Amendment to OPSS.MUNI 206 (Nov 2013) – Construction Specification for Grading

OPSS 206.07 CONSTRUCTION

OPSS 206.07.01.03 Compaction

Clause 206.07.01.03 of OPSS 206 is amended by deleting the first sentence and replacing it with the following:

Materials shall be compacted according to TS 501.

OPSS 206.07.07.01 General

Clause 206.07.07.01 of OPSS 206 is amended by the addition of the following paragraphs:

Fill, for embankment construction shall consist of sound, clean earth or a mixture of sound, clean earth and stones, broken rock, concrete or masonry from a source designated by the Contractor and approved by the City. The materials for the fill shall be deposited and spread in layers not more than 230 mm in depth prior to compaction, extending to the full width of the fill area.

Where fill less than 300 mm in depth is proposed over an existing flexible pavement, such pavement shall be uniformly plowed or scarified, full depth and spread to form a uniform foundation before any new fill is placed thereon. Where such a fill is proposed over an existing rigid pavement or other structure, such pavement or structure shall be broken up and removed.

Where fills are to be constructed on existing slopes steeper than 6H:1V, steps with a horizontal dimension of not less than 1 m and a vertical dimension of not greater than 230 mm shall be formed in the slopes before any of the fill is placed.

Where the use of frozen material is permitted by the Contract Administrator, it shall be placed outside the limits of assumed 1H:1V slopes, spreading outward from lines one metre outside of the edges of the proposed construction for example pavement, interlocking brick and sidewalk..

Stones more than 750 mm in diameter shall be disposed of, off the site.

Where, in the opinion of the Contract Administrator, filling in layers of the specified thickness is not feasible, as in the case of filling in water, the fill may be constructed in one layer to the minimum elevation at which the equipment can be operated as determined by the Contract Administrator. The fill material placed in this manner shall be thoroughly compacted by approved methods capable of producing a uniform and well consolidated roadway foundation. Above this elevation, the fill shall be constructed in layers of the specified thickness.

In areas where stones are prevalent, the material shall be carefully placed so that any large stones will be well distributed and the interstices completely filled with smaller stones, earth, sand or gravel so as to form a solid fill. Any rock or fragmental material of such size as would prohibit it from being placed in layers of the specified depth shall be placed in the fill only where and as directed or approved by the Contract Administrator.

CONSTRUCTION SPECIFICATION FOR GRADING

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206.01 SCOPE

This specification covers the requirements for grading, including earth and rock excavation and embankment construction, and management of excavated material.

206.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

206.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

206.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 209	Embankment Over Swamps
OPSS 212	Borrow
OPSS 501	Compacting
OPSS 802	Topsoil
OPSS 804	Seed and Cover

Ontario Provincial Standard Specifications, Material

OPSS 1004	Aggregates - Miscellaneous

206.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Angle of Repose means the maximum angle, measured from the horizontal, at which fill remains stable.

Backslope means the slope in a cut between the invert of the roadside ditch and the point where the slope intersects original ground.

Benching means the keying of new fill slopes into existing slopes by excavating horizontal planes in the existing slopes and backfilling the benches and placing the fill simultaneously. Benching also means the stepping of cut slopes at intermediate levels in deep cuts.

Bulking Factor means the ratio of the volume of earth or rock material following excavation, placement, and compacting to the original in situ volume of the same material. The bulking factor for the purposes of this contract shall be 1.35. For rock excavation quantities identified as shatter, the bulking factor shall be 0.35.

Cushion Blasting means the placing of a single row of lightly loaded closely spaced holes along the excavation limits as specified in the Contract Documents and firing them coincident with the main excavation blast as the last delay sequence to remove rock inside the cut limits.

Ditching means the excavation in earth or rock for all water courses. The term shall include roadside ditches, all excavation lying beyond the end of drainage structures, and stream and watercourse diversions and corrections.

Earth means all soils except those defined as rock, and excludes stone masonry, concrete, and other manufactured materials.

Embankment means the material placed within the sideslopes; below the top of subgrade; and above the original ground, excavated base, or theoretical bottom, as applicable, to the limits specified in the Contract Documents.

Existing Rock Surface means the exposed rock surface or the rock surface after removal of overburden.

Frontslope means the slope in a cut section between the edge of shoulder and the invert of the roadside ditch.

Line Drilling means the placing of a single row of very closely spaced holes without explosives along the rock excavation limits specified in the Contract Documents.

Mucking means the excavation of broken rock.

Overbreak means any broken, displaced, or loosened rock material that originates outside the rock excavation limits specified in the Contract Documents.

Pre-Shearing means the placing of a single row of closely spaced lightly loaded holes placed along the rock excavation limits specified in the Contract Documents, which are fired prior to the main excavation blast.

Profile Grade means the elevation of the surface of the Base as specified in the Contract Documents.

Roadside Ditch means a ditch with one of its sideslopes coincident with the road frontslope.

Rock means natural beds or massive fragments of the hard, stable, cemented part of the earth's crust, either igneous, metamorphic, or sedimentary in origin, which may or may not be weathered and includes boulders having a volume of 1 m^3 or greater.

Rock Face means the vertical or near vertical face between the top of the existing rock surface and the designated rock or ditch grade line.

Rock Surplus means the rock excavation tender quantity multiplied by the bulking factor minus the rock embankment tender quantity. Rock overbreak and rock materials resulting from scaling are specifically excluded from this definition.

Scaling means the removal of loose, broken, or overhanging rock fragments from a rock face.

Shale means a fine grained, low strength, sedimentary rock that undergoes rapid deterioration on exposure.

Shatter means fractured rock broken by the use of explosives or mechanical means and left in place.

Sideslope means the slope in a fill between the edge of shoulder and the point where the slope intersects original ground.

Spall means a rock fragment, chip, or splinter from a rock surface created by weathering, stress relief, blasting, or a combination thereof.

Stripping means the excavation of the upper lay of soil, which is predominantly organic and unsuitable for the construction of embankments. It is commonly referred to as topsoil.

Tolerance means a construction working tolerance only, minus or plus:

a) Minus

   i. Narrower than the Contract standard pertaining to horizontal dimensions as measured from centreline, and
   ii. lower in elevation than the Contract standard pertaining to vertical dimensions.

b) Plus

   i. Wider than the Contract standard pertaining to horizontal dimensions as measured from centreline, and
   ii. higher in elevation than the Contract standard pertaining to vertical dimensions.

Wall Control Blasting means a blasting method using carefully spaced and aligned drill holes intended to produce a relatively flat rock surface, generally characterized by noticeable drill hole traces, with a minimum of blast induced fractures beyond the rock excavation limits specified in the Contract Documents. Wall control blasting techniques are cushion blasting, line drilling, and pre-shearing.

206.04 DESIGN AND SUBMISSION REQUIREMENTS

206.04.01 Submission Requirements

206.04.01.01 Rock Material Management Plan

When a rock material management plan is specified in the Contract Documents, the following information shall be submitted to the Contract Administrator a minimum of 5 Business Days prior to undertaking the work of rock excavation or rock embankment:

a) A plan for rock excavation corresponding to the station intervals shown in the Contract Documents. The plan shall identify the volume in cubic metres of the following:

   i. In situ rock prior to blasting, with shatter quantity shown separately.
   ii. Excavated rock available calculated by applying a bulking factor of 1.35 to the quantity of in situ rock prior to blasting less the quantity of shatter.
   iii. Excavated rock to be placed in rock embankment.
   iv. Excavated rock to be processed into granular material.
   v. Excavated rock to be used for other purposes in completing the Work and the type and location of that Work.
   vi. Excavated rock not incorporated into the Work and the location and use of the material.

b) A plan for construction of embankments identifying locations and volume in cubic metres from where material is supplied that corresponds to the station intervals in the Contract Documents.

c) The source locations and volume in cubic metres for additional rock and granular material required to complete the Work.

The Contractor shall update the rock material management plan monthly. The Contractor shall be solely responsible for the assumptions and the reasonableness of the rock material management plan.

206.04.01.02 Trial Section

A minimum of 48 hours prior to commencing any work on the trial section required by the modified layer compaction method, a detailed plan shall be submitted in writing to the Contract Administrator for approval. The plan shall include full details of the placing and compaction procedure, including layer thickness; number and type of compaction units and number of passes; and a method of evaluating the compaction achieved throughout the full lift.

206.06 EQUIPMENT

206.06.01 Tractor Bulldozer, Crawler Type

Tractor bulldozer, crawler type, shall have a minimum net flywheel power of 200 kW.

Rollers for compacting shale embankments shall weigh:

a) 18 tonnes - first stage.

b) 9 tonnes, minimum - second stage.

206.07 CONSTRUCTION

206.07.01 General

206.07.01.01 Removal of Ice and Snow

All ice and snow shall be removed from any earth excavation and embankment areas under construction.

206.07.01.02 Embankments

Only materials approved by the Contract Administrator shall be used. Frozen earth materials shall not be incorporated into embankments. Materials shall not be placed over either frozen earth or ice surfaces.

Reclaimed asphalt pavement (RAP) used in embankments shall be surplus to the recycling requirements of the Contract.

206.07.01.03 Compaction

Materials shall be compacted according to OPSS 501.

For the purpose of compaction, RAP and reclaimed Portland cement concrete included in the embankment shall be treated as earth or rock corresponding to the embankment being constructed.

206.07.01.04 Management of Excavated Material

As much of the excavated materials as possible shall be used within the contract limits. Material surplus to embankment requirements or unsuitable material that cannot be accommodated in embankments shall be placed adjacent to the embankments by widening embankments, flattening side slopes, and constructing modified cross-sections, as specified in the Contract Documents or as directed by the Contract Administrator.

Materials that cannot be accommodated as above shall be treated as excess material.

206.07.01.05 Borrow

When borrow is specified in the Contract Documents to complete embankments or backfill requirements, borrow shall be according to OPSS 212.

206.07.01.06 Tolerances - General

In the event of a conflict between meeting horizontal grading tolerances and meeting vertical grading tolerances, the vertical grading tolerances shall take precedence.

206.07.01.07 Tolerances for Earth

Upon completion, all earth grade surfaces, excluding swamp excavations, shall be shaped to the grades and cross-sections specified in the Contract Documents within the following tolerances:

a) Vertical grading tolerances for the finished earth subgrade within the limit of the roadway:

+ 30 mm
- 30 mm

b) Horizontal grading tolerances for the vertical faces of excavations to be backfilled:

+ 100 mm
- 0 mm

c) Horizontal grading tolerances for ditch slopes, excluding roadside ditches:

+ 300 mm
- 0 mm

Sideslopes beyond the plus tolerance may be accepted by the Contract Administrator where they are not detrimental to the work.

d) Vertical grading tolerances for all ditching in earth:

+ 30 mm
- 30 mm

e) Horizontal grading tolerances for the backslopes in earth cut sections:

+ 300 mm
- 300 mm

Backslopes beyond the plus tolerance may be accepted by the Contract Administrator where they are not detrimental to the work.

f) Horizontal grading tolerances for each sideslope in earth embankment construction:

+ 300 mm
- 0 mm

g) Horizontal grading tolerances for roadside ditch frontslopes:

+ 30 mm
- 0 mm

Irrespective of compliance with the above tolerances, the completed slopes shall present a uniform appearance.

206.07.01.08 Tolerances for Rock

Completed rock grade surfaces shall be shaped to the grades and cross-sections specified in the Contract Documents within the following tolerances:

a) Vertical grading tolerances for the finished rock subgrade within the limits of the roadway:

+ 30 mm
- 100 mm

Excavation below the minus tolerance may be accepted by the Contract Administrator where it is not detrimental to the work and is brought up to grade according to the General clause of the Rock Excavation, Grading subsection.

b) Horizontal grading tolerances for vertical rock face cut limits:

+ 0 mm
- 300 mm

Final faces beyond the plus tolerance may be accepted by the Contract Administrator where they are not detrimental to the work.

c) Horizontal grading tolerances for sloped rock face cut limits:

+ 300 mm
- 300 mm

d) Horizontal grading tolerances for ditch slopes, excluding roadside ditches:

+ 300 mm
- 0 mm

Excavation beyond the plus tolerance may be accepted by the Contract Administrator where it is not detrimental to the work.

e) Vertical grading tolerances for all ditching in rock cuts:

+ 30 mm
- 100 mm

Excavation below the minus tolerance may be accepted by the Contract Administrator where it is not detrimental to the work.

f) Horizontal grading tolerances at the top of each sideslope of rock embankment construction:

+ 300 mm
- 0 mm

206.07.02 Drainage

Excavation operations shall be performed in such a manner as to avoid water saturation of embankment material and roadway foundation material and to avoid leaving undrained pockets in rock excavations by providing effective drainage during all stages of the work.

In excavations below subgrade and in stripping operations where provision for surface drainage is impractical, backfill materials shall be placed as soon as possible following the excavation work.

Ditching required to provide for drainage of an embankment shall be completed in advance of the embankment construction. Ditches in roadway cuts shall be constructed as soon as possible to provide drainage from the cuts. Ditches located above and beyond roadway cuts shall be constructed prior to excavating adjacent cuts. Where pipe subdrains are required in the base of roadway cuts, such work shall be carried out at the time that the roadside ditches are being constructed.

206.07.03 Earth Excavation, Grading

206.07.03.01 General

The work shall include excavating, hauling, handling and placing in embankments, shaping, compacting, trimming of earth material and applying temporary cover, and the management of excavated material.

Suitable excavated earth from roadway cuts, ditching, and other associated sites shall be used in embankment construction and as specified in the Contract Documents.

206.07.03.02 Provision for Temporary Cover

Mulch for cover used in temporary applications shall be applied according to OPSS 804 to areas specified in the Contract Documents.

206.07.03.03 Excavation Below Subgrade

Unsuitable materials, other than swamp material, shall be removed below the subgrade to the lengths, widths, and depths specified in the Contract Documents. The resulting excavation shall be backfilled with approved material and compacted.

206.07.03.04 Backfilling of Overexcavated Areas

Where overexcavation occurs, it shall be backfilled with approved material and compacted. With the exception of frontslopes and where boulders are encountered in the excavated slopes, backfilling shall not be permitted to obtain required slopes for excavations. When boulders are encountered in the excavated slopes, the boulders shall be removed when directed by the Contract Administrator and the cavity backfilled with approved material and compacted.

206.07.03.05 Overexcavation of Cut Slopes

Suitable material from overexcavation of cut slopes shall be used in embankment construction.

206.07.03.06 Swamp Excavation

Swamp excavation shall be according to OPSS 209.

206.07.03.07 Stripping

Except where swamp treatment is required, the original ground under embankments of 1.2 m or less in height and the original surface over the entire width of all excavation shall be stripped as specified in the Contract Documents. The height of embankment shall be measured from original ground to profile grade.

Material meeting the requirements of topsoil according to OPSS 802 shall be stockpiled.

Stripped material that does not meet the requirements of OPSS 802 shall be managed as per the Management of Excavated Material clause.

206.07.03.08 Excavation for Widening

Excavation that is adjacent to the travelled portion of the roadway shall at no time be in advance of the backfilling operation by a distance greater than the limits specified in the Contract Documents. Any such excavation shall be backfilled and compacted with material specified in the Contract Documents prior to closing down operations each day.

206.07.04 Excavation for Pavement Widening

The work shall include excavating a trench adjacent to the existing pavement, to the widths and depths specified in the Contract Documents. Excavated material shall be spread on the adjacent shoulders and slopes.

206.07.05 Rock Excavation, Grading

206.07.05.01 General

The work shall include drilling and blasting to obtain the required rock excavation and shatter, mucking, and bringing to grade any overexcavation. The use of explosives in the blasting operation shall be according to the Contract Documents.

All excavated rock materials, including rock materials resulting from overbreak and scaling, except the quantity of rock surplus, shall be placed in embankments.

Where rock is to be excavated, all overlying stumps, roots, and vegetation shall be treated as excess material. Where earth overlies the rock to be excavated, the earth shall be removed. This work shall be performed sufficiently in advance of blasting operations to allow rock cross-sections to be taken.

Scaling and the removal of all rock or boulders liable to slide or roll down rock cuts either on or outside the excavation areas shall be performed during or after mucking. Cut ditches shall be excavated at the same time as the main excavation.

Excavation below grade in rock cuts shall be brought to grade within the specified tolerances with approved material.

Rock in roadway cuts shall be shattered to a uniform minimum depth of 300 mm below the theoretical rock subgrade for the full width of the cut, including the ditch.

206.07.05.02 Shale

The Contractor shall determine the method of excavation of shale according to site conditions. Side slopes in shale shall be as specified in the Contract Documents. Rock face and shatter are not required in shale.

206.07.05.03 Drilling

All drilling shall be performed within the design excavation limits and to provide shatter as specified in the Contract Documents.

206.07.06 Rock Face

The work shall include drilling and blasting using one or more wall control blasting techniques to produce rock face when specified in the Contract Documents. The work shall also include scaling, removing all overbreak and scaled rock, and incorporating removed rock into embankments.

The spacing and diameter of drill holes for wall control blasting of rock face shall be decided by the Contractor. The spacing and diameter of holes shall be adjusted where necessary to ensure a uniform shear face between holes.

The first line of production holes shall be positioned and loaded with explosives in such a manner as to produce the required rock face.

206.07.07 Earth Embankments

206.07.07.01 General

Embankment material shall be deposited and spread in uniform layers for the full width of the embankment and each layer shall be compacted before the succeeding layer is placed. The lower portion of side hill or sloping sections shall be constructed as above until a full width surface of the specified cross-section is obtained. The embankment shall be completed thereafter with full width layers or as stage construction allows.

The construction of a core through the embankment and the subsequent completion of the embankment are prohibited except where core construction is permitted in swamps as specified in OPSS 209. The use of surplus material and the placing of material in difficult locations by side dumping may be permitted subject to the approval of the Contract Administrator.

Boulders, cobbles, fragments of rock, RAP, and reclaimed concrete material over 150 mm in their maximum dimension shall not be placed within 300 mm of the surface of the earth grade.

Boulders, cobbles, fragments of rock, RAP, and reclaimed concrete material up to 0.5 m^3 may be incorporated into an earth embankment provided:

a) They are placed only in the bottom layer of the embankment.

b) The maximum dimension of the largest particle shall not exceed 800 mm.

c) They are not located within 300 mm of the final embankment side slopes.

d) They are not located within 1.0 m of the surface of the earth grade.

When the earth embankment has been completed to the limits specified in the Contract Documents, the Contract Administrator shall be notified before placing any surplus, unsuitable material, and topsoil on the embankment slopes.

Topsoil placed on earth embankments shall be according to OPSS 802.

206.07.07.02 Layer Compaction Method

Except as provided in the Modified Layer Compaction Method clause, all earth embankments shall be built using a layer compaction method. The embankment material shall be spread in uniform full width layers not more than 300 mm in depth prior to compaction. Each layer shall be shaped and compacted to the line and cross-section specified before the succeeding layer is placed. All boulders, cobbles, fragments of rock, RAP, and reclaimed Portland cement concrete greater in dimension than the fully compacted layer depth shall be removed.

Where the ground cannot support construction equipment using this method initially, then the first layer may be increased in thickness according to the modified layer compaction method.

206.07.07.03 Modified Layer Compaction Method

When it is deemed practical to construct an earth embankment or portion of an embankment in thicker lifts than specified in the Layer Compaction Method clause, permission may be requested to do so by supplying full details of the proposed method. The maximum thickness of allowable lifts shall not exceed 600 mm. All boulders, cobbles, and fragments of rock shall not exceed the modified layer depth. All RAP and reclaimed Portland cement concrete shall not exceed 300 mm in thickness.

Before placing material, proof of the ability of the proposed method to achieve the specified density shall be demonstrated by means of a trial section consisting of a single uniform lift covering a minimum area of 400 m^2.

The location and extent of the trial section is subject to approval by the Contract Administrator.

All necessary excavation for establishing the compaction results throughout the layer shall be done by hand.

When the placing and compacting procedure has successfully demonstrated that compaction can be achieved over the entire lift that procedure shall be permitted for the remainder of the work to which it is applicable.

If at any time, test results show that the permitted procedure is no longer producing the required degree of compaction, a new trial area shall be required. Changes in the procedure shall be made to satisfy the requirements of this specification. Such changes shall be in writing to the Contract Administrator before commencing work on the new trial area.

206.07.08 Rock Embankments

206.07.08.01 General

The work shall include, hauling, placement, and compaction of broken rock.

Each rock fill layer shall be compacted with a tractor bulldozer, crawler type. The minimum number of complete passes is six and the maximum number of passes is eight. A complete pass is 100% coverage of the layer surface. The maximum speed of the equipment during each pass shall be 3.2 km/h.

Embankments to be constructed of rock other than shale shall be constructed by placing embankment materials full width in successive, uniform layers. Layers shall not exceed 1.5 m thickness prior to compaction. Material in each layer shall be fully compacted before the succeeding layer is placed.

Materials shall be placed in final position by blading. End dumping or depositing of rock over the end of any layer by hauling equipment is not permitted, except as otherwise noted below. Each layer shall be levelled in place and compacted to minimize voids and bridging of large rock fragments within the embankment.

Rocks fragments exceeding a maximum dimension of 1 m shall be well distributed throughout the embankment. Rock fragments up to a maximum size of 3 m in size may be incorporated into the embankment provided that the rock fragments are less than two-thirds the remaining embankment height, when measured from the bottom of the oversized rock fragment at the point of placement to the top of the rock embankment, and are sufficiently spaced to allow free access of the specified equipment to compact the intervening fill.

Placement and compaction in layers are not required for rock to be placed under water. Rock placed underwater may be placed by end dumping. End dumping shall only be used to an elevation of 1.0 m above the water level after which the rock embankment shall be constructed using the equipment and method specified. The materials shall be well distributed to form a solid embankment constructed to full width as the work progresses, or as stage construction allows.

Where rock embankment is constructed in a wet area such as swamps with full, partial, or no excavation, the direction of the rock placement shall be such that mud waves generated by the rock placement would move away from the embankment. Mud waves shall be displaced or removed to prevent its entrapment below or within the embankment.

Voids on the top surface of the embankment shall be minimized to prevent migration of the roadway subbase and base into the rock fill embankment by chinking the top surface with rock fragments and spalls to form the subgrade prior to the placement of the roadway subbase.

Care shall be taken to avoid large boulders and rock fragments protruding above the average embankment surface within a distance of 3.0 m beyond the edge of shoulder.

Dumping of surplus rock over the sides of embankments is permitted only after the rock embankments have been completed. Dumping over the sides of embankments shall be restricted to areas not affecting features within the right-of-way (e.g., ditches, culverts, and signs) or right-of-way limits. The Contractor shall receive written approval from the Contract Administrator before commencing these operations.

When the rock embankment has been completed, the Contract Administrator shall be notified before placing any surplus, unsuitable material, and or top soil on the embankment slopes.

206.07.08.02 Shale Embankments

Shale embankment materials shall be deposited and spread in uniform layers for the full width of the embankment. Layers shall not exceed 450 mm in thickness prior to compaction. Where a harder more durable rock, such as limestone, is present as an integral part of a shale formation, no pieces greater than 150 mm measured vertical to the embankment layer, or greater than 600 mm measured parallel to layers shall be placed in the embankment.

Compaction of each layer shall be in two stages. In the first stage, a minimum of two passes shall be made with a static sheepsfoot, packall, padfoot, or tamping foot type roller. In the second stage, a minimum of two passes shall be made with a vibratory steel drum or pneumatic-tired roller. Maximum speed of rollers shall not exceed 10 km/hr.

When the shale embankment has been completed, the Contract Administrator shall be notified before placing any surplus, unsuitable material, and or top soil on the embankment slopes.

206.07.08.03 Rock Backfill to Structure

When rock backfill to structures is specified, the rock shall be clean, free from contaminants, with no fragments larger than 250 mm in its greatest dimension.

Rock backfill shall be placed in such a manner that the structure is not damaged. Dumping of rock backfill against a structure shall not be permitted.

206.07.09 Quality Control

206.07.09.01 General

The Contractor shall be responsible for carrying out all quality control grade checks to ensure that horizontal and vertical grading tolerances are met.

206.07.09.02 Submission of Grade Checks

All grade checks relating to horizontal and vertical grading tolerances, including all non-compliances, shall be submitted to the Contract Administrator within 2 Business Days following completion of the grade.

Where grading templates are available, the Contractor shall sign and certify the template as correct. If no template is available, the Contractor shall complete, sign, and submit the attached form OPSF 206-1 to the Contract Administrator.

206.07.09.03 Finished Grades Outside Specification

Where the finished grade or cross-section does not meet the requirements of the Contract Documents, the earth or rock grade surface shall be brought to grade within the specified tolerances.

206.07.10 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

206.08 QUALITY ASSURANCE

The Contract Administrator may conduct random quality assurance grade checks to verify horizontal and vertical grading tolerances. If the finished grade or cross-section is found to be outside the specified tolerances, the Contractor shall be required to bring the earth or rock grade within the specified tolerances.

206.09 MEASUREMENT FOR PAYMENT

206.09.01 Actual Measurement

206.09.01.01 Earth Excavation, Grading

Measurement of earth excavation, grading, shall be by volume in cubic metres measured in its original position and based on cross-sections taken prior to grubbing.

Benching of slopes shall not be measured.

206.09.01.01.01 Overbuilding, Earth

Where the Contract requires borrow, the quantity of material placed beyond the earth grading tolerance shall be deducted from the measured quantity of borrow on a cubic metre for cubic metre basis, with no correction for changes in density of the material.

206.09.01.02 Excavation for Pavement Widening

Measurement of excavation for pavement widening shall be the horizontal length in metres along each edge of existing pavement where widening is specified in the Contract Documents.

206.09.01.03 Rock Excavation, Grading

206.09.01.03.01 General

Measurement of rock excavation, grading, shall be by volume in cubic metres computed from field measurement of cross-sections taken after earth overburden has been removed and shall be based on the designated limits. The theoretical bottom of the cut shall be the shatter line, which shall be 300 mm below the rock grade.

The quantity of rock beyond that specified in the Contract Documents, as ordered by the Contract Administrator in writing, shall be included in the rock excavation computation.

Deductions shall not be made from the rock excavation quantity for any material conforming to OPSS 1004 and used as rip-rap or rock protection.

206.09.01.03.02 Overbuilding, Rock

Where the Contract requires borrow, the quantity of material placed beyond the rock grading tolerance at the top of subgrade and beyond the angle of repose for rock fills, below the subgrade, shall be deducted from the measured quantity of borrow on a cubic metre for cubic metre basis, with no correction for changes in density of the material.

206.09.01.03.03 Boulders

The volume of boulders classified as rock shall be determined on the basis of actual rock measurement.

206.09.01.04 Rock Face

Measurement of rock face shall be by area of the rock face in square metres.

206.09.01.05 Rock Embankment

Measurement of rock embankment shall be by volume in cubic metres of the material placed within the embankment.

206.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

206.10 BASIS OF PAYMENT

206.10.01 Earth Excavation, Grading - Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Material to do the work.

Benching of materials excavated as required to key new fills into existing slopes shall not be included for payment.

206.10.02 Excavation for Pavement Widening - Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Material to do the work.

Material used to backfill the excavation shall be paid for at the Contract price for the tender item of the material used.

Where the Contract Administrator directs that material excavated under this item is to be managed other than as specified in the Excavation for Pavement Widening subsection, then such material shall be managed as excess materials as specified in the Contract Documents and shall be paid as Extra Work.

206.10.03 Rock Excavation, Grading - Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Material to do the work.

When a rock face item is not included in the Contract, rock scaling and the removing of all overbreak and scaled materials shall be included in the rock excavation, grading item.

When a rock embankment item is not included in the Contract, the work of rock embankments shall be included in the rock excavation, grading item.

When excavated rock is to be used for other Contract item work (e.g., rock embankment, granular, and rip-rap) the hauling costs are deemed to be included in payment for the work associated with the appropriate tender item.

Where drilling, blasting, and mucking are required as a part of the work for this tender item, the following progress payments shall be made:

a) 33% of the progress volume for drilling

b) 33% of the progress volume for blasting

206.10.04 Rock Face - Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Material to do the work.

When the Contract does not contain a separate tender item for rock face, the Contract price for Rock Excavation, Grading, shall include full compensation for all labour, Equipment, and Material to do the work of rock face.

On completion of drilling and blasting, a progress payment of 50% of the above item shall be made.

On completion of mucking, a progress payment of 75% shall be made.

206.10.05 Rock Embankment - Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Material to do the work.

When the Contract does not contain a separate tender item for rock embankment, the Contract price for Rock Excavation, Grading, shall include full compensation for all labour, Equipment, and Material to do the work of rock embankment.

206.10.06 Backfill for Overexcavation

Payment shall not be made for backfill for any overexcavation in excess of the specified tolerances.

206.10.07 Backfill for Subexcavation

Material used to backfill subexcavations and transition or grade point treatments shall be paid for at the Contract price for the tender item of material used.

206.10.08 Finished Grades Outside Specification

When finished grades are outside specifications, bringing the earth or rock surface to grade within the specified tolerances shall be at no extra cost to the Owner.

206.10.09 Rock Borrow

When the Contract does not contain sufficient rock within the Contract limits and the Contract does not contain a rock embankment item, rock borrow shall be paid according to OPSS 212.

CERTIFICATION OF GRADE ELEVATION / CROSSFALL

CONTRACT _____ **LOCATION** _____

COMPONENT _____ **LOCATION** _____

In compliance with the Contract, I hereby certify that the following portions of the above component of the work have been correctly constructed to the specified line and grade tolerances.

FROM STATION	TO STATION	TYPE OF GRADE	DATE	CERTIFIED BY	
				Print Name	Signature

OPSF 206-1

Appendix 206-A, November 2013
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Locations for use of excavated material. (206.07.01.04)

- Areas requiring temporary cover. (206.07.03.02)

- Location and extent of unsuitable material below subgrade to be removed. (206.07.03.03)

- The stripping limits. (206.07.03.07)

- The maximum limit of open excavation allowed adjacent to the travelled roadway. (206.07.03.08)

- The widths and depths when excavation is required adjacent to the travelled roadway. (206.07.04)

The designer should determine if the following is required and, if so, specify it in the Contract Documents:

- Rock material management plan. (206.04.01.01)

- Borrow requirements. (206.07.01.05)

- Rock face item. (206.07.06)

- Rock embankment item. (206.10.05)

The designer should be aware that in estimating fill quantities, where displacement may be anticipated, an allowance should be made for losses into bottom of fills in material due to displacement.

Consideration should be given to the use of trial blast over a limited extent to ensure that the method spacing and diameter wall control blast holes are properly selected to achieve an acceptable rock face for the given rock condition.

On reconstruction projects, areas of subgrade shatter, rock fill, and previously blasted rock to be removed should be clearly defined in terms of location, depth, etc.

When a rock embankment item is not included in the Contract, the designer should include a rock borrow item if there is insufficient rock within the Contract limits.

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Appendix 206-A

Related Ontario Provincial Standard Drawings

OPSD 200.010	Earth/Shale Grading, Undivided Rural
OPSD 200.020	Earth/Shale Grading, Divided Rural
OPSD 201.010	Rock Grading, Undivided Rural
OPSD 201.020	Rock Grading, Divided Rural
OPSD 202.010	Slope Flattening Using Excess Material on Earth or Rock Embankment
OPSD 202.020	Drainage Gap for Slope Flattening on Rock or Granular Embankment
OPSD 202.030	Embankment Widening for Guide Rail End Treatments and Transitions
OPSD 203.010	Embankments Over Swamp, New Construction
OPSD 203.020	Embankments Over Swamp, Existing Slope Excavated to 1H:1V
OPSD 203.030	Embankments Over Swamp, Existing Slopes Maintained
OPSD 203.040	Embankments Over Swamp at Pipe Culverts ≤ 1,500mm
OPSD 204.010	Boulder Treatment, Cut Sections - Subgrade
OPSD 205.010	Transition Treatment, Earth Cut to Earth Fill
OPSD 205.020	Transition Treatment, Rock Cut to Rock Fill
OPSD 205.030	Transition Treatment, Rock Cut to Earth Fill
OPSD 205.040	Transition Treatment, Earth Fill to Rock Fill and Earth Fill to Granular Fill
OPSD 205.050	Transition Treatment, Rock Cut to Earth Cut
OPSD 205.060	Frost Heave Treatment
OPSD 208.010	Benching of Earth Slopes
OPSD 209.010	Rural Pavement Widening
OPSD 209.011	Rural Pavement Widening with Curb and Gutter
OPSD 209.020	Widening, Existing Rock Cut with Grade Raise
OPSD 300.010	Side Road Intersection, Fill
OPSD 300.020	Side Road Intersection, Cut
OPSD 301.010	Rural Entrances to Roads on Fill
OPSD 301.020	Rural Entrances to Roads in Earth Cut With Culvert Installation
OPSD 301.030	Rural Entrance, Rock Cut