

Part 1 General**1.1 DEFINITIONS**

- .1 Corrected maximum dry density is defined as:
 - .1 $D = (F1 \times D1) + (0.9 \times D2 \times F2)$
 - .2 Where: D = corrected maximum dry density kg/m³.
 - .1 F1 = fraction (decimal) of total field sample passing 4.75 mm sieve
 - .2 F2 = fraction (decimal) of total field sample retained on 4.75 mm sieve (equal to 1.00 - F1)
 - .3 D1 = maximum dry density, kg/m³ of material passing 4.75 mm sieve determined in accordance with Method A of ASTM D1557-00.
 - .4 D2 = bulk density, kg/m³, of material retained on 4.75 mm sieve, equal to 1000G where G is bulk specific gravity (dry basis) of material when tested to ASTM C127-88 (93).
 - .3 For free draining aggregates, determine D1 (maximum dry density) to ASTM D4253-00 dry method when directed by Engineer.

Part 2 Products**2.1 NOT USED**

- .1 Not Used.

Part 3 Execution**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 32 11 23 – Aggregate base course.
- .2 Section 32 12 16 – Asphalt paving.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- .1 "Loi sur la qualité de l'environnement (RLRQ, chapitre Q-2) " .
 - .1 "Règlement sur les carrières et sablières (Q-2, r. 7) " .
- .2 U.S. Environmental Protection Agency (EPA)/Office of Water
 - .1 EPA 832/R-92-005-92, Storm Water Management for Construction Activities, Chapter 3.
- .3 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 MEASUREMENT FOR PAYMENT

- .1 Granular materials will be measured and paid as per section 32 11 23 – Aggregate base courses.

1.4 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROVAL/INFORMATION

- .1 Submit documents and samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Technical sheet
 - .1 Submit product data and instructions and manufacturer's literature on aggregate. The technical data must include product characteristics, performance criteria, physical size, finish and limitations
- .3 Sample
 - .1 Submit sample.
 - .2 Take necessary measures for the continuous sampling of aggregates by the Departmental Representative during their production.
 - .3 Provide Departmental Representative, for sampling, access to the source of supply and prepared materials.
 - .4 Rise of sampling stations at the exit of the conveyor for the preparation of aggregates for the Representative of the Ministry there may take representative

- samples. Stop the conveyor at the request of the Departmental Representative, to enable it to take a sample from one side to the other of the transported material.
- .5 Provide a front end loader or other suitable device and, if necessary, the services of a specialist in sampling lots operator. Move the samples to a storage site by the Departmental Representative directives.
- .6 Provide bags or containers for new or clean samples which are suitable to contain aggregates.
- .7 Pay the sampling and testing of aggregates if they do not comply with the prescribed requirements.
- .8 Ensure, at the location of production, the supply of water, electricity and propane gas for the departmental representative mobile laboratory.
- .4 Documents/samplings to submit for durable conception.
 - .1 Construction waste management:
 - .1 Submit the waste management plan of construction waste established for the project, which should specify the requirements for recycling and recovery.
 - .2 Erosion and sediments control:
 - .1 Submit a copy of the erosion and sediment control plan conform to the competent authority.

1.5 TRANSPORT, STOCKPILE AND HANDLING

- .1 Transport and handling: the aggregate materials must be transported and handled in a manner to prevent segregation, contamination and degradation.
- .2 Stockpile: the washed or excavated under water materials shall be piled in a manner to let the water runoff of the materials and to uniform the water content of the pile at least 24 hours.

Part 2 Products

2.1 MATERIALS

- .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
 - .1 Greatest dimension to exceed five times least dimension.
- .3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
 - .1 Screenings produced in crushing of quarried rock, boulders, gravel or slag.
- .4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
 - .1 Crushed rock.
 - .2 Gravel and crushed gravel composed of naturally formed particles of stone.

2.2 SOURCE QUALITY CONTROL

- .1 Inform departmental representative of proposed source of aggregates and provide access for sampling at least 4 weeks prior to commencing production.
- .2 If materials from 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.
- .3 Advise departmental representative 4 weeks in advance of proposed change of material source.
- .4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

Part 3 Execution

3.1 EXAMINATION

- .1 Conditions verification: insure that the condition was acceptable to remove the vegetal materials.
 - .1 Visually inspect surfaces and supports with the departmental representative.
 - .2 Immediately inform the departmental representative of any unacceptable condition founded.
 - .3 Begin to remove the vegetal materials only after make corrections of unacceptable condition and obtain the departmental representative approval.

3.2 PREPARATION

- .1 Processing with vegetal materials removal
 - .1 The vegetal materials should not be manipulated when the materials is wet or frozen nor in any manner that could alter the soil structure.
 - .2 Remove the vegetal materials to the depth indicated by the departmental representative. Avoid mixing vegetal materials with subsequent layer materials.
 - .3 Stockpile or install vegetal materials at the location indicated by the departmental representative. The height of pile do not exceed 2 meters.
 - .4 Keep the vegetal materials for re-use in the re-naturalization of the supply source.
- .2 Processing of granulate
 - .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
 - .2 If necessary, a mixture of aggregates, including recycled materials that meet the physical requirements of the specifications, is allowed to provide the particle size, the particle shapes or percentage of crushed particles prescribed
- .3 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.

- .4 If necessary, screening, crushing, washing, classify and treat aggregates with appropriate equipment complies with the requirements.
- .5 Stockpiling
 - .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by departmental representative. Do not stockpile on completed pavement surfaces.
 - .2 Stockpile aggregates in sufficient quantities to meet Project schedules.
 - .3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
 - .4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.
 - .5 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by departmental representative within 48 h of rejection.
 - .6 Stockpile materials in uniform layers of thickness max 1.5 m .
 - .7 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
 - .8 Do not cone piles or spill material over edges of piles.
 - .9 Do not use conveying stackers.
 - .10 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.3 CLEANING

- .1 Progress Cleaning: made them clean in accordance with Section 01 74 11 – Cleaning.
 - .1 Leave Work area clean at the end of each working day
- .2 Final Cleaning: upon completion remove materials / surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning
- .3 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .4 Leave any unused aggregates in neat compact stockpiles as directed by departmental representative.
- .5 Waste Management: separate waste materials for reuse / re-use and recycling in accordance with Section 01 74 21 - Construction-demolition waste management and disposal.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 31 14 13 – Soil stripping and stockpiling.

1.2 MEASUREMENT PROCEDURES

- .1 Common Excavation:
 - .1 Measure in cubic metres calculated from cross sections taken in areas of excavation including topsoil.
- .2 Measure topsoil placing for payment as common excavation.
 - .1 If double handling of topsoil is directed by Departmental Representative (stockpiling and later placing), then measure quantities twice; on excavation from original location and on excavation from stockpile.
- .3 Measure pavement subgrade compaction in square metres.

1.3 REFERENCES

- .1 Definitions:
 - .1 Excavation classes: 2 classes of excavation will be recognized; common excavation and rock excavation.
 - .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.
 - .2 Common Excavation: excavation of materials of whatever nature, which are not included under definition of rock excavation, including dense tills, hardpan and frozen materials.
 - .3 Unclassified excavation: excavation of deposits of whatever character encountered in work.
 - .2 Compaction classes: two classes of soil are recognized for compaction purposes; cohesionless and cohesive soil:
 - .1 Cohesionless soil:
 - .1 Soils which have less than 20% passing 0.075 mm sieve, when tested to ASTM C117, regardless of plasticity of fines.
 - .2 Soils containing between 20% to 50% passing 0.075 mm sieve and having liquid limit less than 25 and plasticity index less than 6 when tested to ASTM D4318.
 - .2 Cohesive soil: soil not having properties to be classified as cohesionless.
 - .3 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
 - .4 Waste material: excavated material unsuitable for use in work or surplus to requirements.

- .5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of work.
- .6 Pavement structure: combination of layers of unbound or stabilized granular sub-base, base, and asphalt or concrete surfacing.
- .7 Subgrade elevation: elevation immediately below pavement structure.
- .8 Unsuitable materials:
 - .1 Weak and compressible materials under pavement areas.
 - .2 Frost susceptible materials under pavement areas.
 - .3 Frost susceptible materials:
 - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1.

Sieve Designation	% passing
2.00 mm	100
0.10 mm	45-100
0.02 mm	10-80
0.005 mm	0-45

- .2 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.
- .2 Reference Standards:
 - .1 ASTM International
 - .1 ASTM C117-04, Standard Test Method for Materials Finer Than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D4318-10, Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-[88], Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-[M88], Sieves, Testing, Woven Wire, Metric.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Sustainable Design Submittals:
 - .1 Construction Waste Management:
 - .1 Submit project Waste Reduction Workplan highlighting recycling and salvage requirements.
 - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.

- .3 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with authorities having jurisdiction.

Part 2 Products

2.1 MATERIALS

- .1 Fill materials: from excavated materials and to approval of Departmental Representative.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for grading.
 - .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 STRIPPING OF TOPSOIL

- .1 Commence topsoil stripping of areas as per indications of section 31 14 13 – Soil stripping and stockpiling.
- .2 Strip topsoil to depths as indicated.
 - .1 Do not mix topsoil with subsoil.
- .3 Stockpile in locations as indicated Departmental Representative.
 - .1 Stockpile height: 2 m maximum.
- .4 Dispose of unused topsoil to location as indicated by Departmental Representative.

3.3 EXCAVATING

- .1 General:
 - .1 Advise Departmental Representative 7 days minimum in advance of excavation operations for initial cross sections to be taken.
 - .2 Excavate to lines, grades, elevations and dimensions .
 - .3 Ensure drainage of excavated areas and maintain crowns and cross slopes to provide surface drainage.
 - .4 Notify Departmental Representative whenever unsuitable materials are encountered in cut sections, remove unsuitable materials as directed and replace with material approved by Departmental Representative to depth and extent as directed.

- .5 Treat ground slopes at grade points, where subgrade is on transition from excavation to embankment or earth to rock as directed by Departmental Representative.
- .6 Dispose of waste material off project limits.
- .2 Do not disturb foundation materials of adjacent pavements or structures which are to remain in place.

3.4 PLACING FILL

- .1 Before taking material from borrow areas, completely use, in fill areas, suitable materials removed from excavation.
- .2 Use excavated topsoil before taking from borrow areas.
- .3 Do not place frozen material nor place material on frozen surfaces.
- .4 Maintain crowned surface during construction to ensure run-off of surface water. Do not place material in free standing water. Drain low areas, before placing material.
- .5 Material containing less than 25% by volume of rock fragments larger than 100 mm maximum dimension:
 - .1 Place and compact to full width in uniform layers 200 mm maximum loose thickness.
 - .1 Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
 - .2 Place using thicker layers only after receipt of written approval from Departmental Representative.
 - .2 Compact fill materials, in non-pavement areas, minimum 90% of corrected maximum dry density.
 - .3 Compact cohesionless fill soils, under pavement areas, 95% minimum of corrected maximum dry density and cohesive fill soils 90% minimum of corrected maximum dry density.
- .6 Where material consists principally of rock:
 - .1 Place full width, in layers of sufficient depth to contain maximum sized rocks but in no case is layer thickness to exceed 1 m.
 - .2 Individual rock fragments not exceeding 1.5 m in vertical dimension will be permitted provided their vertical dimension does not exceed one third of fill section depth.
 - .3 Distribute rock material to fill voids with smaller fragments to form compact mass.
 - .4 Fill surface voids at subgrade level with rock spalls or selected material to form an earth-tight surface.
- .7 Do not place stones and boulders exceeding 50 mm maximum dimension within 100 mm of finished surface in graded areas.

3.5 SUBGRADE COMPACTION IN PAVEMENT AREAS

- .1 Fill area: do not place stones and boulders exceeding 150 mm maximum dimension within 0.5 m of subgrade elevation.
- .2 Remove stones and boulders, in cut areas, exceeding 150 mm maximum dimension within specified depth, for subgrade compaction.
- .3 Scarify and mix pavement subgrade surface, after grading has been completed, to required depth of subgrade compaction.
- .4 Compact top 150 mm of cohesive subgrade soils 98% minimum of corrected maximum dry density.
- .5 Compact top 300 mm of cohesionless subgrade soils 98% minimum of corrected maximum dry density.
- .6 Break soil down to sizes suitable for compaction and mix for uniform moisture and soil conditions to full depth of layer.
- .7 Bring moisture content of soil to level required to achieve specified compaction. Add water or aerate as required.
- .8 Shape subgrade to required cross section and grade.
- .9 Remove upper portion to depth necessary, when subgrade preparation and compaction can not be achieved to requirement in single layer, to achieve requirement. Remove, replace and compact such materials at no extra cost to Departmental Representative.

3.6 FINISHING AND TOLERANCES

- .1 Blade finished surfaces in cut and fill areas free from ruts, depressions, rocks in excess of 50 mm and debris.
- .2 Roll finished surfaces to tight dense condition.
- .3 Finish pavement subgrade within 15 mm of design elevations, but not uniformly high or low.
- .4 Finish graded area within 20 mm of design elevations, but not uniformly high or low.
- .5 Surfaces free from depressions exceeding 30 mm in 5 m.

3.7 PLACING TOPSOIL

- .1 Place topsoil after Departmental Representative has accepted subgrade.
- .2 Spread 150 mm depth of topsoil as indicated. Remove surface stones, roots and other debris and leave surface in uniform condition.

3.8 MAINTENANCE

- .1 Maintain finished surfaces in a condition in accordance with this Section until succeeding material is applied or until acceptance by Departmental Representative.

3.9 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 reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION