## PART 1 - GENERAL

1.1 Definitions:

.1 Excavation Classes: Two classes of excavation will be recognized; common excavation and rock excavation.

.1 Common Excavation: Excavation of materials of whatever nature, which are not included under definition of rock excavation.

.2 Rock Excavation: Excavation of material from solid masses of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders or rock fragments having individual volume in excess of $1m^3$, which cannot be removed by means of a single tooth ripper on a D8 Caterpillar crawler tractor, or a Kohring 466 backhoe, in good condition (or approved equal), at a rate of greater than $40m^3$/ hr. Frozen material not classified as rock.

.2 Gravels & Native Materials:

.1 Gravel: Composed of inert, durable material, reasonably uniform in quality and free from soft or disintegrated particles. Soundness to be tested according to ASTM test procedure C-88 or latest revised issue. Maximum weight average losses for coarse and fine aggregates to be 30% when magnesium sulphate is used.

.2 Crushed gravel: When tested according to ASTM C-136, or latest revised issue, to have a generally uniform gradation and conform to the gradation limits noted in this section. 60% of the material passing each sieve must have one or more fractured faces. The Plasticity Index for crushed gravel not to exceed 6.0.

.3 Native Material: Any workable soil free from organic or foreign matter. Native material is unacceptable if it is impracticable to control its water content.

1.2 Protection of Existing Features:

.1 Existing buried utilities and structures:

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

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

**PART 1.2 – GENERAL (Cont.)**

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

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

.5 Where utility lines or structures exist in area of excavation, obtain direction of Contract Administrator before removing.

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

.2 Existing buildings and surface features:

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

.2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair to approval of the City.

1.3 Shoring, Bracing and Underpinning: Ref: CSA Standard S269.1, 'Falsework for Construction Purposes'.

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

.2 Sides of trenches or other excavations to be adequately supported. Trench stability and safety procedures to meet or exceed minimum requirements of "Accident Prevention Regulations" current issues of the Workers Compensation of the Province of Manitoba.

.3 Engage services of qualified professional engineer who is registered or licensed in the Province of Manitoba, Canada to design and inspect cofferdams, shoring, bracing, and underpinning required for Work.

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

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

.6 Professional Engineer responsible for design of temporary structures to submit proof of insurance coverage for professional liability except where engineer is employee of Contractor, in which case Contractor shall submit proof that work by professional engineer is included in Contractor's insurance coverage.

## PART 2 - MATERIALS

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.

| Sieve Designation | % Passing | |
|---|---|---|
| | Type 1 | Type 2 |
| 75 mm | - | - |
| 50 mm | - | 70-100 |
| 37.5 mm | - | - |
| 25 mm | - | 50-100 |
| 19 mm | 90-100 | - |
| 12.5 mm | 65-85 | - |
| 9.5 mm | 50-75 | - |
| 4.75 mm | 25-50 | 22-85 |
| 2.00 mm | 10-35 | 10-80 |
| 0.425 mm | 0-15 | - |
| 0.180 mm | - | - |
| 0.075 mm | 0-5 | 2-8 |

.2 Type 3 Fill: Selected material from excavation or other sources, approved by Consultant 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 Cofferdams, Shoring, Bracing and Underpinning:

.1 Obtain permit from authority having jurisdiction for temporary diversion of water course.

**PART 3.2 – EXECUTION (Cont.)**

.2 During backfill operation:

.1 Unless otherwise as indicated or as directed by Contract Administrator, remove sheeting and shoring from excavations.
.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 site and restore water courses.

3.3 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 methods.

.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, or other means.

.4 Project open excavations against flooding and damage due to surface run-off.

.5 Dispose of water in a 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.

3.4 Excavation:

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

.2 Excavation must not interfere with normal 45 splay of bearing from bottom of any footing.

.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.

**PART 3.4 – EXECUTION (Cont.)**

.4 For trench excavation, unless otherwise authorized by Contract Administrator in writing, 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 Dispose of surplus and unsuitable excavated material off site.

.6 Do not obstruct flow of surface drainage or natural water courses.

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

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

.9 Correct unauthorized over-excavation as follows:

.1 Fill under bearing surfaces and footings with concrete specified for footings.
.2 Fill under other areas with Type 2 fill compacted to not less than 95% of maximum dry density.

.10 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.

3.5 Fill Types and Compaction:

.1 Use fill of types as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698 maximum dry density.

.1 Underground Services: Use Type 2 fill above pipe zone to sub-grade level. Compact to 95%.

3.6 Bedding and Surround of Underground Services:

.1 Place and compact granular material for bedding and surround of underground services as indicated and as specified in pipe-work sections.

.2 Place bedding and surround material in unfrozen condition.

3.7 Backfilling:

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

**PART 3.7 – EXECUTION (Cont.)**

.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 Backfill around installations.

3.8 Restoration:

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

.2 Reinstate pavement, sidewalks, and lawns to elevation which existed before excavation.

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