

SECTION 201

ROADWAY AND DRAINAGE EXCAVATION

DESCRIPTION

201.01 General – Roadway and Drainage Excavation shall include all excavation and the construction of all embankments required for the formation of the roadbed, pullouts, parking areas and look-outs; excavation for any drainage ditch, off-take ditch or channel for stream diversion within or outside the right-of-way; removal of surcharge material, topsoil and organic waste material from the roadway, and of topsoil and unsuitable overburden from any Ministry provided borrow pit or any available Ministry or Crown gravel pit, and disposal of same, as may be directed by the Ministry Representative; excavation of materials below grade; excavation of borrow pits; the grading necessary to construct any frontage road, gravel pit access road, borrow pit access road or any other access road, public or private, either within or outside the right-of-way, only to Ministry provided sources as may be ordered by the Ministry Representative; the grading of connections to intersecting roads, public or private, either within or outside the right-of-way; the hauling and disposal of all excavated material, and the trimming and shaping of all excavations and embankments. All Works shall be confined to the right-of-way except where agreements for access rights are in place for other lands, public or private.

201.02 Extent of Work – The dimensions of the excavations and embankments shall be as shown on the Contract Drawings but the Ministry Representative may increase or decrease roadbed dimensions and slope angles. Construction Grade is defined as the grade upon which the Asphaltic Pavement is laid.

Subgrade is defined as the grade upon which the first layer of select granular subbase or base material is laid.

MATERIALS

201.11 Description of Material Types – Excavation shall be classified by the Ministry Representative, under the following material types:

- a) Type A
- b) Type D

The material encountered in any project excavation shall be classified as one of the two types listed above.

In no case shall a material be classified using percentages of two or more types.

201.11.01 Type A - Solid Rock – Type A shall, without limitation, include all forms of “solid rock in place” including solid formations, masses, ledges, seams or layers of dense sedimentary, igneous or metamorphic material of

sufficient hardness generally requiring drilling and blasting methods, very heavy ripping, or equivalent methods, before excavation and removal.

Type A shall also include detached masses of rock or boulders individually containing a volume of 2.0m³ or more.

The breaking and removal of frozen materials or manmade materials (such as asphalt pavement or concrete) as determined by the Ministry Representative shall not be considered Type A excavation.

201.11.02 Type D – Common – Common material is all other excavation materials of a nature not included in the foregoing description of Type A, regardless of the nature or condition of the material, or the method used to excavate or remove.

201.12 Material Classification Changes – It is possible that the material in a cut may change at some level in the excavation, and may change more than once in a single cut.

Where such a change occurs, the Contractor shall immediately, and in any event within 24 hours of attempting to excavate the changed material, notify the Ministry Representative and clean off any material falling within the currently approved material classification of the cut, in order to expose the horizon where the material change is thought to occur.

The Ministry Representative will review the exposed material, determine whether a classification change is warranted, and notify the Contractor if a classification change is warranted or not.

If a classification change is approved, sufficient field measurements will be taken to establish boundaries and the material horizon for volume calculations.

If the Contractor disagrees with the Ministry’s assessment of the material classification, the Contractor may appeal only in accordance with SS 201.13.

201.13 Material Classification Appeal

201.13.01 Type A and Type D Material Classification – The Contractor may appeal the material classification determined by the Ministry Representative.

201.13.02 Notice and Time Limit of Appeal – The Contractor shall serve written Notice of appeal to the Ministry Representative within:

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- i. twenty-four (24) hours of the Contractor attempting to excavate any potentially changed classification material; or
- ii. three (3) working days of the material classification designation by the Ministry Representative; or
- iii. in no event less than two (2) working days prior to the completion of the excavation.

201.13.03 Ripping Test – Where the Contractor appeals the material classification, a ripping test will be conducted under the direction and control of the Ministry Representative, including the determination of the location, time, and suitability of weather, ground, equipment and other conditions for the ripping test to occur.

The ripping test will be conducted using a Class 7 or more powerful bulldozer (as identified in the “Equipment Rental Rate Guide” published by the BC Road Builders and Heavy Equipment Association), that will develop sufficient traction and effectively deliver a minimum force of 700kN per lineal metre of ripper shank embedded in the material by a single shank static ripper as determined by the manufacturer’s Drawbar Pull versus Ground Speed Charts.

If, under the above specified ripping force, the material can be broken or loosened into pieces with an individual volume of 2.0 m³ or smaller, the material will be classified as Type D. If the material cannot be broken or loosened within the time limit as directed by the Ministry Representative, the material will be classified Type A.

The test will be conducted at the Contractor’s expense unless the test determines, in the sole determination of the Ministry Representative, that a material classification change is warranted. In that case, the cost of the equipment (including mobilization and demobilization if the equipment is brought in solely for the purpose of the ripping test) and the operator will be paid as Extra Work.

201.14 Unsuitable Material – Only material acceptable to the Ministry Representative shall be used in the construction of embankments.

Material deemed unsuitable for the construction may be wasted between the toe of the embankment and the right-of-way boundary or in other areas as designated by the Ministry Representative. If no on-site waste areas are designated then the unsuitable material shall be removed and disposed offsite at the Contractor’s expense. Any such material subsequently placed in an embankment, without the approval of the Ministry Representative, shall be removed and disposed of, as directed by the Ministry Representative, and no payment will be made for the removal or haul of such unsuitable material from the embankment.

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Where required in the contract all topsoil and organic material shall be stripped over the entire excavation and fill areas and placed in the area between the toe of the embankment and the right-of-way boundary, or on any other area as designated by the Ministry Representative. Topsoil shall meet the requirements of SS 751.16. Organics shall be considered unsuitable material and managed in accordance with SS 201.14. Topsoil shall be stockpiled for later use or disposed of as designated by the Ministry Representative.

All material above or below subgrade in an excavation or in the foundation of an embankment, which in the opinion of the Ministry Representative is unsuitable, shall be removed and paid for as excavation, as classified by the Ministry Representative. Soft clays and peats are typical examples of unsuitable materials.

Where removal of unsuitable material requires backfilling this work shall be carried out with approved fill materials, as directed by the Ministry Representative. Payment for such backfilling and haul will be made at the Unit Price bid for "Roadway and Drainage Excavation".

Upon completion of the road grade, all topsoil and material suitable for growth of ground cover shall be spread to a nominal depth of 150mm on the cleared right-of-way and up the fill slopes to generally blend in with the cross section. Care shall be taken that proper drainage is maintained. This material shall be placed, compacted and trimmed to a neat appearance in a manner to facilitate growth of revegetation. No additional payment will be made for replacing and trimming topsoil except that haul in excess of 300 m will be paid in accordance with SS 201.45, SS 201.83 and SS 201.93.

201.15 Surplus Material – All suitable excavation material shall, if required, be taken or hauled into the nearest embankment and to any embankment on the project to be constructed out to the extreme distance required by the Ministry Representative.

The surplus beyond what is necessary to form the nearest embankment shall be

- disposed of by widening embankments uniformly within the limits of right of way,
- hauled to form or widen any embankment on the road to be constructed,
- stockpiled on-site or in Ministry pits, or
- lastly removed from Site for disposal by the Contractor.

All subject to the approval by the Ministry Representative, where hauling and placing shall be performed in the most efficient manner.

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No material shall be wasted without the approval of the Ministry Representative, all surplus material shall be used as much as possible.

CONSTRUCTION

201.31 Rock Cuts – See SS 204.

201.32 Overhanging Rock and Boulders – The Contractor shall remove overhanging rock or boulders within the excavation limits, as ordered by the Ministry Representative, and shall backfill and compact all resulting cavities to allow the safe passage of construction and support vehicles generally in accordance with the requirements of SS 135. Such work will be paid at the Unit Price bid for "Roadway and Drainage Excavation."

201.33 Overbreak in Solid Rock - Overbreak in solid rock excavation encountered in the contract is that portion of any such material which is excavated, displaced or loosened outside and beyond the slopes or grades as staked or re-established (with the exception of slides as described in SS 201.42).

Any overbreak that occurs due to the inherent character of any formation encountered, as determined by the Ministry Representative in consultation with the Qualified Professional will be classified as allowable overbreak as described in subsection 201.33.01.

All other overbreak, as so defined, shall be removed by the Contractor at the Contractor's expense, and shall be disposed of by the Contractor, in the same manner as provided for "Surplus Material", but at the Contractor's expense without any allowance for overhaul, except as hereinafter stated.

The Qualified Professional is defined as the Ministry's Geotechnical Engineer, Rockwork Engineer, or consultant engineer working for the Ministry whose discipline is in geotechnical engineering.

201.33.01 Allowable Overbreak – If, and only where directed by the Ministry Representative, use is made of the overbreak to replace material which would otherwise have to be borrowed for the construction of the roadway, then such overbreak will be classed as allowable overbreak.

201.33.02 Contractor's Negligence – Overbreak resulting from fault or negligence of the Contractor shall be removed and disposed of, as directed by the Ministry Representative, at no cost to the Ministry.

Definition of negligence will be deemed to be lack of the following: the sequence of operations, lack of a blast design, lack of preblast survey, lack of as-built blast design as described in 204.04.06, 204.04.07, and 204.04.08 and 204.04.09. Also, definition of negligence will be deemed to mean lack of cut-off drill holes on the backslope, excessive

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spacing of drill holes and overloading of the same.

201.34 (Not used)

201.35 Enlargement of Excavation – In cases where the quantity of material taken from a regular excavation will not be sufficient to form the required embankment, the deficiency shall be supplied by taking material from the excavation within or outside the right-of-way, at such places as the Ministry Representative may direct, or from enlargement of the regular excavations made uniformly on one or both sides. The sides of the excavation in all cases shall be dressed to such slopes as the Ministry Representative may require, provided that the Contractor shall have sloped or scaled such excavation by direction of the Ministry Representative before widening the same, payment for sloping or scaling the second time will be made by Order for Extra Work.

201.36 Rock Embankments – This section applies to embankments constructed from material containing more than 15% by volume of rock larger than 150 mm.

Embankments shall be constructed in layers equal in thickness to the largest size of the material but not exceeding 0.7 m. Greater lift thicknesses will be permitted by the Ministry Representative under special conditions provided the Contractor can spread the larger material satisfactorily and attain a degree of compaction no less than attained for layers less than 0.7m in thickness.

Regardless of layer thickness and material particle size all material shall be well compacted to achieve the design density and stability of the embankment and to the satisfaction of the Ministry Representative.

The material shall be deposited and spread so that the larger rocks are well distributed and the intervening spaces are filled with smaller sizes as may be available to form a stable embankment. The finer portion of excavated rock shall be retained for the top transition layer. Each layer shall be compacted by routing the loading construction equipment over the entire width supplemented with additional compaction equipment, as necessary to ensure compaction is uniform, a stable embankment is achieved and to the satisfaction of the Ministry Representative.

When a rock embankment is overlain by an earth embankment or by subbase or base course materials, the top 0.5 m of the rock fill shall be sealed with smaller rock particles and suitable soil materials, if necessary, to prevent the uppermost layers penetrating into voids in this rock embankment.

Where permitted by the Ministry Representative, and where the width is too narrow to accommodate

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equipment, material for the toe of the side hill rock fills may be placed by end dumping until sufficient width of the embankment has been formed to carry equipment, after which the remainder shall be placed in layers and compacted as specified. Any loose material left on the slopes by end dumping shall be incorporated in the fill and compacted according to these standards.

When embankments are made on hillsides or where a new fill is to be applied upon an existing embankment, the slopes of the embankment or original ground (except rock) shall be terraced in a continuous series of steps a minimum of 1.5 m wide as the embankment rises.

The material from step excavation shall be spread and compacted into the adjoining embankment. No additional payment will be made for excavation or for placing step material in the adjoining fill.

201.37 Earth Embankments – This section applies to embankments constructed from material containing less than 15% by volume of rock larger than 150 mm. Embankments shall be constructed in such a manner that they shall be completely stable with reference to designated traffic loading.

The natural surface shall be excavated to remove organic soils or other unsuitable material, as directed by the Ministry Representative, and the removal of such material will be paid at the Unit Prices bid for the class of excavation involved.

When the foundation of the embankment consists of sensitive soils the Contractor shall, with the Ministry Representative's approval, place the initial lift of embankment to a minimum depth required as stated in the design to carry the Contractor's hauling equipment. Static compaction shall be used in areas of sensitive soil.

The earth embankment shall then be constructed in successive horizontal layers not exceeding 200 mm in loose thickness except that the top 500 mm shall be constructed in layers not exceeding 100 mm in loose thickness. Each layer shall be compacted to minimum 95% of the Standard Proctor Density obtained by the current ASTM D 698, except in the top 300 mm of the embankment, which shall be compacted to minimum 100% of the Standard Proctor Density.

The above maximum lift thickness requirements may be waived by the Ministry Representative, where the Contractor can demonstrate

- That the proposed compaction equipment can uniformly compact a thicker layer;
- Attain the required degree of compaction at all levels within the lift;
- Supply compaction testing equipment and services for Quality Control and Quality Assurance that will

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reliably test to the full depth of the proposed lift thickness. The supply of all testing equipment for Quality Control and Quality Assurance shall be the Contractor's responsibility.

No organic soils shall be placed in the embankment. Soils with high moisture content that cannot be compacted to the required density shall not be employed without prior aeration and drying.

When embankments are made on hillsides or where a new fill is to be applied upon an existing embankment, the slopes of the embankment or original ground (except rock) shall be terraced in a continuous series of steps a minimum of 1.5 m wide as the embankment rises.

If suitable, the material from step excavation shall be spread and compacted into the adjoining embankment. No additional payment will be made for excavation or for placing step material in the adjoining fill.

The Contractor shall be responsible for selecting equipment and methods of attaining the specified degree of compaction. In general the roller mass shall be sufficient to compress the soil vertically after each pass but not sufficient to unduly rut or shear the soil.

Water shall be added and incorporated into the soil using suitable equipment such as rotary mixers, cultivators, etc., to increase the natural moisture content to the optimum moisture percentage as determined by the current ASTM D 698.

In the event that the natural moisture content is greater than the optimum, the soil shall be aerated and dried employing suitable mixing equipment.

201.38 Frozen Material – The use of frozen material in embankments will not be permitted; the only exception is, with Ministry Representative approval, broken rock containing less than 15% passing a 4.75 mm sieve. Frozen excavated material which will be suitable when dry shall be stored and allowed to thaw and dry, and then placed in the embankment, as directed by the Ministry Representative. No compensation will be allowed for the storing and re-handling of this material.

No material is to be placed on a frozen surface unless approved by the Ministry Representative.

201.39 Snow Removal – Snow overlying the surface of a cut, or the site or surface of an embankment shall be removed and deposited beyond the slope stakes at the Contractor's own expense.

201.40 Bridge End Fill – Material for bridge end fill shall be in accordance with SS 202.04 and SS 202.05. Construction of bridge end fill shall be in accordance with

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SS 202.23.

201.41 Transition Sections – Subgrade, other than solid rock, shall be subcut 1 m deep at the line of transition from cut to embankment. The subcut shall taper to zero depth 8 m within the cut. The embankment construction shall be carried back over the subcut only after the embankment has reached the level of the bottom of the subcut, as measured by the Ministry Representative. Payment for the subcut will be made as "Roadway and Drainage Excavation."

201.42 Slopes and Slides – The slopes of all excavations and embankments shall be trimmed neatly and evenly to the line and slope indicated on the Drawings or as directed by the Ministry Representative.

No undercutting of slopes in excavation by power shovels or other excavation equipment will be permitted.

In case slopes, finished to the lines as shown on the Drawings, slide into the roadway or out of embankments before final acceptance of the work, such slide material shall be removed by the Contractor from the roadway or replaced by the Contractor in the embankment, as the case may be, at the Unit Price bid for the class of excavation involved. The classification of material in slips and slides shall be in accordance with its condition at the time of removal regardless of its prior condition. The slopes shall be refinished by the Contractor, as directed by the Ministry Representative. Such refinishing will be paid for by Order for Extra Work. Materials to replace embankment slides shall be obtained from sources designated by the Ministry Representative.

Slopes undercut at the base or destroyed in any manner by act of the Contractor shall be resloped by the Contractor at the Contractor's expense to the slope, as directed by the Ministry Representative. All materials resulting from such resloping shall be removed and deposited, as directed by the Ministry Representative. No payment will be made to the Contractor for the removal of such material.

201.43 Ditches – Ditches which may be considered necessary for the proper drainage of the work shall be constructed at such points and to such cross section, alignment and grade as the Ministry Representative may direct. This shall include inlets and outlets to culverts and ditching of all kinds. Ditching quantities will be considered as ordinary excavation quantities and will be measured, classified and paid for as such.

201.44 Borrow – Borrow shall consist of rut resistant material, with less than 20% passing the 0.075 mm sieve and free of organics, high plasticity clays and other unsuitable materials, obtained from an approved source of supply (e.g. pit or quarry) outside the highway right-of-way, developed and used in accordance with SS 202 Parts C and D.

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The Special Provisions may identify potential sources, additional or different material qualities, or require representative sampling and testing of the material.

201.45 Haul and Overhaul– "Haul" includes all work necessary to move excavation materials from their in-situ source to any destination with a freehaul distance of 300 m.

"Overhaul" includes all work necessary to move excavation materials for that portion of the move that is beyond the limits of the 300 m freehaul zone. The volume diagrams when provided within the Contract Drawings are theoretical and do not reflect any constraints imposed due to construction staging.

Haul and overhaul shall be incidental to the Work unless specifically identified as an Item of Work in Schedule 7 of the Contract Special Provision – Approximate Quantities and Unit Prices.

201.46 Watering – Water for compacting embankments, constructing subgrades and surfacing, and for laying dust caused by grading operations and traffic, shall be applied in the amounts and at the places designated by the Ministry Representative. Water shall be applied by sprinkling with tank trucks equipped with spray bars and suitable control apparatus. When directed by the Ministry Representative, sprinkling shall be done at night or in the early morning hours when evaporation loss is at a minimum.

The Contractor shall make all necessary arrangements for obtaining and applying water at the Contractor's expense.

201.47 Finishing of Roadway – Before acceptance and final payment is made, the entire roadway, including the roadbed, shoulders and ditches shall be neatly finished and trimmed to the lines, grades and cross sections shown on the Drawings, or as directed by the Ministry Representative, to reproduce smooth surfaces, slopes and a uniform cross section. Subgrade shall be finished within a tolerance of ± 15 mm except for rock cut fills where the tolerance shall be ± 50 mm.

All drainage ditches, waterways and culverts shall be opened up and cleaned out to restore them to their full effectiveness.

All loose rock and boulders within the right-of-way resulting from grading and grubbing operations shall be gathered up and buried, or otherwise disposed of as the Ministry Representative may direct.

The Contractor shall grade all portions of the right-of-way outside the Excavation and Embankment areas to conform to the general ground line. This work will be considered as subsidiary work pertaining to the item of "Roadway

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and Drainage Excavation," and no extra payment will be made.

201.48 Surcharging – Pre-consolidation by surcharging shall be carried out where indicated on Drawings and/or Special Provisions, or as directed by the Ministry Representative. Embankments on these areas shall be placed directly on the natural ground without removal of the organic materials, unless otherwise directed by the Ministry Representative, and shall be constructed to a surcharged height above construction grade as shown or specified.

The Contractor shall place the initial lift of embankment to a minimum depth required to carry the Contractor's hauling equipment with the approval of the Ministry Representative. Static compaction shall be used in areas of sensitive soils. The remainder of the embankments shall be constructed in accordance with procedures set forth in this Section; except that compaction will not be required on the surcharge material above construction grade.

To avoid shear failures, the rate of construction shall be rigidly controlled by instrumentation installed by the Ministry.

The surcharge shall remain on the embankments for a period of time as outlined in the Contract Special Provisions, or as may be indicated by the instrumentation, or as determined and adjusted by the Ministry Representative.

All instrumentation shall be kept in working, continuous, and operable order according to manufacturer's requirements.

Should any of the instrumentation become damaged or rendered unusable by the construction operations, the same will be replaced by the Ministry at the Contractor's expense.

201.49 Backslope Stabilization – Drain holes, rock bolts, mesh and/or shotcrete may be required where rock is being excavated.

The backslope stabilization requirements will be assessed by the Ministry Representative during construction and the amount and location of the drain holes, rock bolts, mesh and shotcrete may be changed or deleted according to the condition of the rock encountered in the field.

No adjustments in prices for changes in quantities or compensation for eliminated items will be made.

MEASUREMENT

201.81 Borrow – Borrow quantities will be measured from
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the source and computed in accordance with SS 145.21.01. The volume of boulders and unsuitable material removed from borrow pits that is not used in embankments shall be deducted.

201.82 Excavation – All "Roadway and Drainage Excavation" will be measured after Clearing and Grubbing operations have been completed, as specified in SS 200.01 through SS 200.03, and volumes computed in accordance with SS 145.21.01.

Pay quantities will be computed, in accordance with SS 145.21.01, in CUBIC METRE to the neat lines staked. Adjustments for curvature will be made in any cut where deemed equitable by the Ministry Representative.

201.83 Overhaul – Overhaul of excavations and embankments will be measured, for that portion of the movement that is beyond a 300 m freehaul distance from the source, on the completion of the project by the 1000 STATION METRES where a station metre (Sta. m) is 1 m³ of excavated material hauled a distance of one station (100 m). No allowance will be made for shrinkage or swell.

After allowances have been made for specific hauls which have been designated by the Ministry Representative, this information will be used to prepare a final volume overhaul diagram which will form the basis for payment of all other overhaul on "Roadway and Drainage Excavation."

PAYMENT

201.91 Borrow – Payment for BORROW materials shall be at the Unit Price per cubic metre bid for "Roadway and Drainage Excavation" classified as provided for in SS 201.11. All specifications in this Section relating to excavation shall apply to borrow. Payment shall be full compensation for everything furnished and done, including without limitation costs for acquisition, development, and payment of royalties for private pits or quarries, purchase price of borrow material, access road construction and maintenance, screening, crushing, stockpiling, loading, hauling, spreading, compaction and moisture adjustment (watering or drying) in place as specified.

201.92 Excavation – Payment for EXCAVATION shall be at the Unit Price bid per cubic metre for the various types of materials excavated. The Unit Price for such excavation shall include hauling the materials to any point within 300 m from the point of excavation and shall be accepted as full compensation for everything furnished and done in connection therewith.

Compensation for hauling excavation to distances greater than the free haul limit of 300 m will be paid as

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prescribed in SS 201.93.

201.93 Overhaul – OVERHAUL is incidental to the Work and will not be paid separately unless explicitly included as an Item of Work in Schedule 7.

Where such an Item is used, payment for OVERHAUL will be at the Unit Price bid per 1000 station metres (Sta. m).

201.94 (not used)

201.95 Allowable Overbreak – Allowable overbreak will be paid at 75% of the Unit Price bid for TYPE A MATERIAL. The quantity at the Unit Price for overbreak in any one cut shall not exceed 10% of the original theoretical cut, as shown on the Drawings or as directed by the Ministry Representative. Material in excess of the above 10%, if used in lieu of borrow and only on the advice

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of the Ministry Representative, will be paid at the Unit Price bid for TYPE D MATERIAL.

201.96 Embankment – Except where otherwise distinctly provided herein, the work described under the heading of "Embankment" will not be paid for directly as a pay item, but shall be considered as incidental work pertaining to the placement of the several classes of excavation or borrow and, therefore, no additional compensation will be made for the construction of embankments.

201.97 (not used)

201.98 Surcharge Removal – Payment for surcharge removal shall be at the Unit Prices bid for EXCAVATION and OVERHAUL.

