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), referencing latest version.

.1 ASTM C117, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.

.2 ASTM C127, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate

.3 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D422, Standard Test Method for Particle-Size Analysis of Soils.

.5 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600kN-m/m^3).

.6 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.7 ASTM 4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregates.

.8 ASTM D6928, Standard Test Method for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.

.9 ASTM D7428, Standard Test Method for Resistance of Fine Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.

1.3 SAMPLES

.1 Allow continual sampling by Engineer during production.

.2 Provide Engineer with access to source and processed material for sampling at least five (5) weeks prior to construction.

.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 shipping, sampling, and testing of aggregates which fail to meet specified requirements.

1.4 MEASUREMENT PROCEDURES

.1 Refer to Section 01 29 00 – Payment Procedures

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 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.

.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 Type 1 – Surface Granular Material

.1 Crushed pit run or screened stone, gravel or sand consisting of hard, durable, angular particles free from clay lumps, cementation, organic material, frozen material, and other deleterious materials.

.2 Type 1 shall be generated from larger material that is non-Potentially Acid Generating.

.3 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117 and to have a smooth curve without sharp breaks when plotted on semi-log grading chart.

ASTM Sieve Designation	% Passing
25 mm	100
19 mm	75 – 100
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 Other properties as follows:

.1 Liquid Limit ASTM D4318 Maximum – 25

.2 Plasticity Index ASTM D4318 Maximum – 5

.3 Micro Deval ASTM D6928, Maximum % loss by weight – 30.

.4 Flat and Elongated ASTM D4791, Ratio (4:1) of less than 35%.

.5 Type 2 – Subbase Granular Material

.1 Crushed pit run or screened stone, gravel or sand consisting of durable angular particulars free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.2 Type 2 material shall be generated from larger material that is non-Potentially Acid Generating.

.3 Gradation to be within limits specified when tested to ASTM C136 and ASTM C117 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
25 mm	50 – 85
4.75 mm	20 – 55
1.80 mm	10 – 40
0.300 mm	5 – 22
0.075 mm	0 – 10

.4 Other properties as follows:

.1 Liquid Limit ASTM D4318-10 Maximum - 25

.2 Plasticity Index ASTM D4318-10 Maximum – 5

.3 Micro Deval ASTM D6928, Maximum % loss by weight – 30.

.4 Flat and Elongated (4:1) of less than 35%.

.6 Type 3 – Borrow Material

.1 Natural sand and gravel consisting of hard, durable particles free from cementation, organic material, frozen material, and other deleterious materials.

.2 Gradation to be within limits specified when tested to ASTM C136 and ASTM C117, and to have a smooth curve without sharp breaks when plotted on semi-log grading chart.

.1 Average gradation shall not deviate by more than 15% on the 25mm and 4.75mm sieves throughout production

.2 Average gradation shall not deviate by more than 10% on the 1.18mm sieves throughout production

ASTM Sieve Designation	% Passing
100 mm	100
50 mm	30 – 80
4.75 mm	10 – 40
0.075 mm	0 – 10

.3 Other properties as follows:

.1 Liquid Limit ASTM D4318-10, Maximum – 40

.2 Plasticity Index ASTM D4318-10, Maximum – 15

.7 Type 4 – Bedding Material

.1 Natural sand or manufactured sand consisting of hard, durable 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 and ASTM C117 and to have a smooth curve without sharp breaks when plotted on semi-log grading chart.

ASTM Sieve Designation	% Passing
4.75 mm	100
1.18 mm	20 – 90
0.600 mm	0 – 70
0.300 mm	0 – 35
0.075 mm	0 – 5

.8 Type 5 – Drainage Crushed Rock

.1 Crushed pit run or screened stone, gravel or sand consisting of durable angular particulars free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.2 Type 5 Material shall be generated from larger material that is non-Potentially Acid Generating.

.3 Gradation to be within limits specified when tested to ASTM C136 and ASTM C117 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	80 – 100
50 mm	30 – 70
25 mm	0 – 25
12.5 mm	0 – 5

.9 Type 6 – Rip Rap

.1 Hard, with specified gravity no less than 2.65 durable quarry stone as per ASTM C127, free from seams, cracks, or other structural defects, to meet following size distribution for use intended.

.2 Rip Rap shall be generated from larger material that is non-Potentially Acid Generating.

.3 Random Riprap:

.1 Rip Rap to be placed with a minimum thickness of 600 mm.

ASTM Sieve Designation	% Passing
500 mm	100
300 mm	40 – 60
150 mm	0 – 15

.10 Stone Boulders

.1 Hard, with specified gravity no less than 2.65 durable field stone as per ASTM C127, free from seams, cracks or other structural defects, with a minimum size of 0.9 m^3 and a maximum size of 1.4 m^3. The long dimension of the stone can not be greater than 1.5 times the shortest dimension

.2 If boulders meeting the specifications cannot be sourced, similarly sized corrugated steel pipe filled with common fill may be used. Contractor is to submit a shop drawing with dimensions to engineer for approval as per section 01 33 00 Submittals.

2.2 SOURCE QUALITY CONTROL

.1 Inform Engineer of proposed source of aggregates and provide access for sampling at least 5 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 the specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.

.3 Advise Engineer two 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.

.5 Contractor is responsible to perform testing on the aggregates during production to confirm that the rock is non-potentially acid generating. Reports of the testing shall be presented to the Engineer.

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 2:1 slope or as directed by the Engineer, 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 aggregates 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 or as directed by Engineer. Do not stockpile on completed finished 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 of 1.5 m. Subsequent layers above should be inset by 0.5 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 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 and Engineer.

.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