

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 31 23 16.26 - Rock Removal.
- .2 Section 31 22 16.13 - Roadway Subgrade Reshaping.
- .3 Section 31 23 33.01 - Excavating and Backfilling.
- .4 Section 34 71 13.25 - Vehicle W-Beam Guide rail.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM D 4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
 - .2 ASTM C 117-13, Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing.
 - .3 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .4 ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .5 ASTM D 1883, Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils.
 - .6 ASTM D 698-07e7, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
 - .7 ASTM D 1557-09 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
- .2 Ontario Provincial Standard Specifications (OPSS).
 - .1 OPSS 1010 - Material Specification for Aggregates - Base, SubBase, Select Subgrade and Backfill Material.
 - .2 OPSS 1003 - Material Specification for Aggregates - Hot Mix Asphalt.
- .3 Laboratory Testing Manual, Ministry of Transportation, Ontario.
 - .1 LS-619 Resistance of Fine Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.
 - .2 LS-618 Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.

- .3 LS-602 Sieve Analysis of Aggregates.
- .4 Office des normes générales du Canada (CGSB)
 - .1 CAN/CGSN-8.1-F88, Tamis de contrôle en toile métallique, non métriques.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for aggregate materials and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit documents of materials to approval
 - .1 It is the responsibility of the contractor to submit at Departmental Representative all documents and evidence of material integrate to work to approval.
 - .2 Provided sampling resulted document to Departmental Representative during production.
 - .3 Provide Departmental Representative with access to source and processed material for sampling.
 - .4 Contractor Pay cost of sampling and testing of aggregates, which fail to meet specified requirements.

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, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D 4791.
 - .1 Greatest dimension to exceed five 5 times least dimension.
- .3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
 - .1 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

- .2 Reclaimed asphalt pavement.
- .3 Reclaimed concrete material.
- .4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
 - .1 Crushed rock.
 - .2 Gravel and crushed gravel composed of naturally formed particles of stone.
 - .3 Lightweight aggregate, including slag and expanded shale.
 - .4 Reclaimed asphalt pavement.
 - .5 Reclaimed concrete material.
- .5 Granulaire A - type 1: as per OPSS 1010 and as per specifications section 31 23 33.01 - Excavating and backfilling - Base, SubBase, Select Subgrade and Backfill Material
- .6 Granulaire B - type 2 : as per OPSS 1010 and as per specification section 31 23 33.01 - Excavating and backfilling - Base, SubBase, Select Subgrade and Backfill Material.

2.2 SOURCE QUALITY CONTROL

- .1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling (2) weeks minimum before starting production.
- .2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.
- .3 Advise Departmental Representative two (2) weeks minimum 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.

3 EXECUTION

3.1 PREPARATION

- .1 Topsoil stripping:
 - .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
 - .2 Begin topsoil stripping of areas as indicated on drawings after area has been cleared of brush, weeds and grasses and removed from site or reuses on site.

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- .3 Strip topsoil to depths as indicated on drawings. Avoid mixing topsoil with subsoil.
 - .4 Stockpile in locations as directed by Departmental Representative. Stockpile height not to exceed 2 m.
 - .5 Dispose of topsoil as directed by Departmental Representative.
 - .2 Processing:
 - .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
 - .3 Stockpiling:
 - .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative.
 - .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 Departmental Representative within 48 hours of rejection.
 - .7 Stockpile materials in uniform layers of thickness as follows:
 - .1 Maximum 1.5 m for coarse aggregate and base course materials.
 - .2 Maximum 1.5 m for fine aggregate and sub-base materials.
 - .3 Maximum 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 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.2 CLEANING

- .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 Departmental Representative.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 00 10 - Generals Instructions.
- .4 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.
- .5 Restrict public access to temporary or permanently abandoned stockpiles by means acceptable to Departmental Representative.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 31 05 16 - Aggregate materials.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³) 600 kN-m/m³.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

2 PRODUCTS

2.1 NOT USED

- .1 Not used.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed for roadway subgrade reshaping installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 RESHAPING

- .1 Provide 15 m² of compactable aggregate for reshaping roadway at Bridge approaches.
- .2 Where deficiency of material exists, add and blend additional subgrade material as directed by Departmental Representative.

- .3 Re-use excess material in areas of material deficiency and Blade excess material over shoulder and trim as directed by Departmental Representative.
- .4 Adjust the transition of the gravel edge with appropriate material aggregate and match the existent road section as indicated on drawing.

3.3 COMPACTING

- .1 Compact to minimum corrected maximum dry density.
- .2 Shape and roll alternately to obtain smooth, even and uniformly compacted subgrade surface.
- .3 Apply water as necessary during compaction to obtain specified density.
- .4 If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected to value for compaction to ASTM D 698.

3.4 SITE TOLERANCES

- .1 Reshaped compacted surface to be within plus or minus 10 mm of elevation as indicated.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove, surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.6 PROTECTION

- .1 Protect and maintain reshaped surface in condition conforming to this Section until succeeding material is applied or until after receipt of written acceptance from Departmental Representative.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 31 23 33.01 - Excavating and Backfilling.
- .2 Section 34 71 13.25 - Vehicle W-Beam Guide rail.

1.2 Definitions

- .1 Rock: Any solid mass except for frozen material, greater than 0.25m³ in volume

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Sustainable Standards Certification:
 - .1 Construction Waste Management: submit copy of Waste Management Plan for project highlighting recycling and salvage requirements, in accordance with Section 01 00 10 - Generals Instructions.
 - .2 Erosion and Sedimentation Control: submit copy of Erosion and Sedimentation Control Plan for project highlighting implementation measures, in accordance with Section 01 35 43 - Environmental Procedures.

1.4 QUALITY ASSURANCE

- .1 The Contractor must ensure that the work is executed without compromising the stability or condition of nearby structures and services that could be damaged by excessive vibration or projectile debris. The Contractor is solely responsible for choosing the demolition methods used and must take steps to maintain control over demolition equipment at all times

2 PRODUCTS

2.1 NON USED

- .1 Not Used

3 EXECUTION

3.1 ROCK REMOVAL

- .1 Use an appropriate drill equipment to progress the work.
- .2 Perform excavation in accordance with Section 01 35 43 - Environmental Procedures, Erosion and Sedimentation Control.

- .3 Co-ordinate this Section with Section 01 35 29.06 - Health and Safety Requirements.
- .4 Remove rock to alignments, profiles, and cross sections as indicated.
- .5 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.
- .6 Excavate rock to horizontal surfaces.
- .7 Prepare rock surfaces, which are to bond to concrete, by scaling, pressure washing and broom cleaning surfaces.
- .8 Perform cutting in advance, unless otherwise indicated.
- .9 Remove boulders and fragments which may slide or roll into excavated areas.

3.2 CLEANING

- .1 Clean in accordance with Section 01 00 10 - General Instructions.
- .2 Rock Disposal:
 - .1 Dispose of surplus removed rock off site.
 - .2 Send material to appropriate location as approved by Departmental Representative.

3.3 PROTECTION

- .1 Prevent damage to surroundings and injury to persons in accordance with Section 01 00 10 - General Instructions.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 31 23 16.26 - Rock Removal
- .2 Section 31 05 16 - Aggregate Materials
- .3 Section 34 71 13.25 - Vehicle W-Beam Guide rail

1.2 REFERENCE STANDARDS

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 117-13, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 136-6, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D 422-63-2007, Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D 698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
 - .5 ASTM D 1557-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2,700 kN-m/m³).
 - .6 ASTM D 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.3 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock excavation: solid material in excess of 0.25 m³ and which cannot be removed by means of heavy-duty mechanical excavating equipment with 0.95 to 1.15 m³ bucket. Frozen material not classified as rock. Refer to Section 31 23 16.26 - Rock Removal.
 - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

- .2 Topsoil:
 - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
 - .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.
- .3 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .4 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .5 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .6 Unsuitable materials:
 - .1 Weak, chemically unstable, and compressible materials.
 - .2 Frost susceptible materials:
 - .1 Fine-grained soils with plasticity index less than 10 when tested to ASTM D 4318, and gradation within limits specified when tested to ASTM D 422 and ASTM C 136: Sieve sizes to CAN/CGSB-8.1.
 - .2 Coarse-grained soils containing more than 20 % by mass passing 0.075 mm sieve.
- .7 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Quality Control: in accordance with Section 01 45 00 - Quality Control:
 - .1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
 - .2 Submit for review by Departmental Representative proposed dewatering methods as described in PART 3 of this Section.
 - .3 Submit to Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.
 - .4 Submit to Departmental Representative written notice when bottom of excavation is reached.
 - .5 Submit to Departmental Representative testing and inspection results as described in PART 3 of this Section.

- .3 Preconstruction Submittals:
 - .1 Submit list for major equipment to be used in this section prior to start of Work.
 - .2 Submit records of underground utility locates, indicating: location plan of existing utilities as found in field.
- .4 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.

1.5 QUALITY ASSURANCE

- .1 Submit design and supporting data at least 2 weeks prior to beginning Work.
- .2 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Ontario, Canada.
- .3 Keep design and supporting data on site.
- .4 Do not use soil material until written report of soil test results are reviewed and approved by Departmental Representative.
- .5 Health and Safety Requirements:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 00 10 - Generals Instructions.
- .2 Divert excess aggregate materials from landfill to local quarry recycling facility for reuse as directed by Departmental Representative.

1.7 EXISTING CONDITIONS

- .1 Examine information available in the plans on existing soil conditions.
- .2 Buried services:
 - .1 Before commencing work establish location of buried services on and adjacent to site.
 - .2 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
 - .3 Prior to beginning excavation Work, notify applicable Departmental Representative establish location and state of use of buried utilities

and structures. Departmental Representative to clearly mark such locations to prevent disturbance during Work.

.3 Existing buildings and surface features:

- .1 Conduct, with Departmental Representative: condition survey of existing bridge, trees and other plants, fencing, service poles, survey bench marks which may be affected by the Work.
- .2 Where required for excavation, cut roots or branches as directed by Departmental Representative.

2 PRODUCTS

2.1 MATERIALS

- .1 Type 1 and Type 2 fill: properties to Section 31 05 16 - Aggregate Materials and the following requirements:
 - .1 Crushed, pit run or screened stone, gravel or sand.
 - .2 Gradations to be within limits specified when tested to the limits specified in the following table.
 - .3 Table

Sieve Designation	% Passing	
	Type 1	Type 2
112 mm	-	100
80 mm	-	-
56 mm	-	-
40 mm	-	-
31.5 mm	100	-
20 mm	90 - 100	-
14 mm	68 - 93	-
5 mm	35 - 60	12 - 100
1.25 mm	19 - 38	-
0.315 mm	9 - 17	-
0.080 mm	2 -	0 - 10

- .2 Type 3 fill: selected material from excavation or other sources, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.
- .3 Non-shrinkable fill: proportioned and mixed to provide:
 - .1 Maximum compressive strength of 0.4 MPa at 28 days.
 - .2 Maximum cement content of 25 kg/m³ with 40% by volume fly ash replacement: to CSA-A3001, Type GU.
 - .3 Minimum strength of 0.07MPa at 24 h.
 - .4 Concrete aggregates: to CSA-A23.1/A23.2.
 - .5 Cement: Type GU.
 - .6 Slump: 160 to 200 mm.

3 EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust, according to Section 01 35 43 Environmental Procedures.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls, restore, and stabilize areas disturbed during removal.

3.2 SITE PREPARATION

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
 - .1 Contractor should coordinated snow removal after each snowfall for efficient work, by 7H00 AM to 6H00 PM.

3.3 PREPARATION/PROTECTION

- .1 Protect existing features in accordance with Section 01 00 10 - General Instruction, Temporary access and protection works and relevant municipal by-laws.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative requirement.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

- .5 Protect buried services that are required to remain undisturbed.

3.4 STRIPPING OF TOPSOIL

- .1 Begin topsoil stripping of areas as indicated after area has been cleared of brush and grasses and removed from site.
- .2 Strip topsoil to depths as indicated.
 - .1 Do not mix topsoil with subsoil.
- .3 Stockpile in locations as directed by Departmental Representative.
 - .1 Stockpile height not to exceed 2 m and should be protected from erosion.
- .4 Dispose of unused topsoil off site.

3.5 STOCKPILING

- .1 Stockpile fill materials in areas designated by Departmental Representative.
 - .1 Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.
- .3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.6 EXCAVATION

- .1 Remove the appropriate depth of soil or rock to install guide rail post. See detail on drawing.
- .2 Excavation must not interfere with bearing capacity of adjacent foundations.
- .3 Minimize disturbance of soil within branch spread of trees or shrubs that are to remain.
 - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .4 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.
- .5 Dispose of surplus and unsuitable excavated material in approved location on site or off site.

3.7 FILL TYPES AND COMPACTION

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D 698/ASTM D 1557.
 - .1 Hole guide rail post: use Type 1 fill and compact to 95 % to the corrected maximum dry density.

3.8 BACKFILLING

- .1 Vibratory compaction equipment: Use compaction equipment that will not damage existing structures. The Contractor must consider using small compaction equipment when work is performed near existing structures.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material, which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
 - .1 Place bedding and surround material as specified elsewhere.

3.9 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 00 10 - Generals Instructions, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Replace topsoil as directed by Departmental Representative.
- .3 Reinstate lawns to elevation, which existed before excavation.
- .4 Clean and reinstate areas affected by Work as directed by Departmental Representative.

END OF SECTION

1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 Section 31 23 33.01 - Excavating and Backfilling.
- .2 Section 34 71 13.25 - Vehicle W-Beam Guide rail.

1.3 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM D 698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).

1.4 DEFINITIONS

- .1 Embankment: material derived from usable excavation and placed above original ground or stripped surface up to top of subgrade.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements:
- .2 Adhere to Provincial and National Environmental requirements when potentially toxic materials are involved.

2 PRODUCTS

2.1 MATERIALS

- .1 Embankment materials require approval by Departmental Representative.
- .2 Material used for embankment not to contain more than 3% organic matter by mass, frozen lumps, weeds, sod, roots, logs, stumps or other unsuitable material.
- .3 Borrow material:
 - .1 Obtain from sources such as quarry, or borrow pit as approved by Departmental Representative.
 - .1 Earth Embankment materials to consist of acceptable earth material and processed rock material free from objectionable quantities of organic matter, frozen soil, stumps, trees, moss, and other unsuitable materials.
 - .2 Rock Embankment material to consist of fragmented rock produced

by drilling and blasting operations, and boulders, which cannot be placed, in layers as specified for earth embankments.

- .1 Rock Embankment to conform to gradation as follows:

<u>Sieve Designation /percent Passing by Weight</u>	
150 mm	100
100 mm	85-100
75 mm	10-50
No. 200	* 0-3

- .2 * Gradation is determined by that portion passing 75 mm screen.

3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that condition of substrate is acceptable for roadway embankment Work:
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 COMPACTION EQUIPMENT

- .1 Compaction equipment: vibratory rollers or vibrating plate compactors capable of obtaining required density in materials on project.
- .1 Demonstrate compaction equipment effectiveness on specified material and lift thickness by documented performance of test-strip before start of Work.
- .2 Replace or supplement equipment that does not achieve specified densities.
- .2 Operate compaction equipment continuously in each embankment when placing material.

3.3 WATER DISTRIBUTORS

- .1 Apply water with equipment capable of uniform distribution.

3.4 STRIPPING (OF TOPSOIL)

- .1 Stockpile in locations as directed by Departmental Representative.

- .1 Stockpile height: not to exceed 2 m.
- .2 Dispose of unused topsoil as directed by Departmental Representative.
- .3 Remove clearing and grubbing debris from stripping.
- .4 Spread organic stripping, on completion of excavation and embankment construction, on slopes and trim or remove from site if quantity exceeds ability to grade on site.

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.
 - .1 Method used to be to be pre-approved in writing by Departmental Representative.
- .2 Contractor to use slope of the typical section proposed on drawing (3) to determine the quantity need behind the new guide rail.
- .3 Do not place material, which is frozen, nor place material on frozen surfaces except in areas authorized by Departmental Representative.
- .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. Departmental Representative 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 gravel subgrade elevation.
- .7 Deductions from excavation will be made for overbuild of embankments.

3.6 COMPACTION

- .1 Break material down to sizes suitable for compaction and mix for uniform moisture to full depth of layer.
- .2 Use specialized compaction equipment supplemented by routing, hauling, and leveling equipment over each layer of fill.

- .3 Compact each layer to minimum 95% maximum dry density: ASTM D 698 AASHTO T99 except top 150 mm of subgrade.
 - .1 Compact top 150 mm to 98% maximum dry density.
- .4 Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction.

3.7 FINISHING

- .1 Shape entire roadbed to 50 mm of design elevations.
- .2 Finish slopes, ditch bottoms and borrow pits true to lines, grades and drawings where applicable. Scale slope by removing loose fragments, for cut slopes in bedrock steeper than [1:1].
- .3 Remove rocks over 150 mm in dimension from slopes and ditch bottoms.
- .4 Hand finish slopes that cannot be finished satisfactorily by machine.
- .5 Round top of back slope 1.5 m both sides of top of slope.
- .6 Run tractor tracks over slopes exceeding 3 m in height to leave tracks parallel to centerline of highway.
- .7 Trim between constructed slopes and edge of clearing to provide drainage and free of humps, sags and ruts.

3.8 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 00 10 - Generals Instructions.

3.9 PROTECTION

- .1 Maintain finished surfaces in condition conforming to this section until acceptance by Departmental Representative.
- .2 Provide silt fences and erosion protection as required to mitigate and prevent impacts to adjacent properties.

END OF SECTION