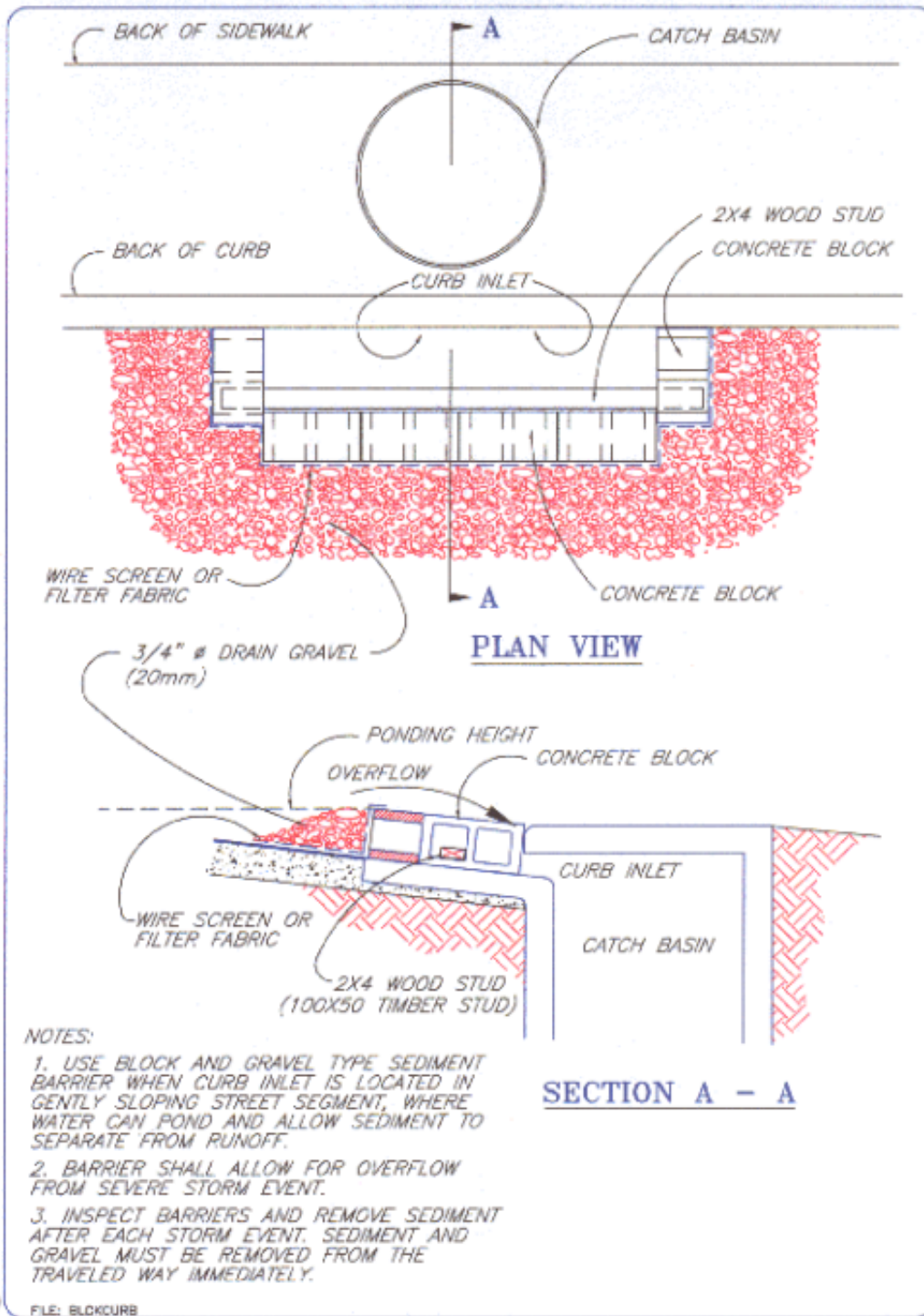
S1B: SEDIMENT BASIN DETAIL B: HOLDING TANK



S2: Gravel Construction Entrance



S3: Curb Inlet Sediment Barrier



END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 03 20 00 Concrete Reinforcement.
- .2 Section 03 30 00 Cast-in-Place Concrete

1.2 REFERENCES

- .1 Canadian Standards Association (CSA), latest edition
 - .1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete
 - .2 CAN/CSA-A23.5-M, Supplementary Cementing Materials
- .2 City of Winnipeg Standard Construction Specifications, latest edition.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 and Indicate the following:
 - .1 Lifting point details and locations.
 - .2 Storage support point locations.
 - .3 Connector details [complete with calculations].
 - .4 Concrete strength.
 - .5 Reinforcing details.
 - .6 Type and grade of steel.
- .2 Each drawing submitted shall bear the signature and stamp of qualified professional engineer registered or licensed in the Province of the Work.

1.4 CERTIFICATES

- .1 Piles delivered to the Site shall be certified by manufacturer that each batch of piles has a minimum strength of 35 MPa, unless otherwise noted in Structural drawings.

1.5 FIRM BID

- .1 Work of this section shall include installation of piles through and under any subsurface conditions encountered on-site, in accordance with the General Conditions.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Concrete mixes and materials: to Section 03 30 00- Cast-in-Place Concrete
- .2 Reinforcing steel: to CAN/CSA-A23.1.
- .3 Pile connections: capable of providing positive means to hold pieces together, maintaining alignment for full depth and transmitting full design load.

2.2 CONCRETE MIXES

- .1 Proportion normal density concrete in accordance with CAN/CSA-A23.1, Alternative 1, to give following properties: for all concrete
 - .1 Use type 50 cement.
 - .2 Minimum compressive strength at 28days: 35 MPa.
 - .3 Minimum cement content: 360 kg/m³ of concrete.
 - .4 Class of exposure: F1
 - .5 Nominal size of coarse aggregate: 20 mm.
 - .6 Slump at point of discharge: 70 +/- 20 mm
 - .7 Air content: 5 to 8%.
 - .8 Chemical admixtures: in accordance with CAN3-A266.4 or latest.
- .2 Replace a minimum of 30% of the cement content with Supplementary Cement Materials such as fly ash.

PART 3 EXECUTION

3.1 FABRICATION

- .1 Fabricate precast concrete piles as indicated.
- .2 Fabricate piles to following finish tolerances:
 - .1 Length: plus or minus 3 mm/m of length.
 - .2 Cross section:
 - .1 Wall thickness of hollow sections: minus 5 to plus 10 mm.
 - .2 Solid sections: minus 5 to plus 10 mm.
 - .3 Deviation from straight line: not more than 3mm/m of length, 10 mm in full length.
 - .4 Deviation of internal core or void from true position: 10 mm.
 - .5 Pile head: 10 mm/m from true right angle plane. Surface irregularities 3 mm.
 - .6 Location of reinforcing steel main reinforcing cover: minus 3 to plus 5 mm; spiral: 10 mm.
- .3 Pre-stress piles in accordance Precast Structural Concrete standards. Measure strand elongation to determine stressing force and measure hydraulic pressure at jack. Stressing force as measured by both methods to be within 5%.
- .4 De-tension in a manner to keep eccentricity to a minimum. Release prestress prior to cutting pre-stress strands.
- .5 Quality and dimensions of piles will be determined by a Structural Engineer, who is registered in the Province of the Work.

3.2 HANDLING

- .1 Ensure handling and installation stresses are within safe limits.

3.3 PREPARATION

- .1 Obtain prior approval of hammer type to be used.
- .2 Use driving method which will not cause damage to nearby structures.
- .3 Notify any adjacent and affected property owners and building occupants with 7 days notice before proceeding with the Work.
- .4 Protect structures near the Work from damage.

3.4 DRILLING

- .1 Drill holes to facilitate driving to a minimum depth of 5m.
- .2 Hole Diameter: Maximum 25 mm larger than tip dimension.

.3.5 INSTALLATION

- .1 Protect pile head during driving, using cushion cap with full bearing on pile butt for even distribution of hammer blow.
- .2 Deliver hammer blows to central axis of pile.
- .3 If driving is interrupted before refusal, drive an additional 300mm before resuming recording of performance data.
- .4 Do not damage piles during driving operations.
- .5 Re-drive pile which have lifted due to driving adjacent pile, or soil uplift.
- .6 Prepare pile top to receive pile caps, grade beams or walls.

3.6 TOLERANCES

- .1 Maximum Variation From Vertical For Plum Piles: 1 in 48.
- .2 Maximum Variation From required Angle for Batter Piles: 1 in 24.
- .3 Maximum Variation From Pile Cut-off Elevation: 100mm.
- .4 Maximum Out-of-Position: 50mm.

3.7 PROJECT RECORD DOCUMENTS

- .1 Accurately record the following:
 - .1 Sizes, lengths, and location of piles.
 - .2 Sequence of driving.

- .3 Numbers of blows per meter for entire length of piles and measured set for last 10 blows.
- .4 Piles requiring drilling and hole diameters.
- .5 Final base and top elevations.
- .6 Driving for of each hammer blow.
- .7 Submit driving records under the seal of a Professional Engineer registered in the Province of Manitoba.

3.8 UNACCEPTABLE PILES

- .1 Unacceptable Piles: Piles that fail tests, are placed out of position, are below cut-off elevations, or are damaged.
- .2 Provide additional piles or replace piles to conform to specified requirements.

END OF SECTION