Section 4130. Revetment Stone, Erosion Stone, and Gabion Stone

4130.01 REVETMENT DESCRIPTION.

A. Broken limestone, dolomite, quartzite, or granite from an approved source as described in Materials I.M. 409 and meeting the following requirements.

- A minimum of 50% of the stone is to be composed of beds or slabs more than 5 inches (125 mm) thick.
- A minimum of 10% of the beds or slabs are to be thick enough to produce the required weight (mass) of either the stone or concrete, with the greatest dimension not more than two times the smallest dimension.

B. When the source test plot or service history is not available, meet the requirements of Table 4130.01-1 for virgin stone crushed to 3/4 inch to 1 1/2 inch (19 mm to 37.5 mm) nominal sizes. Abrasion loss for all revetment stone is not to exceed 50% when tested according to AASHTO T 96.

Table 4130.01-1: Virgin Stone Requirements

Revetment Type	Revetment Quality	Test Limits (max)	Test Method
Primary projects: Class A & B revetment All projects: Class E revetment	Alumina	0.7	Iowa 222
	A Freeze	10	Iowa 211, Method A
	Secondary Pore Index	25	Iowa 219
Non-Primary projects: Class A & B revetment	C Freeze	5	Iowa 211, Method C
All projects: Class D revetment	C Freeze	10	Iowa 211, Method C
Note: Revetment may pass either Alumina or A Freeze for compliance.			

C. Recycled PCC pavement or broken concrete meeting the requirements of Materials I.M. 210 may be used with the approval of the Engineer.

- All reinforcement material is to be cut flush with the flat surface of the concrete.
- A minimum of 50% of the broken concrete revetment is to be composed of slabs more than 5 inches (125 mm) thick.
- A minimum of 10% of the slabs are to be thick enough to produce the required weight (mass) of the concrete with the greatest dimension not more than 2 times the smallest dimension.
- No petroleum based or HMA material is to be included in revetment.

4130.02 REVETMENT GRADATION.

A. Engineer will determine gradation compliance by visual inspection. After visual inspection and prior to loading, the Engineer may designate material as too fine or too coarse.

1. Class A Revetment.

- Nominal top size of 400 pounds (180 kg).
- At least 75% of the stones are to weigh more than 75 pounds (35 kg).
- None less than 50 pounds (25 kg).
- Stones are to have at least one flat face with one dimension at least 15 inches (375 mm).

2. Class B Revetment.

- Nominal top size of 650 pounds (300 kg).
- At least 20% of the stones are to weigh more than 500 pounds (225 kg).
- At least 50% of the stones are to weigh more than 275 pounds (125 kg).
- At least 90% of the stones are to weigh more than 25 pounds (10 kg).

3. Class D and Class E Revetment.

- Nominal top size of 250 pounds (115 kg).
- At least 50% of the stones are to weigh more than 90 pounds (40 kg).
- At least 90% of the stones are to weigh more than 5 pounds (2 kg).

- The Engineer may approve using riprap containing material larger than 250 pounds (115 kg).

B. Additional processing is not required for Class D material. Mechanically process Class E material to remove material 3 inches (75 mm) and less.

4130.03 EROSION STONE DESCRIPTION.
Broken limestone, dolomite, quartzite, granite, or broken concrete with steel removed.

4130.04 EROSION STONE GRADATION.
Engineer will determine gradation compliance by visual inspection. After visual inspection and prior to loading, the Engineer may designate material as too fine or too coarse.

- Nominal 6 inch (150 mm) size.
- 100% passing the 9 inch (225 mm) screen.
- 100% retained on the 3 inch (75 mm) screen.

4130.05 EROSION STONE QUALITY.
Except for recycled concrete, meet the requirements of Table 4130.05-1. There are no quality requirements for recycled concrete.

Table 4130.05-1: Aggregate Quality (Erosion Stone)

Aggregate Quality	Maximum Percent Allowed	Test Method
C Freeze	15	Office of Materials Test Method No. Iowa 211, Method C
Abrasion	50	AASHTO T 96
Clay Lumps and Friable Particles	5	Materials I.M. 368
Note: Perform tests on product crushed to 3/4 inch (19 mm) or 1 inch (25 mm) maximum size.		

4130.06 GABION STONE DESCRIPTION.
Broken stone or gravel boulders meeting the requirements below. Use stone and boulders from sources similar in geological origin.

4130.07 GABION STONE AND MATTRESS GRADATION.
Process stone or boulders for gabions and mattresses to sizes ranging from 4 inches to 8 inches (100 mm to 200 mm) in nominal dimensions. Three inches to 5 inches (76.0 mm to 127 mm) is recommended for mattresses.

4130.08 GABION STONE QUALITY.
Meet requirements of Table 4130.08-1. Sources with Revetment A, B, or E approvals need not meet these requirements.

TABLE 4130.08-1

Aggregate Quality	Maximum Allowed Percent	Test Method
Alumina A Freeze	0.7 10	Office of Materials Test Method No. Iowa 211, Method A
Abrasion	50	AASHTO T 96
Note: Pass either Alumina or A Freeze for compliance (alumina does not apply to gravel). Perform tests on product crushed to 3/4 inch (19 mm) or 1 inch (25mm) maximum size.		