

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 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 01 33 00 - Submittal Procedures.
- .2 Section 31 05 10 – Corrected maximum dry density for fill.
- .3 Section 31 23 33.01 – Excavating, trenching and backfilling.
- .4 Section 31 37 00 – Rip-Rap.

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.

1.3 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 During the production of aggregate, the contractor shall assume daily the quality control of aggregates and submit daily to the departmental representative all tests results.
- .3 However, in any time the departmental representative take aggregate samples and the contractor must provide Engineer with access to source and processed material for sampling.
- .4 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Divert unused granular materials from landfill to local quarry as approved by departmental representative.

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 Natural sand.
- .2 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, 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.
- .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 PREPARATION

- .1 .
- .2 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.
- .3 Handling
 - .1 Handle and transport aggregates to avoid segregation, contamination and degradation.
- .4 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.
- .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 max 1.5 m .
- .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.
- .3 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section 01 35 27 – Airports In Use.
- .2 Section 01 35 43 – Environmental Procedures.
- .3 Section 31 05 10 – Corrected Maximum Dry Density.
- .4 Section 31 32 19.01 – Geotextiles.

1.2 MEASUREMENT PROCEDURES

- .1 The drainage trenches will be paid in linear meter of drainage trench constructed. The price must include the trenching, the installation of the geotextile, the supply and installation of the new type 3 granular material, the backfill with type 2 materials, the final leveling of the surfaces and the transportation and stockpiling of the exceeding excavated materials at the Transport Canada storage area. The price must include and the repair of the runway shoulder with new MG-20 materials.
- .2 For others works in trench excavation, no measurement will be done for this section. The cost for excavation, digging, bedding preparation, surrounding, trench backfilling and refecton of finished surfaces works must be included in item where those works are required.

1.3 SUBMITTALS

- .1 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Inform the departmental representative at least 2 weeks prior to commencing Work, of proposed source of fill materials and provide access for sampling.

1.4 PROTECTION OF EXISTING FEATURES

- .1 Existing buried utilities and structures:
 - .1 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
 - .2 Prior to commencing excavation Work, notify applicable Owner or authorities having jurisdiction, establish location and state of use of buried utilities and structures. Owners or authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
 - .3 Confirm locations of buried utilities by careful test excavations.
 - .4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.
 - .5 Where utility lines or structures exist in area of excavation, obtain direction of The departmental representative before removing or re-routing.
 - .6 Record location of maintained, re-routed and abandoned underground lines.
- .2 Existing buildings and surface features:

- .1 Conduct, with the 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 to approval of the departmental representative.
- .3 Shoring, bracing and underpinning
 - .1 Protect existing features in accordance with applicable local regulations.

Part 2 Products

2.1 MATERIALS

- .1 Type 1 fill (sand).
 - .1 Crushed, pit run or screened stone sand: unfrozen, sound, hard, durable material free from organic material, clay lumps or minerals, or others substances that would act in deleterious manner for use intended. Gradations to be within limits specified when tested to ASTM C 136-96a and ASTM C 117-95:

Sieve designation	% passing
9,500 mm	100
4,750 mm	70 – 95
0,850 mm	30 – 70
0,425 mm	10 – 40
0,075 mm	2 – 10

- .2 Type 2 fill: selected material from excavation like MG-20 or other sources, approved by the departmental representative for use intended.
- .3 Type 3 fill : Crushed, pit run or screened stone sand: unfrozen, sound, hard, durable material free from organic material, clay lumps or minerals, or others substances that would act in deleterious manner for use intended. Gradations to be within limits specified above:

Sieve designation	% passing
80,0 mm	100
31,5 mm	0

- .1 Type MG-20 material: Crushed stone or gravel. Gradations to be within limits specified when tested to LC 21-040. Gradation curve plotted on a semi-logarithmic diagram must be progressive and continue.

.1	Gradation to:	
	Sieve Designation	% Passing
		MG 20 (MTQ)
	31,5 mm	100
	20 mm	90 – 100
	14 mm	68 – 93
	5 mm	35 – 60

	Sieve Designation	% Passing
	1,25 mm	19 – 38
	0,315 mm	9 – 17
	0,080 mm	2 – 7
.2	Intrinsic characteristic to following test :	
.1	* Methylene blue (LC 21-255) : $\leq 0,20$	
.2	Los Angeles (LC 21-400) : ≤ 50	
.3	Micro-Deval (LC 21-070) : ≤ 35	
.4	MD + LA : ≤ 80	
.5	*Organic material (LC 31-228) : $\leq 0,8$	
	*for aggregates from sand or gravel pit	

Part 3 Execution**3.1 SITE PREPARATION**

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- .2 In paved areas, cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.2 STOCKPILING

- .1 Stockpile fill materials in areas designated by the departmental representative. Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.

3.3 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Submit for the departmental representative's review details of proposed dewatering or heave prevention methods, such as dikes or well points.
- .3 Protect open excavations against flooding and damage due to surface run-off.
- .4 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures, and in manner not detrimental to public and private property, or any portion of Work completed or under construction.

3.4 EXCAVATION

- .1 Excavate to lines, grades, elevations and dimensions as indicated by the departmental representative.
- .2 Remove concrete, paving, walks, demolished foundations and rubble, and other obstructions encountered during excavation.

- .3 Excavation must not interfere with bearing capacity of adjacent foundations.
- .4 For trench excavation, unless otherwise authorized by The departmental representative in writing, do not excavate more than 15 m of trench in advance before proceeding with the installation of the element to be buried. Before each operation period describe in section 01 11 11 "Description of work", all trenches must be backfilled and compacted. No change in ground level or stockpile will be tolerated in proximity of the runway during operation period.
- .5 and do not leave any trenches open at end of day's operation.
- .6 Dispose of surplus and unsuitable excavated material as directed by departmental representative.
- .7 Do not obstruct flow of surface drainage or natural watercourses.
- .8 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .9 Obtain the departmental representative approval of completed excavation.
- .10 Clean for any improper material the bottom of trench on area and deepness as directed by the departmental representative.
- .11 Correct unauthorized over-excavation with type 1 fill, compacted to not less than 95% of corrected maximum dry density as per Section 31 05 10 – Corrected Maximum Dry Density.
- .12 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

3.5 FILL TYPES AND COMPACTION

- .1 Materials as indicated on typical section. Backfill and compact in layer of 150mm of thickness to at least 95% of corrected maximum dry density as per Section 31 05 10 - Corrected Maximum Dry Density. Type 3 fill cannot be compacted, install these materials and puddle it.

3.6 BACKFILLING

- .1 Do not proceed with backfilling operations until the departmental representative has inspected and approved installations.
- .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 compactable backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 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. Difference not to exceed 0.4 m.
- .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 the departmental representative.
 - .2 If approved by the departmental representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by the departmental representative.

3.7 RESTORATION OF THE RUNWAY SHOULDER

- .1 Backfill the surface of the shoulder on 8m wide with material like MG-20 recuperated from excavation. The surface must be finished with new MG-20 materials and compacted to density not less than 100% corrected maximum dry density in accordance with section 31 05 10 - Corrected Maximum Dry Density.
 - .1

3.8 RESTORATION

- .1 Upon completion of work, remove waste materials and debris, trim slopes, and correct defects as directed by the departmental representative.
- .2 Replace topsoil as indicated by the departmental representative.
- .3 Clean and reinstate areas affected by Work as directed by the departmental representative.
- .4 The exceeding excavated materials will be transported and stockpiled at the Transports Canada storage area.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .3 Section 31 37 00 – Rip-Rap.

1.2 MEASUREMENT AND PAYMENT

- .1 The geotextiles used in the construction of rip-rap will not be measured. The cost for that work must be included in the work where geotextile is required.
- .2 The geotextiles used in drainage trench will not be measured. The cost must be included in the work where geotextile is required.

1.3 REFERENCES

- .1 ASTM International
 - .1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM D4491-99a(2009), Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - .3 ASTM D4595-09, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method. ASTM D4716-08, Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
 - .4 ASTM D4751-04, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-4.2 No. 11.2-2004, Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
 - .2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
 - .1 No.2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.
 - .2 No.3-M85, Methods of Testing Geosynthetics - Thickness of Geotextiles.
 - .3 No.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.
 - .4 No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.
 - .5 No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.
- .3 CSA International

- .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

1.4 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 Test and Evaluation Reports:
 - .1 Submit copies of mill test data and certificate at least 4 weeks prior to start of Work.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
- .2 Packaging Waste Management: remove for reuse in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIAL

- .1 Geotextile: non-woven synthetic fibre fabric, supplied in rolls.
 - .1 Width: 3.5 m minimum.
 - .2 Length: 50 m minimum.
 - .3 Composed of: minimum 85% by mass of polypropylene and/or polyester with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.
- .2 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m² to CAN/CSA G164.
- .3 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.
- .4 Physical properties:
- .5 Physical and hydraulic properties:
 - .1 For use in rip-rap;
 - .1 Thickness: to CAN/CGSB-148.1, No.3, minimum 5.8 mm.
 - .2 Grab tensile strength and elongation: to CAN/CGSB-148.1, No.7.3.
 - .3 Breaking force: minimum 2500 N, wet condition.
 - .4 Elongation at failure: 65-105%.

- .5 Filtration opening size (FOS): 40-70 micron to CAN/CGSB-148.1 No.10.
- .2 For use in trench drain;
 - .1 Grab tensile strength and elongation: to CAN/CGSB-148.1, No.7.3.
 - .2 Breaking force: minimum 400 N, wet condition.
 - .3 Elongation at future: %15 min.% as per ASTM D4595.
 - .4 Filtration opening size (FOS): 300 µm max.to CAN/CGSB-148.1 No.10.

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 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.
- .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 600 mm over previously laid strip.
- .5 Pin successive strips of geotextile with securing pins as per manufacturer recommendations
- .6 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .7 After installation, cover with overlying layer within 4 h of placement.
- .8 Replace damaged or deteriorated geotextile to approval of departmental representative.
- .9 Install rip-rap stone as per section 31 37 00 – Rip-rap.

3.3 CLEANING

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

R.055093.001

- .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. 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.

3.4 PROTECTION

- .1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

Part 1 General**1.1 RELATED SECTIONS**

- .1 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Section 31 32 19.01 - Geotextiles.

1.2 MEASUREMENT PROCEDURES

- .1 Measure rip-rap in square metres of material placed. The price must included surface preparation, the supply and installation of the geotextile.

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C144-99, Standard Specification for Aggregate for Masonry Mortar.
 - .2 ASTM C618-00, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
- .2 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A23.1-00, Concrete Materials and Methods of Concrete Construction.
 - .2 CAN/CSA-A3000-98, Cementations Materials Compendium.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Collect and separate plastic in accordance with Waste Management Plan.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Fold up metal banding, flatten and place in designated area for recycling.
- .5 Divert left over aggregate materials from landfill at the location indicated by the departmental representative.
- .6 Divert left over hardened cement materials from landfill to local quarry for reuse as approved by the departmental representative.
- .7 Divert left over geotextiles at the location indicated by the departmental representative.

Part 2 Products**2.1 STONE**

- .1 Hard, durable quarry stone, free from seams, cracks or other structural defects, to meet following size distribution for use intended:

- .1 Hand placed rip-rap:
 - .1 Minimum size of individual stones; 100mm, and maximum size; 200mm
 - .
 - .2 Supply rock spalls or cobbles to fill open joints.

2.2 GEOTEXTILE FILTER

- .1 Geotextile: in accordance with Section 31 32 19.01 - Geotextiles.

Part 3 Execution

3.1 PLACING

- .1 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.
- .2 Place geotextile on prepared surface in accordance with Section 31 32 19.01- Geotextiles and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.
- .3 Place rip-rap to thickness and details as indicated.
- .4 Place stones in manner approved by the departmental representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.
- .5 Hand placing:
 - .1 Use larger stones for lower courses and as headers for subsequent courses.
 - .2 Stagger vertical joints and fill voids with rock spalls or cobbles.
 - .3 Finish surface evenly, free of large openings and neat in appearance.

END OF SECTION