FURNISH AND PLACE BALLAST SURFACING COURSE

** From Rutland-Burlington VTRY(1) C1

xx. DESCRIPTION. This work shall consist of furnishing and placing stone ballast for the raising and surfacing of tracks, turnouts, track crossings, and road crossings where indicated in the Contract Documents or as directed by the Engineer.

xx. MATERIALS. All stone ballast shall be composed of angular fragments of rock, reasonably uniform in quality, and having specified durability and wear resistance qualities. Screened gravel, crushed gravel, marble, sandstone, argillaceous limestone, argillaceous dolomite, or crushed slag is not acceptable for use as stone ballast.

All physical requirements and limitations on deleterious materials for crushed stone ballast are specified in TABLE 1 and TABLE 2 herein.

Stone ballast shall be handled in such a manner that it is kept clean and free from segregation. Any stone which requires washing or scrubbing to insure cleanliness shall be washed at the quarry or crusher site. The gradation requirements of stone sizes shall conform to the enclosed TABLE 3 SIZE GRADATION – STONE BALLAST.

All sampling and testing shall be performed in accordance with the requirements of the Specification entitled: Chapter 1, Section 2.8 Sampling and Testing, AREMA Manual - current edition. Each portion of a quarry exhibiting a variation in quality of stone ballast shall be tested separately. The test results shall not be averaged. The Engineer reserves the right to sample and test the stone ballast up to and including the point of use.

TABLE 1
PHYSICAL REQUIREMENTS (TESTING)

Material Designation	Crushed Stone
Magnesium Sulfate Test (703-07 P,G)[2] Max. percent loss by weight at 10 cycles	18
Freezing and Thawing Test (703-08 P,G)[3] Max. percent loss by weight at 25 cycles	20
Los Angeles Abrasion Test (703-11 P,G) Max. percent loss by weight (Grading A or B)	35[4] 45[5]
Flat Particles, Elongated Particles, or Flat and Elongated Particles (ASTM D 4791) Maximum percent by weight Flat and Elongated to the Degree of 5:1	5

Crushed Particles in any primary size (ASTM D 5821) Minimum percent by weight Larger than ½" (1 fractured face)	-
Smaller than ½" (2 fractured faces)	-
Minimum unit weight (703-10 P,G) kg/m^3	-
Impedance Test Impedance K ohms	2.6+

(1) To determine its conformance to specification limits, processed coarse aggregate may be tested at any point after completion of processing.

(2) Loss applies to No. 2 size fraction.

(3) The freeze-thaw requirement applies only to aggregate used in Portland cement concrete. The loss applies to the No. 2 size fraction.

(4) Loss applies to all materials excepting marble, granite, and other similar materials.

(5) Loss applies to marble, granite, and other similar materials.

TABLE 2
PHYSICAL REQUIREMENTS
DELETERIOUS MATERIALS

Maximum percent by weight in any primary size(1)	
Material Designation	Crushed Stone
Shale and shale-like materials(2)	3.0
Coal/Lignite/Sulfides(3)	1.0
Clay lumps or Wood	0.2
Metal Ore(4)	3.0
Other Deleterious Materials(5)	3.0
Total Deleterious Materials	5.0

(1) Coarse aggregates containing more than the specified maximum amounts of deleterious materials may be washed or otherwise processed until such specifications are satisfied.

(2) Shale, slate, phyllite, argillite, schist, and similar shale-like fissile rocks that have been identified by

performance or by test to be unsound and deleterious. Such shale-like fissile rocks may be tested separately from the rest of the aggregate by freezing and thawing according to ASTM Test Method. If the loss is 20% or greater, that material will be designated as deleterious shale or shale-like material.

(3) Pyrite, marcasite, pyrrhotite, bog iron, and similar material.

(4) Magnetite, illmenite, etc. Percentages above 3.0% may be accepted by the VTrans Materials and Research Section, when appropriate adjustments to yield have been made.

(5) Cemented clusters, weathered particles, and similar material.

TABLE 3
SIZE GRADATION - STONE BALLAST
AMOUNTS FINER THAN EACH SIEVE*

AREMA SIZE NO.(1)	NOMINAL SIZE SQUARE OPENING(2)	PERCENT PASSING								
		2 1/2″	2″	1 1/2″	1″	3/4″	1/2″	3/8″	# 4	# 8
4A	2″- 3/4″	100	90-100	60-90	10-35	0-10	-	0-1	-	-
4	1 1/2″ – 3/4″	-	100	90-100	20-55	0-15	-	0-5	-	-
5	1″- 3/8″	-	-	100	90-100	40-75	15-35	0-15	0-5	-

(1) Gradation number 4A is main line ballast material.

(2) Sieves shall meet the requirements of ASTM designation E-11.

xx. CONSTRUCTION REQUIREMENTS.

(a) Production and Handling shall meet the requirements of the Specification entitled: Chapter 1, Section 2.5 Production and Handling, AREMA Manual - current addition.

(b) Sampling and Testing shall meet the requirements of the Specification entitled: Chapter 1, Section 2.8 Sampling and Testing, AREMA Manual - current addition.

(c) Installation shall meet the requirements of the Specification entitled: Chapter 5, Section 4.1 Installation, AREMA Manual - current addition.

The Engineer reserves the right to reject any ballast arriving at the site for unloading that does not meet the requirements of the specifications. If the ballast material does not conform to the specifications, the Contractor must notify the supplier to stop supply

until the fault has been corrected. Any rejected ballast must be disposed of without cost to the State.

xx. METHOD OF MEASURMENT. The quantity of Special Provision (Furnish and Place Ballast Surfacing Course) to be measured for payment will be the number of metric tons (tons) placed in the complete and accepted work, as determined by vehicle loads. A load ticket shall be furnished to the Engineer for each load delivered to the job site.

xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Furnish and Place Ballast Surfacing Course) will be paid for at the Contract unit price per metric ton (ton). Payment will be full compensation for furnishing, transporting, handling, testing, and placing the materials specified, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
900.680 Special Provision (Furnish and Place Ballast Surfacing Course)	Metric Ton (Ton)