

## **PART 1 - GENERAL**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 32 92 23 – Sodding.
- .2 Section 32 93 10 – Trees, Shrubs and Ground Coverings.
- .3 Section 33 65 73 – Concrete Encased Duct Banks.
- .4 Section 32 12 16.01- Asphalt Paving.

### **1.2 REFERENCES**

- .1 ASTM International
  - .1 ASTM C136 / C136M -14- Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .2 ASTM C117-13 – Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
- .2 CSA International
  - .1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .3 Nova Scotia Provincial Standard Specifications.
- .4 U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples: submit samples of backfill material, granular type 1 and 2 for testing company engaged by Departmental Representative.
- .3 Erosion and Sedimentation Control Plan: in accordance with Section 01 57 14.

### **1.4 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 Departmental Representative and the authorities having jurisdiction, establish location and state of use of buried utilities and structures. 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, electric, telephone and other utilities and structures encountered.

## 1.4 PROTECTION OF EXISTING FEATURES (continued)

### .1 (continued)

- .5 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing. Advise Departmental Representative of existing lines in area of excavation that require removal or relocation and cost for such work.
- .6 Record location of maintained, re-routed and abandoned underground lines.
- .2 Existing surface features:
  - .1 Conduct, with Departmental Representative, 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 Departmental Representative.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Select back-fill material: common fill materials approved from site excavation or borrow pits. Material to be free from debris, waste, organic and other deleterious material, well-graded with a maximum particle size not exceeding 200 mm with 40% to 60% of the material retained on 75 mm sieve. Non-frost susceptible material, with moisture content that will allow compaction to specified densities. Use where indicated.
- .2 Granular base and sub-base material:
  - .1 Quarried, crushed and screened rock.
  - .2 Gradations to be within specified limits when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.
  - .3 Table:
    - .1 Type 1 (Granular Base)
 

Sieve size (mm)	% Passing
20 000	100
14 000	50 - 85
5 000	20 - 50
160	5 - 12
80	3 - 8
    - .2 Type 2 (Granular Sub-Base)
 

Sieve size (mm)	% Passing
80 000	100
56 000	70 - 100
28 000	50 - 80
14 000	35 - 65
5 000	20 - 50
160	3 - 10
80	0 - 7

- .3 Clear stone: crushed and screened, hard, durable stone, free from clay and organic material and grade as follows:
- .1 Clear stone, 28 mm.
- | <u>Sieve size (mm)</u> | <u>Cum. % Passing</u> |
|------------------------|-----------------------|
| 28                     | 100                   |
| 20                     | 90 - 100              |
| 10                     | 0 - 40                |
| 5                      | 0 - 10                |
- .4 Mowing strip gravel paving: cobble, clean, washed river stone. Size to vary between 38 mm. and 75 mm.
- .5 Unshrinkable fill: concrete to CSA A23.1/A23.2.
- .6 Pipe bedding materials:
- .1 For pipe: well graded, granular material conforming to Type 1 granular base aggregate gradation specification.
- .2 For electrical conduit: hard, durable, crushed stone particles, free from clay lumps, cementation, organic material, frozen material and other deleterious material and graded as follows:
- | <u>Sieve Size (mm)</u> | <u>Cum. % Passing</u> |
|------------------------|-----------------------|
| 9.5                    | 100                   |
| 4.75                   | 50-100                |
| 2.00                   | 30-65                 |
| 0.425                  | 10-30                 |
| 0.075                  | 5-10                  |
- .7 Geotextile: non-woven synthetic fibre fabric, supplied in rolls; composed of minimum 85% by mass of polypropylene with inhibitors added to base plastic to resist deterioration by ultra-violet.
- .1 Standard of Acceptance: Terrafix 360R or approved equivalent.
- .8 Landscape timber edging (mowing strip): 150 mm. x 150 mm. x 2400 mm long pressure-treated softwood timber for wood curbs at perimeter mowing strip.
- .9 Rigid insulation for under-slab installation: in accordance with Section 07 21 00 – Building Insulation.
- .10 Granular materials for pavements: in accordance with Section 32 12 16.01 - Asphalt Paving.
- .11 Underground warning tape:
- .1 Detectable metallic tape, 50 mm wide clearly marked as follows:
- .1 "CAUTION - BURIED SEWER LINE", colour green with black text.
- .2 "CAUTION - BURIED WATER LINE", colour blue with black text.
- .2 Polyethylene, 3.5 mils thick, 75mm wide, clearly marked as follows:
- .1 "CAUTION - BURIED ELECTRICAL CONDUIT", colour red with black text.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: before commencing work confirm locations of buried services on and adjacent to site.
- .2 Before commencing work, conduct condition survey of existing structures, trees and plants, grassed areas, fencing, service poles, and paving, survey bench marks and monuments which may be affected by work.
- .3 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs for relocating services.
- .3 Not later than 2 weeks before backfilling or filling, provide testing agency, with sample of backfill and fill materials proposed for use.
- .4 Notify Departmental Representative minimum 48 hours before backfilling or filling so that compaction tests can be carried out by designated testing agency.

### **3.2 BLASTING**

- .1 Blasting on site is not permitted.

### **3.3 PREPARATION AND REMOVALS**

- .1 Provide temporary erosion and sedimentation control measures in accordance with Section 01 57 14.
- .2 Protection of in-place conditions:
  - .1 Protect excavations from freezing.
  - .2 Keep excavations clean, free of standing water, and loose soil.
  - .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative's approval.
  - .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
  - .5 Protect buried services that are to remain undisturbed.
- .3 Removal:
  - .1 Remove obsolete buried services within 2 M of foundations. Cap cut-offs.
  - .2 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
  - .3 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.
- .4 Clearing and Grubbing:
  - .1 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within areas designated on drawings.

**3.3 PREPARATION AND REMOVALS** (continued)

- .4 (continued)
  - .2 Remove stumps and tree roots larger than 75 mm. in diameter below footings, slabs, and paving, and to 600 mm below finished grade elsewhere.
  - .3 Remove and dispose of cleared and grubbed materials off site at appropriate disposal site.
  - .4 Leave ground in suitable condition for stripping and storing of topsoil.
- .5 Sawcutting Asphalt and Concrete:
  - .1 Sawcut and mill asphalt as detailed on drawings.
  - .2 Sawcut concrete neatly at limits shown on drawings.

**3.4 EXCAVATION**

- .1 Shore and brace excavations, protect slopes and banks and perform work in accordance with Provincial and Municipal regulations.
- .2 No blasting is permitted on site.
- .3 Topsoil stripping:
  - .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
  - .2 Strip topsoil to depths as indicated as directed by Departmental Representative. Avoid mixing topsoil with subsoil.
  - .3 Strip topsoil over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil.
  - .4 Stockpile in locations as indicated as directed by Departmental Representative.
- .4 Excavate as required to carry out work, in all materials met.
  - .1 Do not disturb soil or rock below bearing surfaces. Notify Departmental Representative when excavations are complete.
  - .2 If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.
  - .3 Fill excavation taken below depths shown without Departmental Representative's written authorization with concrete of same strength as for footings.
- .5 Excavate trenches to provide uniform continuous bearing and support for 150 mm thickness of pipe bedding material on solid and undisturbed ground.
  - .1 Trench widths below point 150 mm above pipe not to exceed diameter of pipe plus 600 mm.
- .6 Excavate for slabs and paving to subgrade levels.
  - .1 Remove topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

### **3.5 SITE QUALITY CONTROL**

- .1 Fill material and spaces to be filled to be inspected and approved by Departmental Representative.

### **3.6 GRANULAR BEDDING AND SURROUND**

- .1 Place bedding to suit pipe or conduits as indicated.
- .2 Do not dump bedding materials directly onto pipe.
- .3 Place granular bedding materials in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.
- .4 Shape bed true to grade to provide continuous uniform bearing surface for pipe. Do not use blocks when bedding pipe.
- .5 Shape transverse depressions in bedding as required to suit joints.
- .6 Carry bedding material across trench width. Mounding of bedding is not permitted.
- .7 Compact each layer full width of bed to at least 90% to ASTM D1557.
- 8 Fill excavation below design elevation of bottom of specified bedding with compacted bedding material or foundation material as directed by Departmental Representative.
- .9 After pipe installation, place and compact bedding to haunch line of pipe. Place and compact bedding material from haunch line of pipe to top of pipe in maximum 150 mm layers. Place remaining bedding material to 300 mm above top of pipe before further compaction. Compact 95% to ASTM D1557.
- .10 In areas of excessive groundwater, the Departmental Representative may approve the substitution of the specified bedding with 28mm clear stone completely surrounded with geotextile separator to prevent the migration of fines into the clear stone.

### **3.7 BACKFILLING**

- .1 Start backfilling only after inspection and receipt of written approval of fill material and spaces to be filled from Departmental Representative.
- .2 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.
- .3 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.
- .4 Compaction of subgrade: compact existing subgrade under walks, paving, and slabs on grade, to same compaction as specified for fill. Fill excavated areas with selected subgrade material gravel and sand compacted as specified for fill.

**3.7 BACKFILLING (continued)**

- .5 Placing:
  - .1 Place backfill, fill and base course material in 150 mm lifts. Add water as required to achieve specified density.
  - .2 Place unshrinkable fill in areas as indicated. Consolidate and level unshrinkable fill with internal vibrators.
- .6 Compaction: compact each layer of material to following densities for material to ASTM D698:
  - .1 To underside of basecourses: 95%.
  - .2 Basecourses: 100%.
  - .3 Elsewhere: 90%.
- .7 Under slabs and paving:
  - .1 Use Type 2 up to bottom of granular base courses.
  - .2 Use Type 1 for base courses.
- .8 In trenches:
  - .1 Up to 300 mm above pipe or conduit: sand placed by hand.
  - .2 Over 300 mm above pipe or conduit: native material approved by Departmental Representative.
- .9 Under seeded and sodded areas: use site excavated material to bottom of topsoil except in trenches and within 600 mm of foundations.
- .10 Blown rock material, not capable of fine grading, is not acceptable, imported material must be placed on this type of material.
- .11 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.

**3.8 INSULATION**

- .1 Place rigid insulation below slabs on grade as indicated on drawings.

**3.9 MARKER TAPE**

- .1 Place marker tape and plank in trenches above electrical conduits and pipes where indicated.

**3.10 GEOTEXTILE**

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated. Hold in place with rocks.
- .2 Place material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Overlap each successive strip of geotextile 600 mm over previously laid strip.
- .4 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .5 After installation, cover with overlying layer within 4 hr. of placement. Replace damaged or deteriorated geotextile to approval of Departmental Representative.

**3.10 GEOTEXTILE (continued)**

- .6 Place and compact soil layers in accordance with requirements of this Section.

**3.11 MOWING STRIP**

- .1 Rake out and stockpile existing mowing strip gravel for re-use.
- .2 Compact base along full extent of mowing strip. Place 100 mm to 150 mm. of sub-base material and make level.
- .3 Install geotextile fabric over levelled sub-base material.
- .4 Install new pressure-treated softwood, landscape timber curb continuously along mowing strip at perimeter of building. Fasten curb securely in place as shown on drawings.
- .5 Place stockpiled existing mowing strip gravel over geotextile fabric, and place new mowing strip gravel paving to levels shown on drawings for full extent of mowing strip. Rake surface of gravel paving.
- .6 Make transition between mowing strip timber curb and adjacent grassed area.

**3.12 GRADING**

- .1 Finish grade to ensure that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by Departmental Representative.
- .2 Grade to be gradual between finished spot elevations as indicated.

**3.13 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Dispose of cleared and grubbed material off site daily.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management.

**END OF SECTION**