

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 23 33.01 – Excavating, Trenching and Backfilling

1.2 SCOPE OF WORK

- .1 Work under this section includes the supply of all labour, material, plant and equipment to process and stockpile aggregates for incorporation into the work.
- .2 This Section describes the general requirements through to the stage of proportioning for use, or to the actual placing of material.
- .3 The specific aggregate requirements shall be as detailed in the material specification for the type of material to be provided.

1.3 APPROVAL

- .1 Only approved materials shall be incorporated into the work.
- .2 Advise the Departmental Representative of proposed material sources two weeks in advance of aggregate use.
- .3 If, in opinion of the Departmental Representative, materials from the proposed source do not meet, or cannot reasonably be processed to meet specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.
- .4 Materials shall be subject to sampling and testing by the Departmental Representative at all times. Provide the Departmental Representative with ample opportunity to sample any material at any time.
- .5 Should a change of source of material be proposed during the work, advise the Departmental Representative sufficiently in advance of such change to allow quality testing of the new source.
- .6 The acceptance of any material shall not preclude its future rejection if it is subsequently found to lack uniformity, or if it fails to conform to the requirements specified, or if its field performance is found to be unsatisfactory.

1.4 SAMPLING AND TESTING

- .1 Routine testing of materials and processed products for compliance with the requirements of this Section shall be completed by the Departmental Representative.
- .2 Samples for quality testing will be required at the discretion of the Departmental Representative. Supply to the Departmental Representative, as required, representative samples of the materials proposed for use in the work. Do not use any material in the work until it has been approved.

- .3 Provide subsequent and progress samples from the processed materials when and as required by the Departmental Representative.
- .4 Furnish such casual labour as is necessary to obtain and handle samples at the project or at other sources of material.
- .5 Testing required because of changes in materials or proportions of a mix requested by the Contractor, and extra testing occasioned by their failure to meet the specification requirements, will be at the Contractor's expense.
- .6 Quality testing shall not relieve the Contractor of his responsibility to furnish materials in compliance with the Contract Documents.
- .7 Testing of aggregates will be carried out in accordance with CSA or ASTM methods.
- .8 Thin and elongated pieces shall be those particles whose greatest dimension exceeds four times their least dimension.
- .9 Pieces having at least one freshly fractured face will be considered as crushed material.

Part 2 Products

2.1 MATERIALS

- .1 Aggregates shall be sound, hard, durable material free from soft, thin, elongated or laminated particles, debris, or deleterious substances such as clay or organic matter and shall meet the physical and gradation requirements as specified in Section 31 23 33.01 – Excavating, Trenching and Backfilling.
- .2 Fine aggregates satisfying all requirements of the Specification unless otherwise provided therein, shall be one, or a blend of the following:
 - .1 natural sand
 - .2 manufactured sand
 - .3 screenings produced in the crushing of quarried rock, boulders or gravel.
- .3 Coarse aggregates satisfying all requirements of the Specification unless otherwise provided therein, shall be one of the following:
 - .1 crushed rock
 - .2 gravel composed of naturally formed particles of stone.

Part 3 Execution

3.1 STRIPPING

- .1 Prior to excavating materials for aggregate production, clear and grub the area to be worked, and strip all unsuitable surface materials.
- .2 Open a sufficient area ahead of the quarrying, or excavating operation, to prevent contamination of the aggregate by deleterious materials.

3.2 PROCESSING

- .1 Process aggregate in a manner that will provide a uniform product and will avoid contamination and segregation.
- .2 Blending of qualitatively acceptable aggregates will be permitted in order to satisfy the grading requirements specified, provided that the blending is performed in a satisfactory manner and with approved equipment so as to consistently produce a uniformly well graded and acceptable product. Blending performed to increase the percentage of crushed particles or decrease the percentage of flat and elongated particles, will be permitted.

3.3 HANDLING

- .1 Handle and transport aggregates in a manner and with equipment that will avoid segregation and contamination.

3.4 STOCKPILING

- .1 Stockpiling sites shall be level, well drained, free of all foreign materials and of adequate bearing capacity to support the weight of the materials to be placed thereon. Stockpiles shall be either far enough apart or separated by substantial dividers to prevent intermingling.
- .2 For all coarse aggregates, except where stockpiled on Portland cement or asphaltic concrete foundations or otherwise acceptably stabilized areas, provide a compacted sand stockpile base not less than 300 mm in depth to prevent contamination of the material.
- .3 For fine or combined aggregate stockpiles, the foundation shall be as specified above for coarse aggregates; or, unless otherwise required by the Departmental Representative, fine and combined aggregate stockpiles may be placed on the ground, provided that the bottom 300 mm of the pile is not incorporated into the work.
- .4 Build stockpiles in layers not exceeding 1.5 m in depth. Complete each layer over the entire area of the stockpile before beginning the next layer. Uniformly spot-dump aggregates delivered to the stockpile in trucks and build the stockpile as specified. Coning of the piles or spilling material over the edges of the pile will not be permitted. During winter operations, keep stockpiles free from buried ice or snow.

3.5 DEFECTIVE MATERIALS

- .1 Unless otherwise permitted by the Departmental Representative, remove rejected materials from the site of the work within 48 hours of such rejection.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling
- .2 Section 31 23 13 – Rough Grading

1.2 SCOPE OF WORK

- .1 Work under this section includes the supply of all labour, material, plant and equipment required for the removal and disposal of all trees, logs, stumps, and other organic materials from the full width of the area designated to be cleared and grubbed.

1.3 DEFINITIONS

- .1 Clearing means and consists of the cutting of trees, bushes and brush within the entire width of the right-of-way and easements, including the disposal of such cut materials by removal from the site.
- .2 Grubbing means and consists of the removal and disposal of stumps, roots, brush, branches, all organic matter, and all other material left behind from the clearing operation completed by others, including disposal of such grubbed material at the Contractor's disposal site located off site.

Part 2 Products - Not Used

Part 3 Execution

3.1 GENERAL NOTES

- .1 Contractors are advised that clearing and grubbing limits may be altered in the field. Prior to commencement of work, inspect the site and verify with Departmental Representative items designated to remain and limits of the work.
- .2 All materials resulting from the clearing and grubbing operations become the property of the Contractor, who will remove it from the site prior to the completion date of the Contract.
- .3 The Contractor shall be responsible for damage to adjacent properties along the limits of grubbing. No burning shall be permitted on site.
- .4 Under no circumstances shall material resulting from the clearing and grubbing operations be disposed of under fill or embankments, nor shall excavation be combined with the grubbing operation.
- .5 Upon completion of grubbing operations, the site will be left in such a condition that topsoil stripping and grading operations can be undertaken immediately.

3.2 EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures as detailed on the Contract Drawings or as required by authorities having jurisdiction, whichever is more stringent to prevent soil erosion and discharge of soil-bearing water runoff into adjacent ditches or watercourses.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures and ensure they function properly at all times during construction and until permanent vegetation has been established.
- .3 Contractor shall be required to cover exposed surfaces with hay/straw and/or mulch as required to prevent sediment runoff. Coverage shall be maintained until vegetation is properly established.
- .4 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 GRUBBING

- .1 Remove and dispose of roots larger than 5 cm in diameter, matted roots, and designated stumps from indicated grubbing areas.
- .2 Grub out stumps and roots to not less than 300 mm below ground surface.

3.4 FINISHED SURFACE

- .1 Leave ground surface in condition suitable for immediate grading operations to approval of Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 11 00 – Clearing and Grubbing
- .2 Section 31 23 33.01 – Excavating, Trenching, and Backfilling

1.2 SCOPE OF WORK

- .1 Work under this section includes the supply of all labour, material, plant, equipment, and incidentals for the regrading of all disturbed areas and all other areas indicated on the Contract Drawings or as directed by the Departmental Representative.

1.3 EXISTING CONDITIONS

- .1 Contractor shall review existing condition of surface features with the Departmental Representative and determine the location of buried utilities prior to the beginning of work on site as per Section 31 23 33.01 – Excavating, Trenching, and Backfilling of these specifications.

1.4 PROTECTION

- .1 Protect and/or transplant existing fencing, trees, landscaping, natural features, bench marks, buildings, pavement, and surface or underground utility lines which are to remain as directed by the Departmental Representative. 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: Imported Borrow A in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Common excavated or graded material existing on site may be suitable to use as fill for grading work if approved by Departmental Representative.

Part 3 Execution

3.1 GRADING

- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated. Remove all debris and stones larger than 200 mm in greatest dimension.

- .2 Rough grade all areas to elevations as required.
- .3 Slope rough grade as indicated and as directed in order to eliminate uneven areas and low spots, ensuring positive drainage.
- .4 Grade ditches and swales to depth required for maximum run-off as indicated or as directed.
- .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 Compact filled and disturbed areas to maximum dry density in accordance with ASTM D1557, as follows:
 - .1 95% under landscaped areas.
 - .2 98 % under all areas to receive aggregate base and/or subbase.
- .7 Do not disturb soil within branch spread of trees or shrubs to remain.

3.2 SURPLUS AND UNSUITABLE MATERIALS

- .1 All suitable excavated material shall be kept on site and placed and compacted where fill is required. When insufficient space is available to allow stockpiling of suitable excavated materials on site, the Contractor shall load, haul and stockpile such excavated materials off site at an approved location. When all excavation work is complete, the Contractor shall, at his own expense, bring back as much acceptable material as may be required to properly refill all excavations or trenches, or for general backfilling purposes.
- .2 All material unsuitable for reuse and all excess materials found upon or excavated from the site shall become the property of the Contractor and shall be disposed of off site in accordance with all federal, provincial and municipal regulations and requirements, including acquisitions of permits, etc.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Excavating, trenching and backfilling for building footing and foundations, slabs, and subsurface utilities within building footprint.

1.2 RELATED SECTIONS

- .1 Section 01 57 14 – Erosion and Sediment Control
- .2 Section 07 11 13 - Damproofing and Waterproofing
- .3 Section 07 21 00 - Building Insulation.
- .4 Mechanical and Electrical Sections

1.3 REFERENCES

- .1 All References are to be the latest edition or latest edition adopted by the authorities having jurisdiction. Most stringent requirements apply.
- .2 Geotechnical Investigation Report Chignecto South Campground, prepared by Gemtec Project Number 10456.05 Dated March 31, 2016.
- .3 ASTM C136-05 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
- .5 ASTM D 4318, Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .6 ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ 600 kN-m/m³))
- .7 New Brunswick Department of Transportation Standard Specifications.

1.4 DEFINITIONS

- .1 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 0.76 cubic metre.
- .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation including dense tills, hardpan, frozen materials and partially cemented materials which can be ripped and excavated with heavy construction equipment.
- .3 Unsuitable materials:
 - .1 Weak and non- compressible materials under excavated areas.
 - .2 Frost susceptible materials under excavated areas.

- .4 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
- .5 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .6 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .7 Lean Concrete 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.

1.5 QUALITY ASSURANCE

- .1 Testing of materials and compaction will be carried out by the testing laboratory designated by the Departmental Representative in accordance with Section 01 45 00 Quality Control
- .2 Compaction densities are percentages of Standard maximum dry density as determined by ASTM D698.
- .3 Engage services of qualified professional Engineer who is registered or licensed in Province of New Brunswick, to design and inspect shoring and bracing required for Work.

1.6 SUBMITTALS FOR REVIEW

- .1 Provide submittals in accordance with Section 01 33 00 Submittal Procedures.
- .2 Inform Engineer/ Architect at least two weeks prior to commencing Work, of proposed source of fill materials and provide access for sampling.
- .3 Provide design of shoring and bracing required for Work.
 - .1 Engage services of qualified professional Engineer who is registered or licensed in Province of New Brunswick,
 - .2 Submit design and supporting data at least two weeks prior to commencing Work.
 - .3 Keep design and supporting data on site.
- .4 Submit samples of granular materials to be used in the works.
 - .1 Approval of a sample does not mean acceptance of the whole source.

Part 2 Products

2.1 MATERIALS

- .1 Structural Fill; imported well-graded, granular soil with a maximum particle size of 75 millimeters and a maximum of 10 percent passing the 80 micron sieve, such as pit run or quarried rock fill.
 - 1. Quarried sandstone is suitable for use as structural fill provided the maximum particle size is less than 150 millimeters prior to compaction and the sandstone is not used within 450 millimeters of the lowest floor slab or asphalt.
- .2 Type 1 Fill: Crushed rock, pit run gravel; 75 millimeters minus approved by Departmental Representative prior to placement.
- .3 Type 2 Fill: Well-graded free draining crushed rock, 19 millimeters minus with a maximum of 4 percent passing the 4 mm sieve, approved by Departmental Representative prior to placement.
- .4 Type 3 Fill: Crushed rock, pit run gravel; 31.5 millimeters minus approved by Departmental Representative prior to placement.
- .5 Type 4 Fill: Selected site material from excavation or other sources, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials and approved by Departmental Representative prior to placement and for use intended.
- .6 Type 5 Fill: Drainage stone for foundation drainage piping, unfrozen and free from clay lumps, cementation, organic material, and other deleterious materials shall be 100% fractured, crushed stone aggregate devoid of mineral fines.
 - .1 Rounded sands, semi-angular river rock and soft aggregates are prohibited.
 - .2 Maximum particle size of 60 millimeters and a maximum of 5 percent passing the 5 mm sieve, approved by Departmental Representative prior to placement.
- .7 Type 6 Fill: Clean granular material having less than 15% fines; 0% passing a 0.080mm sieve
- .8 Sand: Silica sand, free from clay, shale and organic material, for bedding of underground services.
- .9 Lean Concrete 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.
 - .3 Minimum strength of 0.07 MPa at 24 h.
 - .4 Concrete aggregates: to CAN/CSA-A23.1.
 - .5 Portland cement: Type 10.
 - .6 Slump: 160 to 200 mm.

Part 3 Execution

3.1 GENERAL

- .1 The General Contractor shall follow the recommendations outlined in the Geotechnical Investigation Reports noted in Section 00 21 14 Project Specific Instruction to Bidders.
 - .1 Any discrepancies with this specification to be brought to the attention of the Engineer / Architect.
 - .2 The most stringent requirement will prevail.

3.2 EXISTING FEATURES

- .1 Existing and new buildings, structures and surface features.
 - .1 Protect existing buildings, structures features and enclosures in accordance with applicable local regulations for duration of Work.
 - .2 In event of damage, immediately make repair to approval of Engineer.
 - .3 Where required for excavation, cut roots or branches as approved by Engineer.
- .2 Take necessary precautions to protect existing or newly constructed works.
 - .1 If undermining occurs, correct by replacing disturbed foundation material with fill concrete or other material and or means as directed by the Engineer- Architect.
 - .2 Should damage of any kind, including but not limited to settlement or lateral movement of adjacent structures, utilities or surface features occur as a result of the work, such conditions and any resultant damage to be immediately rectified by the Contractor.
 - .3 All protective and corrective work to be to the satisfaction of the Engineer- Architect and at the expense of the Contractor.
- .3 Existing buried utilities and structures:
 - .1 Size, depth and location of existing utilities and structures, as indicated on drawings, are for guidance only.
 - .1 Completeness and accuracy are not guaranteed.
 - .2 Prior to beginning excavation Work, notify Owner or authorities having jurisdiction to establish location and state of use of buried utilities and structures if known.
 - .1 If known, Owner or authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
 - .3 In all cases, confirm locations of buried utilities by careful test excavations.
 - .4 Maintain and protect from damage, water sewer, gas, electric, telephone, data and other utilities and structures encountered.

- .5 Where utility lines or structures are discovered in area of excavation, obtain direction from the Departmental Representative before re-routing. Costs for such additional work to be paid by Owner.
- .6 Record on As-Built the location of maintained, re-routed and abandoned underground lines.

3.3 PREPARATION

- .1 Follow Erosion and Sediment Control Plan (ESC Plan) requirements in accordance with Section 01 57 14.
 - .1 Ensure erosion and sedimentation control measures and other environmental protection measures are in place prior to beginning work of this Section.
- .2 Remove obstructions, ice and snow, from surfaces to be excavated within limits of contract.
- .3 Identify required lines, levels, contours, and datum.
- .4 Identify known underground, above ground, and aerial utilities. Stake and flag locations.
- .5 Notify utility company to remove or relocate utilities.
- .6 Protect above and below grade utilities which are to remain.
- .7 Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.
- .8 Construct temporary Works to depths, heights and locations as required and or as directed by the Engineer – Architect.

3.4 STOCKPILING AND DISPOSAL

- .1 Stockpile fill materials in areas designated by Engineer - Architect.
- .2 Stockpile granular materials in manner to prevent segregation.
- .3 Protect fill materials from moisture and contamination.
- .4 Excess material unsuitable for backfill shall become the property of the Contractor and be disposed of offsite.
- .5 It will be the Contractor's responsibility to acquire permission and all permits for the disposal site.
- .6 Submit copies of all obtained permits to the Engineer- Architect when requested.
- .7 In case of a dispute, the Departmental Representative shall be the sole judge as to which material is unsuitable and shall be hauled away.

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 All excavations and trenches shall be kept free from water. Dams, dykes or other work necessary for dewatering including duplicate pumps of sufficient capacity for the purpose, shall be placed at the Contractor's expense.
- .4 The discharge of water from any dewatering operation shall be in accordance with the Erosion and Sedimentation Control Plan.
- .5 Protect installed foundations from freezing and frost penetration prior to completion of Work as required and as directed by the Departmental Representative.

3.6 EXCAVATION AND TRENCHING

- .1 Excavate to lines, grades, elevations and dimensions as specified or shown on drawings.
- .2 Excavate subsoil required to accommodate building foundations, slabs-on-grade, mechanical work electrical work and construction operations as required.
- .3 Remove all obstructions encountered during excavation.
- .4 Surplus and unsuitable excavated material will become the property of the Contractor and will be removed and disposed of off-site.
- .5 Excavation must not interfere with bearing capacity of adjacent foundations.
- .6 For trench excavation, unless otherwise authorized by Engineer – Architect in writing, do not excavate more than 30 m of trench in advance of installation operations.
- .7 Earth bottoms of excavations to be undisturbed soil or engineered fill, level, free from loose, soft or organic matter.
- .8 Correct over-excavation as follows:
 - .1 Fill under bearing surfaces and footings with concrete specified for footings or structural fill compacted to not less than 100 % of Standard Proctor Density in accordance with ASTM D698.
 - .2 Fill under other areas with Structural fill compacted to not less than 98 % of Standard Proctor Density in accordance with ASTM D698.
- .9 Ensure Geotechnical Representative has reviewed and inspected all bearing surfaces prior to installing any footing or concrete surface.
- .10 Notify Geotechnical Representative when materials unsuitable for use in the work are encountered and remove to depth and extent as directed by the Geotechnical Representative.
- .11 Backfill excavations with specified material or selected backfill material as directed by the Geotechnical Representative.

3.7 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Place and compact fill material for bedding and surround of underground services, shaped to provide uniform support to pipe structures.
- .2 Place bedding and surround material in unfrozen condition.

3.8 BACKFILLING

- .1 Coordinate placement of underslab vapour barrier and rigid insulation prior to backfilling.
- .2 Do not proceed with backfilling operations until Geotechnical Representative has inspected and approved installations.
- .3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .4 Do not use backfill material which is frozen or contains ice, snow or debris.
- .5 Proof roll slab-on-grade area with 8 tonne roller prior to placement of fill.
 - .1 Undercut any loose or soft areas and fill to sub grade level.
- .6 Place backfill material in uniform layers not exceeding 150mm compacted thickness up to grades indicated.
 - .1 Compact each layer before placing succeeding layer.
- .7 Do not backfill around or over mechanical and electrical installations until Work has been reviewed by Departmental Representative.
- .8 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.
 - .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 Engineer – Architect.
- .9 Place Lean Concrete fill in areas as indicated.
 - .1 Consolidate and level Lean Concrete fill with internal vibrators.
- .10 Prior to backfilling, ensure all associated work by other trades are complete and have been reviewed by the Engineer – Architect.
- .11 Do not cover up or put out of view any work until it has been reviewed by the Engineer – Architect.
 - .1 All work covered without approval of the Engineer – Architect must, if required, be uncovered for examination.

3.9 FILL TYPES AND COMPACTION

- .1 Use fill of types as indicated or specified below. Compaction densities are obtained from ASTM D698. All material must be approved by the Geotechnical Representative prior to installation.
 - .1 Under Footings:
 - .1 Use Structural Fill. Footings may bear on bedrock only on approval of Departmental Representative.
 - .1 Compact to 95% Proctor density
 - .2 Fill to correct over excavation:
 - .1 Use Structural Fill.
 - .1 Compact to 95% Proctor density
 - .3 Fill-to-sub-grade:
 - .1 Use Type 1 Fill Type 3 Fill
 - .1 Compact to 95% Proctor density
 - .4 Under Slab:
 - .1 From sub grade to the bottom of slab or insulation use Type 2 Fill.
 - .1 150 mm thick
 - .2 Compact to 95% Proctor density
 - .3 See drawings for insulation locations.
 - .5 Drainage Exterior side of perimeter foundation walls:
 - .1 Type 6 Fill
 - .6 Sand fill for subsurface trench installations: Compact to 95%.
 - .7 Backfill for trenches within building area:
 - .1 Use Structural Fill or Type 2 Fill.
 - .1 Compact to 95% Proctor density

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 05 17 – Aggregate Materials
- .2 Section 31 11 00 – Clearing and Grubbing
- .3 Section 31 22 13 – Rough Grading
- .4 Section 32 91 19.16 – Topsoil Placement and Grading
- .5 Section 33 46 13.01 – Foundation and Underslab Drainage

1.2 SCOPE OF WORK

- .1 Work in this section includes the supply of all labor, plant, materials, and equipment for excavating, trenching and backfilling for the installation of underground site services, construction of parking lots and roadways, ditches, and all other related work as shown on the drawings and specified herein.
- .2 Contractor's base bid for the project shall not include an allowance for rock excavation. If rock is encountered during construction, a price will be negotiated at that time.

1.3 DEFINITIONS

- .1 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 1 m³.
 - .1 Rock excavation may be required to complete the work. Refer to the Geotechnical Investigation Report prepared by Gemtec for this project for further details.
- .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation including dense tills, hardpan, frozen materials, asphalt and partially cemented materials which can be ripped and excavated with heavy construction equipment.
- .3 Embankment: material derived from usable excavation and placed above original ground or stripped surface up to subgrade elevation.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

- .1 Adhere to regulations of authorities having jurisdiction.
- .2 Adhere to Provincial and National Environmental requirements if toxic materials are involved.

1.5 PROTECTION OF EXISTING FEATURES

- .1 Existing buried utilities and structures:
 - .1 Before commencing work, establish location and extent of underground utilities in area of excavation, including but not limited to water, sewer (mains and services), electrical and communication underground lines, and gas mains. Clearly mark such locations to prevent disturbance during the work. It is the Contractor's responsibility to contact all utilities for locates and ensure that all underground utilities are identified prior to starting work; whether shown on the drawings or not.
 - .2 Size, depth and location of existing utilities and structures shown on Drawings are for guidance only. Completeness and accuracy are not guaranteed.
 - .3 Confirm locations of buried utilities by careful test excavations.
 - .4 Maintain, support, and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered. Support of the utilities, if required, shall be as required by the utility owner. Obtain direction of Departmental Representative before moving or otherwise disturbing utilities or structures.
 - .5 Maintain existing utilities in area of excavation which must remain active as indicated. Pay costs for such work.
 - .6 Record location of maintained re-routed and abandoned underground utilities.
 - .7 Make good and pay for damage to existing utilities resulting from work.
 - .8 Remove abandoned utilities. Cap or otherwise seal lines at cut-off points.
- .2 Existing surface features:
 - .1 Conduct, with Departmental Representative, condition survey of existing surface features, trees and other plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by work.
 - .2 Protect existing buildings and surface features which may be affected by work from damage while work is in progress and repair damage resulting from work.
 - .3 Where excavation necessitates root or branch cutting, do so only as approved by Departmental Representative.
 - .4 Protect bottoms of excavation from freezing.
 - .5 Effect approved measures to minimize dust resulting from this work.
 - .6 Do not stockpile excavated material to interfere with site operation, drainage, or vehicular traffic.

1.6 SHORING AND BRACING

- .1 Prevent movement or settlement, safeguard and maintain integrity of adjacent structures, bench marks, services, walks, paving, trees, curbs, landscaping, adjacent grades. Provide bracing and shoring as required.
- .2 Shore and brace excavations to prevent failure in accordance with the requirements of the General Regulation 91-191 under the Occupational Health and Safety Act of the Province of New Brunswick, latest revision and applicable local regulations.

- .3 Make good and pay for any damage and be liable for any injury resulting from inadequate shoring, bracing or underpinning.

Part 2 Products

2.1 MATERIALS

- .1 Common Fill:
- .1 Common fill material shall be approved material, obtained from excavation. The material shall be free of roots, brush, organic material, frozen lumps and shall contain no boulders or broken rock larger than 200mm greatest dimension, approved by the Departmental Representative.
- .2 Aggregate Base and Subbase:
- .1 Shall be crushed rock and shall meet or exceed the physical requirements of the New Brunswick Department of Transportation and Infrastructure Standard Specifications, latest revision, Item No. 201.2.2, Rock and Gravel Aggregates - Physical Requirements.
- .2 Gradation limits for Crushed Aggregate Base (0 – 31.5 mm minus) and Crushed Aggregate Subbase (0 – 75 mm minus) to be as specified in Item 201.2.4.1 - Crushed Rock Base/Subbase contained in the New Brunswick Department of Transportation and Infrastructure Standard Specifications, latest revision.
- .3 Pit Run Gravel Base:
- .1 Shall be used as the surface layer in the parking lot.
- .2 Shall be pit run (not crushed) consisting of hard durable particles free of roots, brush, organic material, clay lumps, cementation, frozen lumps or other deleterious materials.
- .3 Gradation to be within limits specified in the table below when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.

ASTM Sieve Size (mm)	Percent Passing (%)
37.5	100
31.5	95 - 100
25.0	83 - 100
19.0	70 - 90
12.5	55 - 78
9.5	45 - 72
4.75	30 - 57
2.36	20 - 46
1.18	14 - 35
300 µm	5 - 19
75 µm	0 - 6

- .4 Shall be subject to the approval of the Departmental Representative at the time of placement in the work.

- .4 Granular bedding material:
- .1 Shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials.
 - .2 Physical requirements of granular bedding material to meet or exceed the following:
 - .1 The percentage wear of the aggregate as measured in the Micro-Deval Abrasion Loss, MTO Standard LS618, shall not exceed 25%.
 - .2 At least 50% of the particles retained on the 5 mm sieve shall have one or more surfaces formed by the fracture of a larger particle.
 - .3 The plasticity index of that fraction of the granular base material passing the No.40 sieve shall not exceed three (3).
 - .3 Gradation of granular bedding material to be within limits specified in the tables below when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.

31.5 mm Minus

<u>ASTM Sieve Size, mm</u>	<u>% Passing</u>
37.5	100
31.5	95-100
25.0	83-100
19.0	70-90
12.5	55-78
9.5	45-72
4.75	30-57
2.36	20-46
1.18	14-35
300µm	5-19
75µm	0-6

5 mm - 20 mm *

<u>Sieve Size, mm</u>	<u>% Passing</u>
20	100
14	40 - 80
10	20 - 62
5	0 - 20
2.5	0 - 10
0.08	0 - 3

* To be used in wet trench conditions only and must have the Departmental Representative's approval prior to use.

- .5 Drainage Stone:
- .1 Shall be used for dry well and catch basin subdrain systems.
 - .2 Shall be clean, sound, durable crushed rock, crushed gravel or pit run gravel meeting the grading requirements shown in Table 366-1 contained in the latest revision of the New Brunswick Department of Transportation and Infrastructure Standard Specifications.

- .6 Imported Borrow A:
 - .1 Borrow shall meet or exceed the material properties of Borrow A as specified in Item 121.2.2 contained in the latest revision of the New Brunswick Department of Transportation and Infrastructure Standard Specifications.
 - .2 Borrow shall be subject to the approval of the Departmental Representative at the time of placement in the work and the maximum particle size shall not exceed two-thirds of the lift thickness being placed.
- .7 Riprap:
 - .1 Shall be a sound, clean, durable, crushed rock, having a density of not less than 2.6 t/m³.
 - .1 Shall have a Micro-Deval loss not greater than 70% when tested in accordance with MTO LS-618.
 - .2 Shall have a Freeze/Thaw loss not greater than 30% when tested in accordance with MTO LS-614.
 - .3 Shall be of size indicated on the contract Drawings and shall be a well graded mixture conform to the grading limits for each size of riprap shown in Table 608-1 contained in the latest revision of the New Brunswick Department of Transportation and Infrastructure Standard Specifications.
- .8 Geotextile:
 - .1 Shall be of the type indicated on the Contract Drawings and shall be needle-punched geosynthetic meeting the requirements of Item 601.2 contained in the latest revision of the New Brunswick Department of Transportation and Infrastructure Standard Specifications.
- .9 Sediment Control Fence:
 - .1 Shall be as detailed on the Contract Drawings.
 - .1 Fabric shall be Type W1 geotextile as specified in Item 601.2 and Table 601-1 contained in the New Brunswick Department of Transportation and Infrastructure Standard Specifications, latest revision.
 - .2 Support posts shall be wooden, metal or synthetic posts or stakes, minimum 1200 mm long.
- .10 Erosion Control Structure:
 - .1 Shall be Type "C" as specified in Item 605 contained in the New Brunswick Department of Transportation and Infrastructure Standard Specifications, latest revision.
 - .2 Random Riprap shall be R-5 as specified in Item 608.2 and Table 608-1 contained in the New Brunswick Department of Transportation and Infrastructure Standard Specifications, latest revision.
 - .3 Geotextile shall be Type N2 as specified in Item 601.2 and Table 601-1 contained in the New Brunswick Department of Transportation and Infrastructure Standard Specifications, latest revision.

Part 3 Execution

3.1 SITE PREPARATION

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

3.2 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.
- .2 Commence topsoil stripping of areas after area has been grubbed and grubbing material has been removed from site.
- .3 Strip topsoil to depths as directed by the Departmental Representative.
- .4 Topsoil shall be removed and disposed off-site unless directed otherwise by the Departmental Representative on site.

3.3 STOCKPILING

- .1 Stockpile suitable excavated materials meeting the appropriate gradations and physical requirements of this specification for re-incorporation into the work.
- .2 Stockpile suitable fill materials on site in areas designated by Departmental Representative. Stockpile materials in manner to prevent segregation.
- .3 Protect fill materials from contamination.

3.4 DEWATERING

- .1 Keep excavations and trenches free of water while work is in progress. Construction of ditches, dams, dykes and sump pits and other work necessary for dewatering including the supply and operation of pumps of sufficient capacity shall be at the Contractor's expense.
- .2 Protect open excavations against flooding and damage due to surface run-off.
- .3 Dispose of water in a manner not detrimental to public and private property or any portion of work completed or under construction.

3.5 COMPACTION EQUIPMENT

- .1 Compaction equipment must be capable of obtaining required densities in materials on project.

3.6 WATER DISTRIBUTORS

- .1 Apply water with equipment capable of uniform distribution.

3.7 EXCAVATION AND TRENCHING

- .1 Perform all excavation and trenching in accordance with the requirements of the General Regulation 91-191 under the Occupational Health and Safety Act of the Province of New Brunswick, latest revision.
- .2 Excavation and trenching should only be carried out during dry weather. Proper drainage system should be in place to keep excavation dry.
- .3 Excavate to elevations and dimensions indicated for installation, construction and inspection of work specified.
- .4 Excavate to well defined lines to minimize quantity of fill material required.
- .5 Correct unauthorized excavation at no extra cost to the Owner using aggregate subbase course.
- .6 Remove obstructions encountered in course of excavation.
- .7 Excavation must not interfere with normal 45 degree splay of bearing from bottom of any footing.
- .8 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. Seal cuts with approved tree wound dressing.
- .9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .10 Protect bottoms of excavation from freezing.
- .11 Effect approved measures to minimize dust resulting from this work.
- .12 Under roadways, walkways and parking areas excavate to depths indicated on the drawings. The bottom of excavation shall be level, undisturbed soil and shall be proof rolled using a 10 tonne or larger vibratory smooth drum roller in the presence of the Departmental Representative prior to placement of fill. Any soft, wet or spongy areas shall be excavated and filled with aggregate subbase material.
- .13 Width of trench excavation shall include the width of the footing and the 45 degree splay angle.
- .14 Excavate trenches to lines and grades shown to a minimum of 150 mm below underside of pipe, conduit, cable or duct.
- .15 Cut trenches 300 mm wider than maximum pipe diameter, trim and shape trench bottoms and leave free of irregularities, lumps or projections.

- .16 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave any open trench at end of day's operation, depending on weather conditions.

3.8 FILL TYPES AND COMPACTION

- .1 Use fill of types as indicated or specified below. Compaction densities are percentages of Maximum Dry Density latest revision of ASTM D698.
 - .1 Under roadways and parking areas: Use aggregate subbase and Pit Run Gravel Base to depths as indicated on the Drawings, compact to 98% in accordance with ASTM D698.
 - .2 Under walkways: Use aggregate subbase and aggregate base to depths as indicated on the Drawings, compact to 98% in accordance with ASTM D698.
 - .3 Under landscaped areas: Use suitable common fill obtained from site excavation or Borrow A material to underside of topsoil layer. Compact to 95% in accordance with ASTM D698.
 - .4 Granular bedding material: Compact granular bedding material to 95% in accordance with ASTM D698.
 - .5 Common Fill and Borrow A (if required): Use under roadways, walkways and landscaped areas up to subgrade elevation, compact to 95% in accordance with ASTM D698.

3.9 BACKFILLING

- .1 Do not proceed with backfilling operations until Departmental Representative has inspected and approved installations.
- .2 Backfill to lines and grades as shown on the Drawings or as staked in the field.
- .3 Area to be backfilled and backfill materials shall be free from debris, snow, ice, water or frozen material.
- .4 In fill areas, once grubbing and topsoil stripping, and removal of all unsuitable materials is completed, the remaining depth up to top of subgrade in roadways and landscaped areas shall be backfilled using suitable common fill from excavation or Borrow "A" (if required).
- .5 Suitable Common Fill from Excavation and Borrow A:
 - .1 Suitable Common Excavated Material and Borrow A shall be placed in uniform lifts not exceeding 300 mm in thickness (before compaction) and compacted to a density of at least 95% of the maximum dry density as determined by ASTM D698.
- .6 Crushed Aggregate Base and Subbase and Pit Run Gravel Base:
 - .1 Place and spread aggregate base/subbase and pit run materials using methods that does not lead to segregation or degradation of the aggregate.
 - .2 Spread aggregate base/subbase and pit run materials in uniform lifts not exceeding 150 mm in compacted thickness to a total thickness of that indicated on the Contract Drawings.

- .3 Compact aggregate base/subbase and pit run materials to a density of at least 98% of the maximum dry density as determined by ASTM D698.
- .7 Granular Bedding Material:
 - .1 Place a minimum 150 mm granular bedding material under pipe or appurtenance and to 300 mm over same.
 - .2 Place and compact granular bedding material in 150 mm lifts to a density of at least 95% of maximum as determined by ASTM D698.
- .8 Backfilling of Pipe Installations:
 - .1 Once pipe bedding material has been placed to the required depth and degree of compaction, the remaining depth of trench up to subgrade shall be backfilled using suitable common fill material obtained from excavation.
 - .2 If common fill material from excavation is unsuitable for reuse as backfill material, as determined by the Departmental Representative, the remainder of the trench shall be backfilled to subgrade elevation with imported Borrow "A" material.
- .9 Backfilling Around Installations:
 - .1 Do not backfill around or over cast-in-place concrete within 24 h after placing of concrete.
 - .2 Place layers simultaneously on both sides of installed work to equalize loading. Difference not to exceed 450 mm.
 - .3 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 Owner. or:
 - .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.
 - .3 Place material by hand under, around and over insulation and installations until 600 mm of cover is provided. Dumping material directly on installations will not be permitted.
- .10 Shape and compact each lift of fill materials to specified lines, grades, compacted thickness, and to degree of specified compaction prior to placement of succeeding lifts.
- .11 Remove and replace areas that become segregated.
- .12 If, during progress of work, tests indicate fills do not meet specified requirements, remove defective fills, replace and retest at no extra cost.
- .13 Apply water as necessary during compaction to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.
- .14 In areas not accessible to rolling equipment, compact to specified density with approved mechanical tampers.

3.10 INSPECTION AND TESTING

- .1 The Contractor is responsible to pay for and conduct Quality Control testing on all materials incorporated into the work in accordance with Section 01 45 00 – Testing and Quality Control.
- .2 Quality Assurance testing may be carried out by a testing laboratory designated by the Departmental Representative.
- .3 Owner will pay initial costs for Quality Assurance inspection and/or testing. Where tests and/or inspections reveal work not in accordance with contract requirements, the Contractor shall pay costs for additional tests and/or inspection required until work complies with contract requirements.

3.11 EXCAVATED MATERIAL

- .1 Stockpile all excess excavated material suitable for reuse on site in designated area.
- .2 All excess material, including any unused/surplus material contained in the existing stockpiles on site and materials unsuitable for grading or backfilling, becomes the property of the Contractor and shall be disposed off site at an approved location.

3.12 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, in accordance with the requirements of authorities having jurisdiction and the erosion control measures detailed on the Contract Drawings, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.13 REINSTATEMENT

- .1 All damage or disturbance to surfaces, properties and structures within the limits of site or elsewhere on other properties occupied, traversed or otherwise used by the Contractor during the Contract Period shall be made good to a condition equal to or better than before work began.

END OF SECTION