

PART 1 - GENERAL

- 1.1 References .1 American Society for Testing and Materials International (ASTM)
.1 ASTM D 698-00a1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
- 1.2 Quality Assurance/Regulatory Requirements .1 Shore and brace excavations, protect slopes and banks and perform work in accordance with Provincial and Municipal regulations whichever is more stringent.
- 1.3 Existing Conditions .1 Buried services:
.1 Before commencing work establish location of buried services on and adjacent to site.

PART 2 - PRODUCTS

- 2.1 Materials - not used

PART 3 - EXECUTION

- 3.1 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, according to requirements of authorities having jurisdiction.
- .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.
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3.2 Preparation/
Protection

- .1 Keep excavations clean, free of standing water, and loose soil.
- .2 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.
- .3 Protect buried services that are required to remain undisturbed.

3.3 Clearing And
Grubbing

- .1 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within areas designated on drawings.
- .2 Remove stumps and tree roots below footings, slabs, and paving, and to 600 mm below finished grade elsewhere.
- .3 Dispose of cleared and grubbed material off site daily to disposal areas acceptable to authority having jurisdiction.

3.4 Excavation

- .1 Strip topsoil over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil.
 - .1 Stockpile topsoil on site for later use.
 - .2 Excavate as required to carry out work.
 - .1 Do not excavate if rain is forecast that will make subgrade too wet. Excavate only length and areas that can be compacted and filled with base material or other materials in reasonable time to prevent rain water soaking and damaging the subgrade strength. If these precaution are not taken, contractor will correct the damage at their own cost.
 - .2 Notify Departmental Representative when excavations are complete.
 - .3 If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.
 - .4 Excavation taken below depths shown without Departmental Representative's written authorization to be filled with granular base at Contractor's expense.
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3.4 Excavation
(Cont'd)

- .3 Excavate trenches to provide uniform continuous bearing and support for 150 mm thickness of pipe bedding material on solid and undisturbed ground.
- .4 Excavate for paving to subgrade levels.
 - .1 In addition, remove all topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

3.5 Backfilling

- .1 Inspection: do not commence backfilling until fill material and spaces to be filled have been inspected and approved by Departmental Representative .
- .2 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.
- .3 Compaction of subgrade: compact existing subgrade under walks, paving, and slabs on grade, to 95% of maximum density in accordance with ASTM D698. Compact only when soil is near its optimum moisture content. Aerate and dry soil if it is too wet, and add water if it is too dry. Use equipment of size type and weight that will not damage the existing subgrade soil conditions.
- .4 Placing:
 - .1 Place backfill, fill and base course material in 150 mm lifts: add water as required to achieve specified density.
- .5 Compaction: compact each layer of material to following maximum corrected dry densities for material to ASTM D 698:
 - .1 To underside of base courses: 95%.
 - .2 Base courses: 100%.
 - .3 Elsewhere: 90%.
- .6 Under seeded and sodded areas: use site excavated material to bottom of topsoil except in trenches and within 600 mm of foundations.

3.6 Grading

- .1 Grade so that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by the Departmental Representative .
 - .1 Grade to be gradual between finished spot elevations shown on drawings.

- 3.7 Field Quality Control
- .1 Quality Control Testing of materials and compaction of backfill and fill will be carried out by Contractor.
 - .2 Not later than two weeks before backfilling or filling, provide to designated testing agency, samples of backfill.
 - .3 Do not begin backfilling or filling operations until material has been approved for use by Departmental Representative.
 - .4 Not later than 48 hours before backfilling or filling with approved material, notify Departmental Representative so that compaction tests can be carried out by designated testing agency.
- 3.8 Shortage And Surplus
- .1 Supply necessary fill to meet backfilling and grading requirements and with minimum and maximum rough grade variance.
 - .2 Dispose of surplus material off site.
- 3.9 Cleaning
- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
 - .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

PART 1 - GENERAL

- 1.1 Summary .1 This section defines correction to maximum dry density to take into account aggregate particles larger than 4.75 mm.
- 1.2 References .1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C127-04, Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
 - .2 ASTM D698-00, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³)).
 - .3 ASTM D1557-02, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700 kN-m/m³)).
 - .4 ASTM D4253-00, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
- 1.3 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. F1 = fraction (decimal) of total field sample passing ASTM 4.75 mm sieve. F2 = fraction (decimal) of total field sample retained on ASTM 4.75 mm sieve. D1 = maximum dry density, kg/m³ of material passing ASTM 4.75 mm sieve determined in accordance with Method A of ASTM D 1557-91 (regardless of %oversize fraction F2) for granular base, subbase and backfill material and to ASTM D 698-00a for clay subgrades and backfill materials. D2 = bulk density, kg/m³ of material retained on ASTM 4.75 mm sieve, equal to 1000 G where G is bulk specific gravity (dry basis) of material when tested to ASTM C 127-88 (1993)e1.

PART 2 - PRODUCTS .2 Not Used

PROJECT No R.064393.001	Corrected Maximum Dry	Section 31 05 10
Penticton, Runway 16-34	Density For Fill	Page 2
and Taxi A		2014-01-21

PART 3 - EXECUTION .3 Not Used

END

PART 1 - GENERAL

1.1 References

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D 4791-99, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.2 Samples

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Allow continual sampling by Departmental Representative during production.
- .3 Provide Departmental Representative with access to source and processed material for sampling.
- .4 Install sampling facilities at discharge end of production conveyor, to allow Departmental Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by Departmental Representative to permit full cross section sampling.
- .5 Acceptance of a material at source does not preclude future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unsatisfactory.
- .6 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.
- .7 Provide water, electric power and propane to for laboratory trailer at production site.

1.3 Waste Management And Disposal

- .1 Divert unused granular materials from landfill to local quarry or facility as approved by Departmental Representative.
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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 D 4791.
 - .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 Natural sand.
 - .2 Manufactured sand.
 - .3 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.
- .5 River or beach gravels shall not be acceptable sources to Departmental Representative .
- .6 Salt water submerged deposits shall not be acceptable sources to Departmental Representative .

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, in opinion of Departmental Representative, 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.
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- 2.2 Source Quality .3 Advise Departmental Representative 2 weeks in
Control advance of proposed change of material source.
(Cont'd)
- .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 Preparation .1 Processing
- .1 Process aggregate uniformly using
methods that prevent contamination,
segregation and degradation.
- .2 Blend aggregates, if required, to obtain
gradation requirements, percentage of crushed
particles, or particle shapes, as specified.
Use methods and equipment approved by
Departmental Representative.
- .3 Wash aggregates, if required to meet
specifications. Use only equipment approved by
Departmental Representative.
- .4 When operating in stratified deposits
use excavation equipment and methods that
produce uniform, homogeneous aggregate.
- .2 Handling
- .1 Handle and transport aggregates to avoid
segregation, contamination and degradation.
- .3 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 Separate different aggregates by strong,
full depth bulkheads, or stockpile far enough
apart to prevent intermixing.
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3.1 Preparation
(Cont'd)

- .3 (Cont'd)
- .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 h of rejection.
 - .7 Stockpile materials in uniform layers of thickness as follows:
 - .1 Max 1.5 m for coarse aggregate and base course materials.
 - .2 Max 1.5 m for fine aggregate and sub-base materials.
 - .3 Max 1.5 m for other materials.
 - .8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
 - .9 Do not cone piles or spill material over edges of piles.
 - .10 Do not use conveying stackers.
 - .11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.2 CLEANING

- .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .2 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative .

PART 1 - GENERAL

1.1 Measurement Procedures

- .1 Common Excavation.
 - .1 Measure in cubic metres calculated from cross sections taken in areas of excavation. Excavation of Base and sub Base granular material is common excavation.
- .2 Common Fill.
 - .1 Measure in cubic metres calculated from cross sections taken in areas of Common Fill.
- .3 No measurement will be made for pavement subgrade compaction include cost in related items.

1.2 References

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM C117-04, Test Method for Materials Finer Than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-06, Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-63(1998), Method for Particle-Size Analysis of Soils.
 - .4 ASTM D4318-05, Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.3 Definitions

- .1 Excavation classes: two 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.
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1.3 Definitions (Cont'd)

- .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 C 117, 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 D 4318.
 - .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 D 4318, and gradation within limits specified when tested to ASTM D422 and ASTM C 136: 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.

- 1.4 Waste Management And Disposal .1 Separate and recycle waste materials.
- .2 Dispose of unused topsoil and rock to location on site as indicated or as directed by Departmental Representative off site.

PART 2 - PRODUCTS

- 2.1 Materials .1 Fill materials: to approval of Departmental Representative.

PART 3 - EXECUTION

- 3.1 Excavating .1 General:
- .1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.
 - .2 Do not excavate if rain is forecast that will make subgrade too wet. Excavate only length and areas that can be compacted and filled with base material or other materials in reasonable time to prevent rain water soaking and damaging the subgrade strength. If these precaution are not taken, contractor will correct the damage at their own cost.
 - .3 Excavate to lines, grades, elevations and dimensions as indicated..
 - .4 Ensure drainage of excavated areas and maintain crowns and cross slopes to provide surface drainage.
 - .5 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.
 - .6 Dispose of waste material as directed by Departmental Representative off project limits.
- .2 Rock excavation:
- .1 During excavation: when material appearing to conform to classification for rock is encountered, notify Departmental Representative in sufficient time to enable measurements to be made to determine volume of rock.
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3.1 Excavating
(Cont'd)

- .2 Rock excavation: (Cont'd)
 - .2 Provide drainage to ditches, leaving no undrained pockets in foundation.
- .3 Common excavation:
 - .1 Excavate to subgrade depths required below finish grade elevation of work area.
 - .2 Stockpile, in locations as directed by Departmental Representative.
- .4 Do not disturb foundation materials of adjacent pavements or structures which are to remain in place.

3.2 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 minimum 98 % of corrected maximum dry density.
- .5 Compact top 300 mm of cohesionless subgrade soils minimum 98 % of corrected maximum dry density.
- .6 Compact only when soil is near its optimum moisture content. Use equipment of size type and weight that will not damage the existing subgrade soil conditions.
- .7 Break soil down to sizes suitable for compaction and mix for uniform moisture and soil conditions to full depth of layer.
- .8 Bring moisture content of soil to level required to achieve specified compaction. Add water or aerate as required.
- .9 Shape subgrade to required cross section and grade.
- .10 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

3.2 Subgrade .10 (Cont'd)
Compaction In compact such materials at no extra cost to
Pavement Areas Departmental Representative.
(Cont'd)

3.3 Finishing And .1 Blade finished surfaces in cut and fill areas
Tolerances free from ruts, depressions, rocks in excess
 of mm and debris.
 .2 Roll finished surfaces to tight dense
 condition.
 .3 Finish pavement subgrade within 25 mm of
 design elevations, but not uniformly high or
 low.
 .4 Finish graded area within 30 mm of design
 elevations, but not uniformly high or low.
 .5 Surfaces free from depressions exceeding 30
 mm in 5 m.

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