Part 1 General

1.1 GENERAL

.1 This specification shall be read in conjunction with the drawings and all other sections of the contract documents.

1.2 WORK INCLUDED

.1 The work under this section shall include the supply and placing of all equipment, labour and materials necessary to:

.1 Construct new roadways, including excavation to subgrade, subgrade preparation, supply, placement and compaction of granular "A", "B" and "C" base, supply and placement of asphalt.

.2 Construct ditches and drainage works.

1.3 RELATED SECTIONS

.1 Section 31 23 10 - Excavating, Trenching and Backfilling.

.2 Section 32 11 23 - Aggregate Base Courses.

.3 Section 32 11 19 - Granular Sub-base.

1.4 MEASUREMENT PROCEDURES

.1 Granular materials will be measured by the Engineer by cubic metre in place and compacted for embankment fill, and subbase material, and by the square metre for the base and surface course material.

.2 All measurements by the Engineer shall be final.

1.5 PAYMENT PROCEDURES

.1 Subexcavation will be paid per cubic metre as measured by the Engineer at the tendered unit price and shall include any subexcavation ordered by the Engineer, and the supply, placement and compaction of the required extra backfill. No payment for subexcavation will be entertained if the Engineer deems it is required because of actions of the contractor.

.2 Granular materials will be paid per cubic metre for embankment fill, and subbase material, and by the square metre for the base and surface course material as measured by the Engineer at the tendered unit price.

.3 Excavation required in the contract or by the Engineer will be paid by the cubic metre as measured by the Engineer at the tendered unit price.

1.6 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).

.1 ASTM D698-12 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 12,000 ft-lbf/ft^3

1.7 DEFINITIONS

.1 Surface Course: The surface course shall be the top layer of material which will be exposed to vehicle traffic.

.2 Base Course: The base course shall be the layer of material directly below the top course.

.3 Subbase: The subbase shall be the layer of material below the base course.

.4 Subgrade: The subgrade shall be the material which the road structure is founded on. This may be the existing ground, the prepared base of an excavation, or the top of an embankment of the engineered fill.

1.8 QUALITY ASSURANCE

.1 Regulatory Requirements:

.1 Adhere to regulations of authority having jurisdiction when blasting is required.

Part 2 Products

2.1 MATERIALS

.1 Granular "A": Granular "A" aggregates shall consist of crushed rock composed of hard, uncoated, fractured fragments, produced from rock formations or boulders of uniform quality, or a mixture of crushed gravel, and fines composed of hard durable, uncoated particles, produced from naturally formed deposits.

Granular "A" shall conform to the requirements listed in section 31 05 17 - Aggregates: General.

.2 Granular "B": Granular "B" aggregates shall consist of crushed rock composed of hard, uncoated, fractured fragments, produced from rock formations or boulders of uniform quality, or a mixture of crushed gravel, and fines composed of hard durable, uncoated particles, produced from naturally formed deposits.

Granular "B" shall conform to requirements listed in section 31 05 17 - Aggregates: General.

Granular "C": Granular "C" aggregates shall consist of clean, hard, durable, uncoated particles obtained from deposits of gravel or sand, talus rock, quarried rock, iron blast furnace or blended nickel slag, clinkers, or other suitable granular materials.

Granular "C" does not require crushing except that the contractor may elect to either screen out or crush any oversize present.

Granular "C" shall conform to the requirements listed in section 31 05 17 - Aggregates: General.

Part 3 Execution

3.1 COMPACTION

.1 The maximum rate of placing material shall be as specified or as instructed by the Engineer. The maximum rate will be determined by the adequacy of the compaction obtained.

Each layer of material shall be compacted to 95% Standard Proctor Density unless otherwise specified before the next layer is placed.

3.2 WATER DISTRIBUTORS

.1 Apply water with equipment capable of uniform distribution.

3.3 STRIPPING ORGANIC MATERIAL

.1 Unless specifically directed, there shall be no stripping of the organic layer of material for road construction.

.2 Stripping of the organic material shall only occur in areas requiring excavation to prepare the subgrade at the design elevation.

3.4 EXCAVATION AND SUBGRADE PREPARATION

.1 General:

.1 Notify Engineer when waste materials are encountered and remove to depth and extent directed.

.2 Subcut 500 mm below subgrade in cut sections unless otherwise directed. Compact top 150 mm below sub cut to minimum 95% maximum dry density, ASTM D698 (AASHTO T99). Replace with approved embankment material and compact.

.3 Treat ground slopes, where subgrade is on transition from excavation to embankment, at grade points as directed by Engineer.

.4 This work shall include all excavation necessary to prepare the subgrade in areas requiring new construction or reconstruction and shall include all hauling, spreading and levelling of excavated material.

The excavated material shall be hauled to the location as directed by the engineer. It shall be spread, graded ad compacted as directed by the engineer.

.5 The contractor shall not excavate below the subgrade level unless directed by the Engineer.

.6 The bottom of the excavation shall provide a flat, uniform, dry surface for the construction of the subbase.

.7 Upon completion of the excavation to the subgrade elevation, the bottom of the excavation shall be inspected and approved by the engineer prior to the placement of any material for the construction of the subbase.

.8 If the bottom of the excavation is unsuitable for the placement of granular material, the contractor shall notify the Engineer.

.2 Drainage:

.1 Maintain profiles, crowns and cross slopes to provide good surface drainage.

.2 Provide ditches as work progresses to provide drainage.

.3 Construct interceptor ditches as indicated or as directed before excavating or placing embankment in adjacent area.

.3 Subgrade Filling

.1 In all areas requiring subgrade fill, the contractor shall be responsible to supply, haul, place and compact suitable material to the elevations as indicated on the drawings. No organic or other unsuitable materials will be acceptable. The material shall be placed to provide a width sufficient to allow for the driving surface specified, shoulders, side slope specified, base course and subbase. Material used to fill to subbase shall have a 2 horizontal to 1 vertical (2:1) side slope unless otherwise specified.

.2 Filling to subgrade shall be accomplished with Granular C unless an alternative has been otherwise specified and /or approved by the Engineer.

.4 Use of Blast Rock for Road Construction

.1 Where blast rock is used for road construction, sand shall be added to the blast rock to fill the voids at the direction of the Engineer.

.5 Construction of Roadway Granular Courses

.1 The granular courses and surface materials shall be kept free from clay and other types of deleterious materials. The contractor shall ensure that his operations do not disturb underlying work.

The granular courses shall be placed without segregation in uniform layers such that the thickness of the compacted layer is not greater than specified below without written approval from the Engineer;

Surface Course	100mm
Base Course	200mm
Subbase Course	300mm minimum

.2 Each layer shall be bladed to a smooth surface conforming to the required cross section.

Prior to closing down operations for each working day the granular material shall be bladed and compacted and, if necessary, covered with sufficient base material to carry traffic.

.3 In no case shall a layer of granular material be laid and compacted on frozen layer of granulars, as the top layer will not bind to the base. The contractor shall be responsible for making good any section of road which the Engineer considers to be below standard because granular material was laid on a frozen granular surface. All costs associated with this work will be borne by the contractor.

.4 The granular courses shall be maintained to the tolerances in grade and cross-section and to the specified density until the project is accepted.

.5 The Engineer may direct that soft or otherwise defective areas be cut out and backfilled with granular material. This work is to include the excavation, removal

and disposal on-site of contaminated material, and the supply, placing and compacting of granular "A" material.

.6 Should, in the Engineer's opinion, the failure of granular course been caused by the contractor's negligence, the full reinstatement shall be carried out and the Engineer's word shall be final and binding upon this matter.

3.5 EMBANKMENTS

.1 Scarify or bench existing slopes in side hill or sloping sections to ensure proper bond between new materials and existing surfaces. Method used to be subject to prior approval of Engineer.

.2 Break up or scarify existing road surface prior to placing embankment material.

.3 Do not place material which is frozen nor place material on frozen surfaces except in areas authorized.

.4 Maintain crowned surface during construction to ensure ready run-off of surface water.

.5 Drain low areas before placing materials.

.1 Place and compact to full width in layers not exceeding 200 mm loose thickness. Engineer may authorize thicker lifts if specified compaction can be achieved and if material contains more than 25% by volume stone and rock fragments larger than 100 mm.

.6 Where material consists of rock:

.1 Place to full width in layers of sufficient depth to contain maximum sized rocks, but in no case is layer thickness to exceed 1 m.

.2 Distribute rock material to fill voids with smaller fragments to form compact mass.

.3 Fill surface voids at subgrade level with rock spalls or selected material to form earth-tight surface.

.4 Do not place boulders and rock fragments with dimensions exceeding 150 mm within 300 mm of subgrade elevation.

.7 Deductions from excavation will be made for overbuild of embankments.

3.6 FINISHING

.1 The surface of the uppermost layer of granular material shall be bladed, shaped and compacted to produce the required surface contour.

The finished granular courses shall not deviate more than 30 mm from the specified grade and cross-section and the surface shall not deviate more than 15 mm at any place on a 3 metre template.

.2 The finished granular courses shall not deviate more than the amount specified below from the specified grade and cross-section, shall not be consistently high or low, and the surface shall not deviate more than 15 mm at any place on a 3 metre template.

Surface Course	+15mm to -15mm
Base Course	+15mm to -25mm
Subbase Material	+25mm to -40mm
Subgrade	+25mm to -50mm

3.7 PROTECTION

.1 Maintain finished surfaces in condition conforming to this section until acceptance by Engineer.

END OF SECTION