PART 1 GENERAL

1.1 References

.1 American Society for Testing and Materials (ASTM)

.1 ASTM D698-00a, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m ^{3}).

1.2 Existing Conditions

.1 Examine subsurface investigation report included in the project manual.

1.3 Protection

.1 Protect and/or transplant existing natural features, bench marks, surface or underground utility lines which are to remain as directed by Contract Administrator. If damaged, restore to original or better condition unless directed otherwise.

.2 Maintain access roads to prevent accumulation of construction related debris on roads.

PART 2 PRODUCTS

2.1 Materials

.1 Fill material: Type in accordance with of Section 31 23 16 - Excavating, Trenching and Backfilling.

.2 Excavated or graded material existing on site may be suitable to use as fill for grading work if approved by Contract Administrator.

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 brush weeds and grasses and removed from 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 locations as indicated and as directed by Contract Administrator Stockpile height not to exceed 2 m.

.5 Dispose of unused topsoil as directed by Contract Administrator.

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:

.1 150 mm for grassed areas.

.2 135 mm for sodded areas

.3 500 mm for shrub beds.

.3 Slope rough grade away from building as indicated.

.4 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.

.5 Compact filled and disturbed areas to ASTM D698, as follows:

.1 85% SPMDD under landscaped areas.

.2 95 % SPMDD under paved and walk areas.

.6 Do not disturb soil within branch spread of trees or shrubs to remain.

3.3 Testing

.1 Inspection and testing of soil compaction will be carried out by independent testing laboratory as determined by Contract Administrator.

.2 Submit testing procedure, frequency of tests, to Contract Administrator for approval.

3.4 Surplus Material

.1 Remove surplus material and material unsuitable for fill, grading or landscaping off site.

PART 1 GENERAL

1.1 Related Work

.1 See City Standard Construction Specifications.

1.2 Source Quality Control

.1 Advise Contract Administrator of sources of topsoil to be utilized 7 days in advance of starting Work.

.2 Contractor is responsible for soil analysis and requirements for amendments to supply topsoil as specified.

PART 2 PRODUCTS

2.1 Topsoil

.1 Topsoil required shall consist of a well mixed and screened 3 way combination of:

.1 A clay textured or loam textured dark topsoil, a fertile, friable material neither of heavy clay nor of very light sandy nature containing by volume, a minimum of 4% for clay loams and 2% for sandy loams to a maximum of 25% organic matter (peat, rotted manure or composted material) and capable of sustaining vigorous plant growth. Topsoil shall be free of subsoil contamination, roots, stones over 30 mm in diameter or subsoil clay lumps over 30 mm diameter and other extraneous matter. Topsoil shall not contain quack grass rhizomes, Canada thistle roots or other noxious weeds. Salinity rating shall be less than 2.5 mm hos/cm. The ph range shall be between 6.0-8.0.

.2 Topsoil shall be placed as a seed bed to a minimum depth of 100 mm, compacted to 75 mm. Topsoil is considered incidental and shall not be measured for separate payment.

2.2 Soil amendments

.1 Peatmoss:

.1 Derived from partially decomposed species of Sphagnum Mosses.

.2 Elastic and homogeneous, brown in colour.

.3 Free of wood and deleterious material, which could prohibit growth.

.4 Shredded particle minimum size: 5 mm.

.2 Sand:

.1 Washed course silica sand, medium to course textured

.3 Fertilizer:

.1 Complete, commercial with 35% soluble nitrogen.

PART 3 EXECUTION

3.1 Preparation Of Existing Grade

.1 Verify that grades are correct. If discrepancies occur, notify the Contract Administrator and do not commence Work until instructed by the Contract Administrator.

.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

.3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 75 mm above surface. Dispose of removed material off-site.

.4 Course cultivate entire area which is to receive topsoil to depth of 150 mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted the soil.

3.2 Placing And Spreading Of Topsoil/Planting Soil

.1 Place topsoil after the Contract Administrator has accepted sub-grade.

.2 Spread topsoil in uniform layers not exceeding 150 mm, over unfrozen sub-grade free of standing water.

.3 For sodded areas keep topsoil 25 mm below finished grade.

.4 Spread topsoil as indicated to following minimum depths after settlement and 80% compaction:

.5 100 mm for seeded areas.

.6 100 mm for sodded areas.

.7 500 mm for flower beds.

.8 500 mm for shrub beds.

.9 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.3 Soil Amendments

.1 For planting beds, turf: apply and thoroughly mix soil amendments and fertilizer into full specified depth of topsoil and top 50 mm if existing soil as recommended by topsoil supplier.

3.4 Finish Grading

.1 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by the Contract Administrator. Leave surfaces smooth, uniform and firm against deep foot-printing.

3.5 Acceptance

.1 Contract Administrator will inspect and test topsoil in place and determine acceptance of material depth of topsoil and finish grading.

PART 1 GENERAL

1.1 References

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C117-95, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D422-98, Standard Test Method for Particle-Size Analysis of Soils.

.4 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft 3) (600 kN-m/m 3).

.5 ASTM D1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft 3) (2,700 kN-m/m 3).

.6 ASTM D4318-00, 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)

.1 CAN/CSA-A3000-98-A5-98, Portland Cement.

.2 CAN/CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction.

1.2 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 m 3 and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m3 bucket. Frozen material not classified as rock.

.2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.

.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 Work or surplus to requirements.

.5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.6 Unsuitable materials:

.1 Weak and compressible materials under excavated areas.

.2 Frost susceptible materials under excavated areas.

.3 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 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 Un-shrinkable 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.

1.3 Submittals

.1 Samples:

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 Inform Contract Administrator at least 4 weeks prior to commencing Work, of proposed source of fill materials and provide access for sampling.

1.4 Quality Assurance

.1 Qualification Statement: submit proof of insurance coverage for professional liability.

.2 Where Consultant/Engineer is employee of Contractor, submit proof that Work by Consultant/Engineer is included in Contractor's insurance coverage.

.3 Submit design and supporting data at least 2 weeks prior to commencing Work.

.4 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Manitoba, Canada.

.5 Keep design and supporting data on site.

.6 Engage services of qualified professional Engineer who is registered or licensed in Province of Manitoba, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.

1.5 Protection of Existing Features

.1 Protect existing features in accordance with applicable local regulations.

.2 Existing buried utilities:

.1 Size, depth and location of existing utilities as indicated are for guidance only. Completeness and accuracy are not guaranteed.

.2 Prior to commencing excavation Work, notify Contract Administrator or authorities having jurisdiction, establish location and state of use of buried utilities and structures. City of Winnipeg or authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.

.3 Confirm locations of buried utilities by careful test excavations.

.4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities encountered

.5 Where utility lines exist in area of excavation, obtain direction of Contract Administrator before removing / re-routing.

.6 Record location of maintained, re-routed and abandoned underground lines.

.7 Confirm locations of recent excavations adjacent to area of excavation.

.3 Existing surface features:

.1 Conduct, with Contract Administrator, condition survey of, trees and other plants, lawns, fencing, service poles, wires, survey bench marks and monuments which may be affected by Work.

.2 Protect existing surface features from damage while Work is in progress. In event of damage, immediately make repair to approval of Contract Administrator.

PART 2 PRODUCTS

2.1 Materials

.1 Type 1 and Type 2 fill: properties to 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, 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 Contract Administrator for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

PART 3 EXECUTION

3.1 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.

3.2 Stripping Of Topsoil

.1 In accordance with Section 31 22 13 - Rough grading.

3.3 Stockpiling

.1 Stockpile fill materials in areas designated by Contract Administrator. Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

3.4 Dewatering and Heave Prevention

.1 Keep excavations free of water while Work is in progress.

.2 Submit for Contract Administrator’s approval 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 manner not detrimental to public and private property, or any portion of Work completed or under construction.

.6 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, water courses or drainage areas.

3.5 Excavation

.1 Excavate to lines, grades, elevations and dimensions as indicated.

.2 Excavation must not interfere with bearing capacity of adjacent foundations.

.3 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.

.4 For trench excavation, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

.5 Keep excavated and stockpiled materials a safe distance away from edge of trench.

.6 Restrict vehicle operations directly adjacent to open trenches.

.7 Dispose of surplus and unsuitable excavated material in approved location on site or off site.

.8 Do not obstruct flow of surface drainage or natural watercourses.

.9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.10 Obtain Contract Administrator's approval of completed excavation.

.11 Remove unsuitable material from trench bottom to extent and depth as directed by Contract Administrator.

.12 Correct unauthorized over-excavation as follows:

.1 Fill under bearing surfaces and footings with fill concrete.

.2 Fill under other areas with fill compacted to not less than 95 % of corrected maximum dry density. Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation 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.

3.6 Fill Types and Compaction

.1 Use fill of types as indicated.

3.7 Bedding and Surround of Underground Services

.1 Place and compact granular material for bedding and surround of underground services as indicated.

.2 Place bedding and surround material in unfrozen condition.

3.8 Backfilling

.1 Do not proceed with backfilling operations until Contract Administrator has inspected and approved installations.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to 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. 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 or:

.2 If approved by Contract Administrator, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Contract Administrator.

.6 Compaction: compact each layer of material to densities noted on drawing or in geotechnical report.

.1 In trenches:

.1 Up to 300mm above pipe or conduit: sand placed by hand.

.2 Over 300 mm above pipe or conduit: native material approved by Contract Administrator.

.2 Under seeded and sodded areas: use site excavated material to bottom of proposed topsoil levels except in trenches and within acceptable distances of foundation.

.3 Against foundations (except as applicable to trenches and under slabs and paving): excavated material or imported material with no stones larger than 200 mm diameter within 600 mm of structures.

3.9 Restoration

.1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Contract Administrator.

.2 Replace topsoil as directed by Contract Administrator.

.3 Clean and reinstate areas affected by Work as directed by Contract Administrator.

.4 Provide temporary plating to support traffic loads over excavated areas where maintenance of access is required as requested by Contract Administrator.

PART 1 GENERAL

1.1 Related Section

.1	Testing of Concrete	Section 03 11 00
.2	Concrete Reinforcing	Section 03 20 00
.3	Bored Concrete Piles	Section 31 63 23

1.2 Delivery, Handling And Storage

.1 Repair or replace damaged piles to satisfaction of Contract Administrator.

.2 If material is stockpiled on a structure, ensure that structure is not overloaded.

1.3 Existing Sub-Surface Conditions

.1 Sub-surface investigation report is attached to the bid documents. This report is provided for the convenience of the Contractors. The Contractor assumes all risk with regard to interpretation of the information contained in the report and/or reliance on the recommendations presented.

1.4 Protection

.1 Protect public and construction personnel adjacent structures and work of other sections from hazards attributable to pile drilling operations.

PART 3 EXECUTION

3.1 Equipment Requirements

.1 Equipment information: prior to commencement of pile installation operation, submit to Contract Administrator for approval, details of equipment for installation of piles. For impact hammers give manufacturer's name, type, rated energy per blow at normal working rate, mass of striking parts of hammer and mass of driving cap.

3.2 Preparation

.1 Ensure that the ground conditions at pile locations are adequate to support pile installation operation. Make provision for access and support of piling equipment during performance of work.

3.3 Field Measurement

.1 Maintain accurate records of installation for each pile.

.2 Provide Contract Administrator with three copies of records.

3.4 Installation Tolerances

.1 Install piles to following tolerances:

.1 Pile heads within 50 mm of locations indicated.

.2 Piles not more than 2% of length out of alignment.

3.5 Damaged Or Defective Piles

.1 No extra compensation will be made for removing and replacing or other work made necessary through rejection of a defective pile.

PART 1 GENERAL

1.1 Related Sections

.1	Pile Foundations - General	Section 31 61 13
.2	Testing of Concrete	Section 03 11 00
.3	Concrete Reinforcing	Section 03 20 00

1.2 Design Criteria

.1 Maximum allowable soil skin friction for drilled piles is indicated on the drawings.

.2 Pile lengths to be measured from finished contours of excavation.

1.3 Examination and Site Conditions

.1 Visit site to determine existing conditions and requirements for protection of adjacent work and accept site and existing work as it exists at time of commencement of work. Verify all dimensions at the site.

.2 Contractor to confirm with authorities, location of all utilities prior to commencing with work.

1.4 Inspection and Testing

.1 Notify Contract Administrator and secure approval before placing reinforcing steel and concrete. Issue at least 72 hours notice to Contract Administrator or his representative when inspection will be required.

.2 Concrete tests will be required in accordance with CSA Standard A23.2-04. If concrete at 28 days is less than required strength, provide whatever additional foundation is required, as directed, to satisfactorily support same load at same point as called for on drawings without additional cost to the City.

1.5 Project Conditions

.1 Protect nearby structures from damage.

.2 This trade shall take adequate precautions to protect all existing properties against damage. This Contractor shall carry adequate insurance to cover cost of glass breakage or damage to any surrounding building, etc. Any glass damage or breakages attributable to the Work of this trade shall be made good at the expense of this Contractor.

.3 The Contractor shall provide either a photographic or video record of the existing building areas adjacent to the addition. The photography shall show any existing cracks or other damage to glass and wall systems.

1.6 Quality Assurance

.1 Qualifications: a Contractor experienced in the related type of work and having at his disposal all necessary equipment shall perform all work.

.2 Allowable Tolerances:

.1 Piles shall not be more than 2% out of plumb; and no more than 50mm out of alignment.

.2 Pile shall be made at elevations indicated plus or minus 25mm.

.3 Safety Requirements: All work shall comply with all local and provincial safety regulations.

1.7 Delivery, Storage & Handling

.1 Acceptance at the site: All reinforcement and concrete for the foundation units delivered to the site that do not conform to the terms of this specification may be rejected by the Contract Administrator or his representative.

.2 Storage: Store all materials at the site in such a way as to avoid undue damage to material before installation.

1.8 Special Protection

.1 If ambient temperature during seven days after placing may fall below $5^{O}C$, cover top of each unit with 300mm depth of loose straw or approved equivalent and comply with protection requirements of CSA Standard A23.1-04.

PART 2 PRODUCTS

2.1 Materials

.1 Reinforcing Steel: CSA Standard G30.18-M 92 (R2002) for 400 grade. Ties may be intermediate grade. Size of reinforcing steel shall be as shown on drawings.

.2 Concrete: generally in accordance with CSA Standard CAN 3-A23.1-04. Strength at 28 days 32Mpa. Concrete to be well vibrated full height of pile. Class S-2 Exposure shall be used. Refer to code requirements.

PART 3 EXECUTION

3.1 Acceptance of Conditions

.1 The Contractor shall examine existing conditions and work already performed by other trades upon which the Work of this Section depends and ensure that these are satisfactory for the continuing work of this trade. Commencement of work implies acceptance of all existing conditions.

3.2 Installation

.1 Do pile installation work in accordance with best industry practice.

.2 Installation process shall be supervised by Geotechnical Engineer in the employ of the City.

3.3 Location

.1 Install within 50 mm of exact centres set out, 2% out of plumb alignment and 25 mm in elevation. If these conditions are not met, remove same and/or install whatever additional the Contract Administrator directs to correct the error, to support same load satisfactorily, at location shown on drawings, and pay for any additional design costs due to such errors.

3.4 Boring

.1 Machine-bore piles to depth required, circular and full diameter noted. Remove stones (up to 300 mm greatest dimension), boulders over 300 mm and rock in whole or in part, before boring. Tool and clean hole to ensure that machine auger has reached required depth.

3.5 Placing Concrete and Steel

.1 Securely fasten steel during concrete placement. Allow for 75 mm cover.

.2 Bring top of each unit to level but roughened surface at elevation shown on plans, and form proper seating for structural work it is intended to support. Each unit shall be vibrated with approved mechanical vibrator.

3.6 Pile Caps

.1 Supply and install pile caps as indicated on drawings.

3.7 Firm Bid

.1 This section of the Contract shall be quoted as a firm price for installation of the piles through and under any subsurface condition encountered. All information given on drawings or in this specification is for Contractor's information only and is to satisfy himself as to existing conditions.

3.8 Pile Log

.1 Keep a log of all piles drilled stating locations, diameter, depth and date placed. Forward triplicate copies of pile log records, in neat and legible form, to Contract Administrator on completion of piling work.

3.9 Excavated Material

.1 As work proceeds clean up and remove all excavated materials and debris. Leave site and all roads or other means of access to site clean and clear of spillage.