

**Part 1            General**

**1.1            GENERAL**

- .1        This specification to be read in conjunction with all other sections and the drawings of the contract document.

**1.2            REFERENCES**

- .1        American Society for Testing and Materials (ASTM), C136-06, C117-13
  - .1        ASTM D4791-[10], Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

**1.3            SAMPLES**

- .1        Allow continual sampling by Engineer during production.
- .2        Provide Engineer with access to source and processed material for sampling.
- .3        Install sampling facilities at discharge end of production conveyor, to allow Engineer to obtain representative samples of items being produced. Stop conveyor belt when requested by Engineer to permit full cross section sampling.
- .4        Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

**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: 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 composed of naturally formed particles of stone.

.5 Type A Material

- .1 Crushed stone or gravel consisting of hard, durable, angular particles free from clay lumps, cementation, organic material, frozen material, and other deleterious materials.
- .2 Gradations to be within limits specified when tested to ASTM C136-06 and ASTM C117-13 and to have a smooth curve without sharp breaks when plotted on semi-log grading chart.

ASTM Sieve Designation % Passing

26.5 mm	100
19 mm	85 – 100
13.2 mm	65 – 90
9.5 mm	50 – 73
4.75 mm	35 – 55
1.18 mm	15 – 40
0.300 mm	5 – 22
0.075 mm	0 - 8

- .3 Liquid Limit ASTM D4318-10 Maximum – 25
- .4 Plasticity Index ASTM D4318-10 Maximum – 0
- .5 Los Angeles Abrasion ASTM C131-06, Gradation “A” Maximum % loss by weight – 60

.6 Type B Material

- .1 Crushed pit run or screen stone, gravel or sand consisting of durable angular particulars free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
- .2 Gradation to be within limits specified when tested to ASTM C136-06a and ASTM C117-13 and to have a smooth curve without sharp breaks when plotted on semi-log grading chart.

ASTM Sieve Designation % Passing

100 mm	100
75 mm	95 - 100
26.5 mm	50 - 100
4.75 mm	20 – 55
1.80 mm	10 – 40
0.300 mm	5 – 22
0.075 mm	0 - 10

- .3 Other properties as follows:
  - .1 Liquid Limit ASTM D4318-10 Maximum - 25
  - .2 Plasticity Index ASTM D4318-10 Maximum – 0

- .3 Los Angeles Abrasion ASTM C131-06, Gradation "A" Maximum % lost by weight – 50
- .7 Type C Material
- .1 Natural sand and gravel consisting of hard, durable, angular particles free from clay lumps, cementation, organic material, frozen material, and other deleterious materials.
- .2 Gradation to be within limits specified when tested to ASTM C136-06 and ASTM C117-13 and to have a smooth curve without sharp breaks when plotted on semi-log grading chart.
- ASTM Sieve Designation % Passing
- |          |          |
|----------|----------|
| 150 mm   | 100      |
| 26.5 mm  | 50 - 100 |
| 4.75 mm  | 20 – 100 |
| 1.18 mm  | 10 – 100 |
| 0.300 mm | 5 – 95   |
| 0.075 mm | 0 - 25   |
- .3 Liquid Limit ASTM D4318-10 Maximum – 25
- .4 Plasticity Index ASTM D4318-10 Maximum – 0
- .5 Los Angeles Abrasion ASTM C131-06 Gradation "A" Maximum % loss by weight – 50
- .8 Type D Material
- .1 Natural sand or manufactured sand consisting of hard, durable, angular particles free from clay lumps, cementation, organic material, frozen material, and other deleterious materials.
- .2 Gradations to be within limits specified when tested to ASTM C136-06 and ASTM C117-13 and to have a smooth curve without sharp breaks when plotted on semi-log grading chart.
- ASTM Sieve Designation % Passing
- |          |          |
|----------|----------|
| 9.5 mm   | 100      |
| 4.75 mm  | 90 – 100 |
| 1.18 mm  | 20 – 90  |
| 0.600 mm | 0 - 70   |
| 0.300 mm | 0 - 35   |
| 0.075 mm | 0 - 5    |
- .9 Riprap
- .1 Hard, with specified gravity no less than 2.65 durable quarry stone, free from seams, cracks or other structural defects, to meet following size distribution for use intended:
- .1 Random Riprap:
- .1 Not more than 10% of total volume of stones with individual volume less than 0.015m<sup>3</sup>.

- .2 Not less than 50% of total volume of stones with individual volume of  $0.085\text{m}^3$  or more.
    - .3 Remaining percentage or total volume to have uniform distribution of stones between  $0.015$  and  $0.085\text{m}^3$ .
  - .2 Hand Placed Riprap:
    - .1 Minimum size of individual stones  $0.01\text{m}^3$ .
    - .2 Not less than 75% of total volume of stones with individual volume of  $0.025\text{m}^3$  or more.
    - .3 Supply rock spalls or cobbles to fill open joints.
- .10 Stone Boulders
  - .1 Hard, with specified gravity no less than 2.65 durable field stone, free from seams, cracks or other structural defects, with a minimum size of  $0.9\text{ m}^3$  and a maximum size of  $1.4\text{ m}^3$ . The long dimension of the stone can not be greater than 1.5 times the shortest dimension

## 2.2 SOURCE QUALITY CONTROL

- .1 Inform Engineer of proposed source of aggregates and provide access for sampling at least 2 weeks prior to commencing production.
- .2 If, in opinion of Engineer, 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 Engineer 2 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 Aggregate source preparation
  - .1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as approved by authority having jurisdiction.
  - .2 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.
  - .3 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.
  - .4 Trim off and dress slopes of waste material piles and leave site in neat condition.
- .2 Processing

- .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
- .2 Blend aggregates, if required, to obtain gradation requirements, as specified. Use methods and equipment approved by Engineer.
- .3 Wash aggregates, if required to meet specifications. Use only equipment approved by Engineer.
- .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 Engineer. 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 Engineer within 24 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 Prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

### **3.2 CLEANING AND SITE GRADING**

- .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 Engineer.
- .3 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

- .4 No separate payment will be made for the site grading.
- .5 Grading shall be done to prevent long term settlement and pond creation.

**END OF SECTION**