

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 74 11 - Cleaning
- .3 Section 31 32 19.01 - Geotextiles
- .4 Section 33 46 16 – Subdrainage Piping

**1.2 REFERENCES**

- .1 Ontario Provincial Standard Specifications (OPSS)
  - .1 OPSS.MUNI 1003-13, Material Specification for Aggregates-Hot Mix Asphalt.
  - .2 OPSS 1150-10, Material Specification for Hot Mix Asphalt.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

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

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Clear stone: to be HL8 aggregate in accordance with OPSS.MUNI 1003 and OPSS 1150.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions:
  - .1 Examine soil report T021204-A1 prepared by Inspec-Sol, dated September 20, 2013.
- .2 Evaluation and Assessment:
  - .1 Testing of materials will be carried out by testing laboratory designated by Departmental Representative.
  - .2 Not later than 2 weeks before filling of crawlspace, provide to designated testing agency, 23 kg sample of clear stone material proposed for use.
  - .3 Before commencing work, conduct, with Departmental Representative, condition survey of existing structures, trees and plants, lawns, fencing, service poles,

wires, rail tracks and paving, survey bench marks and monuments which may be affected by work.

### **3.2 PREPARATION**

- .1 Protection of in-place conditions:
  - .1 Protect crawlspace from freezing.
  - .2 Keep crawlspace clean, free of standing water, and loose soil.
  - .3 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated, protect existing trees from damage.
  - .4 Protect buried services that are to remain undisturbed.
- .2 Removal:
  - .1 Remove obsolete services as indicated. Cap cut-offs.
  - .2 Remove loose and sharp debris from surface to be filled.

### **3.3 SITE QUALITY CONTROL**

- .1 Fill material and spaces to be filled to be inspected and approved by Departmental Representative prior to placement of fill.

### **3.4 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 construction debris, and standing water from spaces to be filled.
- .3 Place lower layer of geotextile in accordance with Section 31 32 19.01.
- .4 Backfill with clear stone.
  - .1 Place subdrainage piping mid-height in clear stone as indicated and as specified in Section 33 46 16.
- .5 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.
- .6 Place upper layer of geotextile in accordance with Section 31 32 19.01.

### **3.5 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .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 and recycling.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 31 00 99 – Earth Work for Minor Works
- .2 Section 31 32 19.01 - Geotextile
- .3 Section 31 23 33.01 - Excavation, Trenching and Backfilling

**1.2 REFERENCES**

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM D698-12, Standard Test /methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/m<sup>3</sup>).

**1.3 ACTION AND INFORMATION SUBMITTALS**

- .1 Make submittals in accordance with section 01 33 00 – Submittal Procedures.
- .2 Quality Control: in accordance with section 01 45 00 – Quality Control:
  - .1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this section.
  - .2 Submit to Departmental Representative written notice when rough grading is complete
- .3 Preconstruction Submittals:
  - .1 Submit construction equipment list for Vibratory Plate Compactors (VPC) to be used in this section prior to start of Work.

**1.4 QUALITY ASSURANCE**

- .1 Health and Safety Requirements:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

**1.5 SCOPE**

- .1 This section covers the requirements for the placement of the Geotextile within the crawlspace.

**1.6 EXISTING CONDITIONS**

- .1 Examine soil report prepared by INSPEC-SOL INC. entitled Geotechnical Investigation Report, No. T021204-A1 dated September 20, 2013.

**1.7 PROTECTION**

- .1 Protect existing man-made features and surface or underground utility lines which are to remain undisturbed. If damaged, restore to original or better condition unless directed otherwise.
- .2 Protect crawlspace from freezing.
- .3 Keep crawlspace clean, free of standing water, and loosened soil.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Excavated or graded material existing on site may be suitable to use as fill for grading work if approved by Departmental Representative.
- .2 Miscellaneous debris (wood, metal, plastic) of small quantities, existing accumulations (stalagmite) of salts and leachate drippings, etc.

**Part 3 Execution**

**3.1 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
  - .1 Remove miscellaneous debris and accumulated salt and leachate drippings.
  - .2 Leave work area clean at end of each day.
- .2 Waste management: separate waste materials for recycling.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**3.2 GRADING**

- .1 Following cleaning, rough grade to level surface including the levelling of local stockpiles.
- .2 Filling of depressed or open excavations is covered in Section 31 32 19.01 item 3.2.3 and Section 31 00 99 items 3.4 and 2.1.
- .3 Compaction of the rough grade surface with reasonable effort is the use of Vibratory Plate Compactor (VPC).
  - .1 Compact the rough grade surface to 95% Standard Proctor Maximum Dry Density (SPMDD) or to approval of the Departmental Representative.
  - .2 In areas of 1.2m of headroom or more use a VPC of 20 kN or greater centrifugal force.
  - .3 In less than 1.2m headroom use 6 kN to 8 kN centrifugal force VPC.

- .4        The VPC should have a minimum of 3 to 5 passes over the area.

**3.3            TESTING**

- .1        Inspection of soil compaction will be carried out by qualified geotechnical technician.
- .2        Submit reports to Departmental Representative for approval prior to placement of Geotextile.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Ontario Provincial Standard Specifications (OPSS)
  - .1 OPSS 1001-05 - Material Specification for Aggregates - General
  - .2 OPSS.MUNI 1010-13 - Material Specification for Aggregates-Base, Subbase, Select Subgrade, And Backfill Material

**1.2 DEFINITIONS**

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
  - .1 Rock : solid material in excess of 1.00 m<sup>3</sup> and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m<sup>3</sup> 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 Topsoil:
  - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
  - .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.
- .3 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .4 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .5 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .6 Unsuitable materials:
  - .1 Weak, chemically unstable, and compressible materials.
  - .2 Frost susceptible materials:
- .7 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Quality Control: in accordance with Section 01 45 00 - Quality Control:
  - .1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
  - .2 Submit for review by Departmental Representative proposed dewatering methods as described in PART 3 of this Section.

- .3 Submit to Departmental Representative written notice when bottom of excavation is reached.
- .4 Submit to Departmental Representative testing and inspection results report as described in PART 3 of this Section.
- .3 Preconstruction Submittals:
  - .1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.
  - .2 Submit records of underground utility locates, indicating: clearance record from utility authority.
- .4 If materials have been tested by independent testing laboratory within the current calendar year and have passed tests equal to requirements of this specification, submit test certificates from testing laboratory showing suitability of materials for this project.
- .5 Samples:
  - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.

#### **1.4 QUALITY ASSURANCE**

- .1 Submit design and supporting data for shoring/bracing at least 2 weeks prior to beginning Work, if applicable.
  - .1 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Ontario, Canada.
  - .2 Keep design and supporting data on site.
  - .3 Engage services of qualified professional Engineer who is registered or licensed in Province of Ontario, Canada in which Work is to be carried out to design and inspect, shoring/bracing required for Work.
- .2 Do not use soil material until written report of soil test results are reviewed by Departmental Representative.
- .3 Health and Safety Requirements:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .4 Prepare and submit Erosion and Sediment Control Plan in accordance with Section 01 35 43.

#### **1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling.
- .2 Divert excess aggregate materials from landfill to local quarry or recycling facility for reuse as directed by Departmental Representative.

#### **1.6 EXISTING CONDITIONS**

- .1 Examine soil report T021204-A1 prepared by Inspec-Sol, dated September 20, 2013.
- .2 Buried services:

- .1 Before commencing work establish location of buried services on and adjacent to site.
- .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
- .3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
- .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
- .5 Prior to beginning excavation Work, notify applicable authorities having jurisdictions to establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
- .6 Arrange and pay for the completion of private utility locates.
- .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
- .8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or re-routing.
- .9 Record location of maintained, re-routed and abandoned underground lines.
- .10 Confirm locations of recent excavations adjacent to area of excavation.
- .3 Existing buildings and surface features:
  - .1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, 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 as directed by Departmental Representative
  - .3 Where required for excavation, cut roots or branches as directed by Departmental Representative in accordance with Section 32 01 90.33 - Tree and Shrub Preservation.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Backfill material: native fill.
- .2 Bedding and cover material: OPSS Granular 'A' in accordance with the requirements of OPSS 1001 and OPSS 1010.

## **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 PREPARATION/PROTECTION**

- .1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.
- .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 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 required to remain undisturbed.

### **3.3 STRIPPING OF TOPSOIL**

- .1 Strip topsoil and sod within limits of excavation to full depth of existing topsoil.
  - .1 Do not mix topsoil with subsoil.
- .2 Stockpile in locations as directed by Departmental Representative.
  - .1 Stockpile height not to exceed 2 m and should be protected from erosion.
- .3 Dispose of stripped topsoil and sod off site.

### **3.4 STOCKPILING**

- .1 Stockpile fill materials in areas designated by Departmental Representative.
  - .1 Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.
- .3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

### **3.5 DEWATERING AND HEAVE PREVENTION**

- .1 Keep excavations free of water while Work is in progress.
- .2 Protect open excavations against flooding and damage due to surface run-off.
- .3 Dispose of water in manner not detrimental to public and private property, or portion of Work completed or under construction.

### **3.6 EXCAVATION**

- .1 Excavate to lines, grades, elevations and dimensions as indicated.
- .2 Remove concrete, masonry, walks and other obstructions encountered during excavation.
- .3 Excavation must not interfere with bearing capacity of adjacent foundations.
- .4 Do not disturb soil within branch spread of trees or shrubs that are to remain.
  - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

- .5 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.
- .6 Restrict vehicle operations directly adjacent to open trenches.
- .7 Dispose of surplus and unsuitable excavated material 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 Notify Departmental Representative when bottom of excavation is reached.
- .11 Obtain Departmental Representative approval of completed excavation.
- .12 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .13 Hand trim, make firm and remove loose material and debris from excavations.
  - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
  - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

### **3.7 FILL TYPES**

- .1 Use OPSS Granular 'A' for bedding and cover.
- .2 Use native material approved by Departmental Representative for trench backfill.

### **3.8 BEDDING AND COVER**

- .1 Place and grade bedding material to dimensions indicated.
- .2 Compact bedding material to 98% SPMDD.
- .3 Install piping as specified in Section 33 11 16 or Section 33 41 00 as appropriate.
- .4 Place and grade cover material to dimensions indicated.
- .5 Compact cover material to 98% SPMDD.

### **3.9 BACKFILLING**

- .1 Do not proceed with backfilling operations until completion of following:
  - .1 Departmental Representative has inspected and approved installations.
  - .2 Departmental Representative has inspected and approved of construction below finish grade.
  - .3 Inspection, testing, approval, and recording location of underground utilities.
  - .4 Backfilling of voids with satisfactory soil material.
- .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 300mm thickness and compact to 95% SPMDD.

**3.10 RESTORATION**

- .1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Reinstate surfaces as specified.
- .3 Clean areas affected by Work as directed by Departmental Representative.
- .4 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Ontario Provincial Standard Specifications (OPSS)
  - .1 OPSS 1860-April 2012, Material Specification for Geotextiles.
- .2 ASTM International
  - .1 ASTM D4355-07 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
  - .2 ASTM D4533-11 Standard Test Method for Trapezoid Tearing Strength of Geotextiles
  - .3 ASTM D4632 - 08 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
  - .4 ASTM D4751-12 Standard Test Method for Determining Apparent Opening Size of a Geotextile
  - .5 ASTM D4759-11 Standard Practice for Determining the Specification Conformance of Geosynthetics
  - .6 ASTM D4833 - 07 Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
  - .1 Submit following samples 4 weeks prior to beginning Work.
    - .1 Minimum length of 2 m of geotextile.
    - .2 Methods of joining.

**1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions and OPSS 1860.
- .2 Storage and Handling Requirements:
  - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect geotextiles from direct sunlight and UV rays.
  - .3 Replace defective or damaged materials with new.
- .3 Packaging Waste Management: remove for reuse by manufacturer of pallets, crates, padding, and packing materials.

**Part 2 Products**

**2.1 MATERIAL**

- .1 OPSS Class II Non-Woven Geotextile Fabric: In accordance with OPSS 1860.
- .2 Knitted Geotextile Sock: In accordance with OPSS 1860.
- .3 High Survivability Non-Woven Geotextile Fabric:
  - .1 Failure: at >50% elongation as per ASTM D4632
  - .2 Grab Strength: 900 N as per ASTM D4632
  - .3 Puncture Resistance: 350 N as per ASTM D4833
  - .4 Tear Strength: 350 N as per ASTM D4533
  - .5 Apparent Opening Size, as per ASTM D4751
    - .1 < 50% soils passing 0.075 mm sieve, AOS < 0.6mm
    - .2 > 50% soils passing 0.075 mm sieve, AOS < 0.3mm
  - .6 UV Degradation: 50% strength retained after 500 hrs exposure, as per ASTM D4355
  - .7 Geotextile Acceptance: as per ASTM D4759

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections are acceptable for geotextile material installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative

**3.2 INSTALLATION**

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with weights.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 Overlap each successive strip of geotextile 500 mm over previously laid strip.
- .5 Pin successive strips of geotextile with securing pins at 500 mm interval at mid-point of lap.
- .6 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.

- .7 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

### **3.3 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .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 recycling.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

### **3.4 PROTECTION**

- .1 Protect geotextile from displacement and damage during work under other Sections.

**END OF SECTION**

**PART 1 General**

**1.1 SECTION INCLUDES**

**1.2 SUBMITTALS**

- A. Submit the following in accordance with the requirements of Section 01 33 00, Submittal Procedures:

1. Mix proportions as noted in paragraph 3.4.

**1.3 UNIT PRICES**

- A. Measurement

1. The method of measurement for grouting jacking is the number of cubic metres of slurry grout mixture completed and accepted in the work.

- B. Basis of Payment

1. For items of work for which specific unit prices or lump sum prices are established in the contract, measurement and payment for pressure grouting will be made as described below. Such payment will constitute full compensation for all labour, materials, equipment, and all other items necessary and incidental to the completion of the work.
2. Drilling overburden: Drilling overburden will be measured by determining to the nearest total linear meter of accepted hole drilled in the overburden. Payment for drilling overburden will be made at the contract unit price which will include compensation for placing and removing casings.
3. Placing Grout: Grout placed will be measured to the nearest cubic meter by counting the number of batches of each grout mixture injected in the holes and multiplying by the number of cubic meters per batch. The number of cubic metres per batch for each grout mixture will be determined as the average of the measured volumes of at least three batches of the mixture.

Admixtures shall not be considered in determining batch volume. The weight and specific gravity for sand shall be based on saturated surface dry conditions.

Payment for placing grout will be made at the contract unit price which will include compensation for handling all materials for the purpose of mixing and placing grout, sealing surface leaks, and maintaining grout records. Payment will not be made for grout lost by failure of the Contractor to caulk surface leaks or for grout otherwise wasted due to the actions of the Contractor.

4. Cement: Cement for grout will be measured on the basis of the number of bags of cement used in the grout. Payment for cement will be made at the contract unit

price. Payment will not be made for cement in grout wasted because of mechanical failure or due to the actions of the Contractor.

5. Sand and Bulk Fillers: Sand and bulk fillers will be measured by volume or equivalent weight, adjusted for moisture content where applicable, to the nearest cubic meter of each used in the grouting operation. Payment will be made at the contract unit price for sand and each type of bulk filler specified. Payment will not be made for sand or bulk filler wasted because of mechanical failure or due to the actions of the Contractor.
6. Admixtures: Liquid admixtures will be measured by volume to the nearest litre. Dry admixtures will be measured by weight to the nearest Kilogram. Payment for admixtures will be made at the contract unit price for each type of admixture specified. Payment will not be made for admixtures wasted because of mechanical failure or due to the actions of the Contractor.
7. Subsidiary Items: Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary.

## **PART 2 PRODUCTS**

### **2.1 BRICK CONSOLIDATION MATERIALS**

- A. Use grout for consolidating brick, consisting of a mixture of Portland Cement and water, with or without sand and other bulk fillers, together with admixtures that may be necessary or desirable to accomplish the work required in these specifications.
- B. Portland Cement: Conform to ASTM C150. If the cement contains lumps or foreign material which would clog the grouting equipment or interfere with grout injection, it shall be screened through a 100-mesh screen.
- C. Use additives for improving intrusion characteristics as required to inhibit early stiffening, decrease bleeding, eliminate shrinkage, and increase fluidity.
- D. Use water that is fresh, clean, and free from deleterious quantities of oil, acid, alkali, salts, organic matter, or similar substances.
- E. Use approved fine aggregates and/or bulk fillers consisting of sand, silt, clay, or a combination of these materials.

## **PART 3 EXECUTION**

### **3.1 MONITORING**

Monitor the area subjected to brick consolidation operations to avoid undesirable vertical displacement and to control pressure induced movement.

### **3.2 GROUTING PROCEDURES**



- A. Drilling Holes
  - 1. Drill grout injection holes, vertical, round, in a pre-planned pattern.
  - 2. Holes may be briefly washed to create a small cavity allowing initial spread of grout.
- B. Upon completion of the grouting, seal all drill holes flush with the ground surface with an accelerated setting sand/cement mixture or other approved material.

### **3.3 EQUIPMENT**

- A. Use only approved mixing and pumping equipment (including the items described below) in the preparation and handling of grout. Remove all oil or other rust inhibitors from the mixing drums, stirring mechanisms, and other portions of the equipment in contact with grout before the mixers are used. Equipment includes, but is not be limited to, the following items:
  - 1. Specially equipped grout pump capable of operating at a minimum discharge pressure of 100 psi or as required by site conditions.
  - 2. A power operated grout mixer specifically designed for the proper mixing of pumpable slurry together with a mechanically agitated slump, if necessary, to maintain uninterrupted grout supply.
  - 3. Valves, pressure gauges, pressure hoses, supply lines, and small tools, as required to insure a continuous supply of grout under accurately controlled pressure.
- B. Maintain additional equipment, parts, and supplies necessary to insure that grouting procedures will continue with minimal interruptions due to equipment failure.

### **3.4 MIX PROPORTIONS**

- A. Measure materials by volume, weight, or other approved means. Add sand or bulk filler to the mixture as warranted to enhance confinement of the grout under pressure. Submit to Departmental Representative records of pumping time, pressures, volume, locations, and slumps.
- B. Adjust the grout mix proportions for each point of injection and for each new batch of grout, as required, to obtain and maintain optimum grouting performance.

### **3.5 RECORDS**

- A. Unless otherwise specified, the Contractor shall keep drilling logs and complete records of all grouting operations. These records include time

logs of grout mixes and admixtures used in each stage or lift for each hole, related pressures and pumping rates, backpressures, and observations on excessive leakage and other non-routine conditions. The drilling log shall include date, hole location, and depth of refusal.

- B. Unless otherwise specified, the Contractor shall cooperate in providing all information related to drilling and grouting activities to the Departmental Representative.
- C. Unless otherwise specified, one copy of the records shall be provided the Departmental Representative at the completion of each shift.

**END OF SECTION**