Note: The 120 implemented in April 2025 replaces 120, November 2014 with no technical content changes.

GENERAL SPECIFICATION FOR THE USE OF EXPLOSIVES

TABLE OF CONTENTS

120.01 SCOPE

This specification covers the requirements for the use of explosives.

~~120.01.01 Specification Significance and Use~~

~~This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.~~

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

~~120.01.02 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.~~

120.02 REFERENCES

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

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

Ontario Ministry of Transportation Publications

Ontario Traffic Manual (OTM):
Book 7 - Temporary Conditions

Department of Fisheries and Oceans (DFO) Publication

Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters, 1998

International Society of Explosives Engineers (ISEE)

Performance Specifications for Blasting Seismographs, 2011 Edition

120.03 DEFINITIONS

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

Blaster means a competent person knowledgeable, experienced, and trained in the handling, use, and storage of explosives and their effect on adjacent property and persons.

Blast Monitoring Consultant means a consulting engineering firm with a minimum of 5 years experience related to blasting retained by the Contractor to provide blast monitoring services. ~~-~~The blast monitoring consultant shall be a third party that is not owned or corporately affiliated with the Contractor responsible for the Work.

Consulting Engineering Firm means a firm or an individual that has been issued a Certificate of Authorization and a Consulting Engineer designation by the Professional Engineers Ontario.

Designated Blast Area means the area where the Contractor has notified, in writing, and provided information to all Utilities, public and private property owners, and as the area where the Contractor has made arrangements to evacuate all persons whose safety might be threatened by the blasting operation.

Fish Habitat means as defined by the Fisheries Act.

Flyrock means rock that becomes airborne as a direct result of a blast.

Peak Particle Velocity (PPV) means the maximum component velocity in millimetres per second that ground particles move as a result of energy released from explosive detonations.

Pre-Blast Survey means a detailed record, accompanied by film or video, as necessary, of the condition of private or public property, prior to the commencement of blasting operations.

120.04 DESIGN AND SUBMISSION REQUIREMENTS

120.04.01 Design Requirements

A blast design shall be prepared by an individual or firm with a minimum 5 years experience and be certified by an Engineer. The blast design shall include, as a minimum, the following:

a) Design PPV and design peak sound pressure level at 250 m radius from the area of the blast or nearest Utility, residence, structure, or facility.

b) Number, pattern, orientation, spacing, size, and depth of drill holes.

c) Collar and toe load, number and time of delays, and mass and type of charge per delay.

d) Setback distances to affected fish habitat.

e) The explosive products to be used.

f) The designated blast area.

120.04.02 Submission Requirements

The following shall be submitted to the Contract Administrator:

a) A minimum of 2 weeks prior to the use of explosives:

   i. The name and statement of experience of the firm carrying out the blasting.
   ii. The name of the blaster including a record of experience and safety training.
   iii. The name of the individual or firm responsible for the blast design, including a record of experience and statement of qualifications.
   iv. A letter from an Engineer certifying the design.
   v. The name of the blast monitoring consultant, including a record of experience and a record of qualifications.
   vi. A certificate of insurance indemnifying the Owner from all claims and damages arising from the use of explosives.

b) A minimum of 48 hours prior to the use of explosives:

i. A letter signed by the Engineer certifying the blast design indicating the areas for which the blast design has been completed.
ii. A letter signed by the blaster indicating receipt of the blast design and agreement that the blasting shall be according to the design.
iii. A letter signed by the Contractor certifying that a pre-blast survey has been carried out in accordance with the Pre-Blast Survey subsection and a copy of the pre-blast survey.
iv. A copy of the blast design, including all items shown in the Design Requirements subsection.
v. The designated blast area.
vi. A blasting schedule.
vii. A list of all locations to be monitored.
viii. Proof of calibration of all monitoring equipment.

c) Upon request, any blasting permits, approvals, and agreements required for the use of explosives or to carry out blasting operations.

120.05 MATERIALS

120.05.01 Explosives

Only explosive products approved for use in Canada shall be used.

120.06 EQUIPMENT

120.06.01 Detonation Apparatus

Detonation apparatus shall be of the type approved by the detonation system manufacturer for the type of blasting operation to be undertaken. All apparatus shall be kept in working order and shall be thoroughly inspected before and after each blasting operation.

All wiring connected to electrical detonation apparatus shall be properly insulated.

120.06.02 Monitoring Equipment

All monitoring equipment shall be capable of measuring and recording ground vibration PPV up to 200 mm/s in the vertical, transverse, and radial directions. The equipment shall have been calibrated within the last 12 months either by the manufacturer or other qualified agent. Proof of calibration shall be submitted to the Contract Administrator prior to commencement of any monitoring operations.

Monitoring equipment shall be according to ISEE Performance Specifications for Blasting Seismographs.

120.07 CONSTRUCTION

120.07.01 General

Blasting shall be carried out only during daylight hours and at a time when atmospheric conditions provide clear observation of the blast when practical from a minimum distance of 1,000 m. Blasting shall not be conducted on Sundays, statutory holidays, or during electrical storms.

Blasting shall not be carried out within 30 m of concrete placed less than 72 hours when the ambient temperature falls below 20 °C or for 36 hours when the ambient temperature is continuously greater than 20 °C, unless otherwise authorized by the Contract Administrator.

Protection of fish and fish habitat shall be according to the Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters.

120.07.02 Radio-Frequency Hazards

Prior to blasting, investigations shall be done to determine if radio-frequency hazards exist. When such hazards exist, necessary precautions shall be taken.

120.07.03 Pre-Blast Survey

A pre-blast survey shall be prepared for all buildings, Utilities, structures, water wells, and facilities likely to be affected by the blast and those within 150 m of the location where explosives are to be used. The standard inspection procedure shall include the provision of an explanatory letter to the owner or occupant and owner with a formal request for permission to carry out an inspection.

The pre-blast survey shall include, as a minimum, the following information:

a) Type of structure, including type of construction and if possible, the date when built.

b) Identification and description of existing differential settlements, including visible cracks in walls, floors, and ceilings, including a diagram, if applicable, room-by-room. All other apparent structural and cosmetic damage or defect shall also be noted. Defects shall be described, including dimensions, wherever possible.

c) Digital photographs or digital video or both, as necessary, to record areas of significant concern.

Photographs and videos shall be clear and shall accurately represent the condition of the property. Each photograph or video shall be clearly labelled with the location and date taken.

A copy of the pre-blast survey limited to a single residence or property, including copies of any photographs or videos that may form part of the report shall be provided to the owner of that residence or property, upon request.

120.07.04 Notification

120.07.04.01 General

A minimum of 15 Business Days prior to blasting, the Contractor shall provide written notice to Utilities and all owners and tenants of improved property within 500 m of the right-of-way in the vicinity of the blast. The notice shall include a blasting schedule, information about the audible blast warning system, and contact name for questions or other concerns.

The Contractor shall ensure that a competent person is available to receive, document, and deal with public inquiries before and after blasting operations.

A minimum 48 hours prior to blasting, sufficient detail regarding the blasting operations shall be provided to NAV Canada.

120.07.04.02 Utilities

Authorities of all likely affected Utilities shall be notified a minimum of 72 hours prior to blasting.

120.07.04.03 Properties

Not more than 5 Business Days and not less than 4 hours prior to each blast, the Contractor shall provide notice of the blasting schedule to all owners and tenants of buildings or facilities within 150 m of the blast. All blasts scheduled for the following 7 Days may be included in one notice. The notice shall include information about the audible blast warning system.

When blasting operations may incur property damage or require temporary evacuation, notification shall include evacuation information and instructions. The Contractor shall take all reasonable steps to ensure that the property owner acknowledges, by their signature, that they have received the information and shall comply with any evacuation requirements. When such signature is withheld, the Contractor shall maintain records showing the date and time that the information was delivered.

120.07.04.04 Flyrock

A completed copy of MTO form PH-CC-808, Flyrock Incident Form - Part A, shall be submitted to the Contract Administrator within 48 hours of a blast where flyrock was generated and landed outside the designated blast area.

120.07.05 Monitoring

120.07.05.01 General

The Contractor shall employ a blast monitoring consultant to carry out monitoring for PPV, peak sound pressure levels, and water overpressures as required. During each blast, ground vibration PPV and the peak sound pressure level shall be monitored at 250 m from the area of the blast or at the closest portion of any Utility, residence, structure, or facility. Water overpressure in affected fish habitats shall be monitored adjacent to the shore closest to the blast. The monitoring equipment shall be repositioned as required.

120.07.05.02 Ground Vibration

Ground vibration as measured by PPV shall be limited to the maximum levels shown in Table 1. Should readings from any two consecutive blasts exceed these values or any single reading exceed these values by more than 30 mm/s, the blast operation shall cease until a revised blast design, certified by the Engineer, has been submitted to the Contract Administrator.

120.07.05.03 Water Overpressure

Instantaneous pressure change as measured by water overpressure in or near fish habitat shall not exceed 100 kPa.

120.07.05.04 Trial Blasts

The Contractor shall confirm the suitability of the blast design for the ground vibration PPV limits and sound pressure levels by carrying out a minimum of three limited test blasts at locations agreed upon by the Contract Administrator and the Contractor. The trial blasts shall be carried out with appropriate blast vibration and noise level monitoring equipment. Based on the results, the initial blast design shall be revised as necessary.

120.07.06 Protective Measures

Immediately prior to the blast, the designated blast area shall be cleared of all vehicular and pedestrian traffic.

All traffic shall be stopped and prevented from entering the area until the blaster gives permission. Traffic control shall be according to the Ontario Traffic Manual, Book 7. Signs shall be posted to inform the public of blasting operations and to turn off radio transmitters. Audible blast warning devices, capable of alerting workers and the public up to a radius of 1,000 m, shall be used before and after blasting.

Blasting mats or other suitable means of controlling flyrock shall be used to limit potential hazardous effects of the blast.

120.07.06.01 Protection of Utility Lines

Where temporary rearranging and shielding of utility lines are detailed within the Contract Documents, such temporary rearranging and shielding is the minimum protection required. The Contractor shall remain responsible for any unauthorized disruptions of service and any damage to utilities arising out of the Contractor's work, notwithstanding such protection. The Utility authorities shall carry out the temporary rearranging and shielding of lines as detailed within the Contract Documents and more extensive rearranging and shielding if requested to do so by the Contractor. The cost of all such protective measures, together with the cost of restoring the lines to their original state and location, shall be at the expense of the Contractor, and shall be billed to the Contractor by the Utility authority.

Notwithstanding the preceding paragraph, the Utility authorities shall, subject to the Contractor's obligation under the Contract to assume responsibility for disruption of services and damage, consider alternative measures which the Contractor may suggest. Such alternative measures, if approved by the Utility authorities in writing, shall be provided at the Contractor's expense and billed to the Contractor by the Utility authority.

Whenever, in the opinion of the Utility authority, standby crews are necessary during blasting operations, the Contractor shall make the necessary arrangements with the Utility authority and the cost of such crews and equipment shall be billed to the Contractor by the Utility authority. These measures shall apply to those utilities located within all rock blasting areas.

120.07.07 Records

A post-blast record shall be prepared and signed by the blaster for each blast completed. The post-blast record shall report the following conditions and be made available to the Contract Administrator for site review:

a) The date, time, and location of the blast.

b) The wind direction and approximate speed at the time of the blast.

c) The general atmospheric conditions at the time of the blast.

d) The actual blast details.

e) PPV, peak sound pressure level, and water overpressure results of each blast.

A report summarizing the results of the ground vibration and peak sound pressure levels shall be submitted to the Contract Administrator at the end of each work day that blasting was carried out.

120.07.08 Damage

Upon completion of blasting or immediately following the receipt of a complaint, a site condition survey shall be performed to determine if any damage has resulted. The Contractor shall record all incidents of any damage or injury, which shall be reported immediately in writing to the Contract Administrator. All other complaints shall be reported to the Contract Administrator in writing within 24 hours of receipt. Each complaint report shall include the name and address of the complainant, time received, and description of the circumstances that led to the complaint.

120.07.09 Management of Excess Material

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

120.10 BASIS OF PAYMENT

Payment at the Contract price for the appropriate tender items that requires the use of explosives shall be full compensation for all labour, Equipment, and Material to do the work.

When the Contract contains separate items for work required by this specification, payment shall be at the Contract prices and according to the specifications for such work.

The cost of standby crews and equipment required by Utility authorities shall be the responsibility of the Contractor.

120.10.01 Claims

The Contractor shall be responsible for the management of all claims and payment arising from the hauling, handling, use of, and storing of explosives and all effects, directly or indirectly related to the blasting operation.

TABLE 1
Maximum Peak Particle Velocity Values

Element	Frequency Hz	Peak Particle Velocity (PPV) mm/s
Structures and Pipelines	≤ 40	20
	> 40	50
Concrete and Grout < 72 hours from placement	N/A	10

Appendix 120-A, November 2014
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

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.

Note: The 120 implemented in April 2025 replaces 120, November 2014 with no technical content changes.

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Consulting Engineering Firm means a firm or an individual that has been issued a Certificate of Authorization and a Consulting Engineer designation by the Professional Engineers Ontario.

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b) Number, pattern, orientation, spacing, size, and depth of drill holes.

c) Collar and toe load, number and time of delays, and mass and type of charge per delay.

d) Setback distances to affected fish habitat.

e) The explosive products to be used.

f) The designated blast area.

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The following shall be submitted to the Contract Administrator:

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   i. The name and statement of experience of the firm carrying out the blasting.
   ii. The name of the blaster including a record of experience and safety training.
   iii. The name of the individual or firm responsible for the blast design, including a record of experience and statement of qualifications.
   iv. A letter from an Engineer certifying the design.
   v. The name of the blast monitoring consultant, including a record of experience and a record of qualifications.
   vi. A certificate of insurance indemnifying the Owner from all claims and damages arising from the use of explosives.

b) A minimum of 48 hours prior to the use of explosives:

   i. A letter signed by the Engineer certifying the blast design indicating the areas for which the blast design has been completed.
   ii. A letter signed by the blaster indicating receipt of the blast design and agreement that the blasting shall be according to the design.
   iii. A letter signed by the Contractor certifying that a pre-blast survey has been carried out in accordance with the Pre-Blast Survey subsection and a copy of the pre-blast survey.
   iv. A copy of the blast design, including all items shown in the Design Requirements subsection.
   v. The designated blast area.
   vi. A blasting schedule.
   vii. A list of all locations to be monitored.
   viii. Proof of calibration of all monitoring equipment.

c) Upon request, any blasting permits, approvals, and agreements required for the use of explosives or to carry out blasting operations.

120.05 MATERIALS

120.05.01 Explosives

Only explosive products approved for use in Canada shall be used.

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Detonation apparatus shall be of the type approved by the detonation system manufacturer for the type of blasting operation to be undertaken. All apparatus shall be kept in working order and shall be thoroughly inspected before and after each blasting operation.

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120.07.01 General

Blasting shall be carried out only during daylight hours and at a time when atmospheric conditions provide clear observation of the blast when practical from a minimum distance of 1,000 m. Blasting shall not be conducted on Sundays, statutory holidays, or during electrical storms.

Blasting shall not be carried out within 30 m of concrete placed less than 72 hours when the ambient temperature falls below 20 °C or for 36 hours when the ambient temperature is continuously greater than 20 °C, unless otherwise authorized by the Contract Administrator.

Protection of fish and fish habitat shall be according to the Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters.

120.07.02 Radio-Frequency Hazards

Prior to blasting, investigations shall be done to determine if radio-frequency hazards exist. When such hazards exist, necessary precautions shall be taken.

120.07.03 Pre-Blast Survey

A pre-blast survey shall be prepared for all buildings, Utilities, structures, water wells, and facilities likely to be affected by the blast and those within 150 m of the location where explosives are to be used. The standard inspection procedure shall include the provision of an explanatory letter to the owner or occupant and owner with a formal request for permission to carry out an inspection.

The pre-blast survey shall include, as a minimum, the following information:

a) Type of structure, including type of construction and if possible, the date when built.

b) Identification and description of existing differential settlements, including visible cracks in walls, floors, and ceilings, including a diagram, if applicable, room-by-room. All other apparent structural and cosmetic damage or defect shall also be noted. Defects shall be described, including dimensions, wherever possible.

c) Digital photographs or digital video or both, as necessary, to record areas of significant concern.

Photographs and videos shall be clear and shall accurately represent the condition of the property. Each photograph or video shall be clearly labelled with the location and date taken.

A copy of the pre-blast survey limited to a single residence or property, including copies of any photographs or videos that may form part of the report shall be provided to the owner of that residence or property, upon request.

120.07.04 Notification

120.07.04.01 General

A minimum of 15 Business Days prior to blasting, the Contractor shall provide written notice to Utilities and all owners and tenants of improved property within 500 m of the right-of-way in the vicinity of the blast. The notice shall include a blasting schedule, information about the audible blast warning system, and contact name for questions or other concerns.

The Contractor shall ensure that a competent person is available to receive, document, and deal with public inquiries before and after blasting operations.

A minimum 48 hours prior to blasting, sufficient detail regarding the blasting operations shall be provided to NAV Canada.

120.07.04.02 Utilities

Authorities of all likely affected Utilities shall be notified a minimum of 72 hours prior to blasting.

120.07.04.03 Properties

Not more than 5 Business Days and not less than 4 hours prior to each blast, the Contractor shall provide notice of the blasting schedule to all owners and tenants of buildings or facilities within 150 m of the blast. All blasts scheduled for the following 7 Days may be included in one notice. The notice shall include information about the audible blast warning system.

When blasting operations may incur property damage or require temporary evacuation, notification shall include evacuation information and instructions. The Contractor shall take all reasonable steps to ensure that the property owner acknowledges, by their signature, that they have received the information and shall comply with any evacuation requirements. When such signature is withheld, the Contractor shall maintain records showing the date and time that the information was delivered.

120.07.04.04 Flyrock

A completed copy of MTO form PH-CC-808, Flyrock Incident Form - Part A, shall be submitted to the Contract Administrator within 48 hours of a blast where flyrock was generated and landed outside the designated blast area.

120.07.05 Monitoring

120.07.05.01 General

The Contractor shall employ a blast monitoring consultant to carry out monitoring for PPV, peak sound pressure levels, and water overpressures as required. During each blast, ground vibration PPV and the peak sound pressure level shall be monitored at 250 m from the area of the blast or at the closest portion of any Utility, residence, structure, or facility. Water overpressure in affected fish habitats shall be monitored adjacent to the shore closest to the blast. The monitoring equipment shall be repositioned as required.

120.07.05.02 Ground Vibration

Ground vibration as measured by PPV shall be limited to the maximum levels shown in Table 1. Should readings from any two consecutive blasts exceed these values or any single reading exceed these values by more than 30 mm/s, the blast operation shall cease until a revised blast design, certified by the Engineer, has been submitted to the Contract Administrator.

120.07.05.03 Water Overpressure

Instantaneous pressure change as measured by water overpressure in or near fish habitat shall not exceed 100 kPa.

120.07.05.04 Trial Blasts

The Contractor shall confirm the suitability of the blast design for the ground vibration PPV limits and sound pressure levels by carrying out a minimum of three limited test blasts at locations agreed upon by the Contract Administrator and the Contractor. The trial blasts shall be carried out with appropriate blast vibration and noise level monitoring equipment. Based on the results, the initial blast design shall be revised as necessary.

120.07.06 Protective Measures

Immediately prior to the blast, the designated blast area shall be cleared of all vehicular and pedestrian traffic.

All traffic shall be stopped and prevented from entering the area until the blaster gives permission. Traffic control shall be according to the Ontario Traffic Manual, Book 7. Signs shall be posted to inform the public of blasting operations and to turn off radio transmitters. Audible blast warning devices, capable of alerting workers and the public up to a radius of 1,000 m, shall be used before and after blasting.

Blasting mats or other suitable means of controlling flyrock shall be used to limit potential hazardous effects of the blast.

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Where temporary rearranging and shielding of utility lines are detailed within the Contract Documents, such temporary rearranging and shielding is the minimum protection required. The Contractor shall remain responsible for any unauthorized disruptions of service and any damage to utilities arising out of the Contractor's work, notwithstanding such protection. The Utility authorities shall carry out the temporary rearranging and shielding of lines as detailed within the Contract Documents and more extensive rearranging and shielding if requested to do so by the Contractor. The cost of all such protective measures, together with the cost of restoring the lines to their original state and location, shall be at the expense of the Contractor, and shall be billed to the Contractor by the Utility authority.

Notwithstanding the preceding paragraph, the Utility authorities shall, subject to the Contractor's obligation under the Contract to assume responsibility for disruption of services and damage, consider alternative measures which the Contractor may suggest. Such alternative measures, if approved by the Utility authorities in writing, shall be provided at the Contractor's expense and billed to the Contractor by the Utility authority.

Whenever, in the opinion of the Utility authority, standby crews are necessary during blasting operations, the Contractor shall make the necessary arrangements with the Utility authority and the cost of such crews and equipment shall be billed to the Contractor by the Utility authority. These measures shall apply to those utilities located within all rock blasting areas.

120.07.07 Records

A post-blast record shall be prepared and signed by the blaster for each blast completed. The post-blast record shall report the following conditions and be made available to the Contract Administrator for site review:

a) The date, time, and location of the blast.

b) The wind direction and approximate speed at the time of the blast.

c) The general atmospheric conditions at the time of the blast.

d) The actual blast details.

e) PPV, peak sound pressure level, and water overpressure results of each blast.

A report summarizing the results of the ground vibration and peak sound pressure levels shall be submitted to the Contract Administrator at the end of each work day that blasting was carried out.

120.07.08 Damage

Upon completion of blasting or immediately following the receipt of a complaint, a site condition survey shall be performed to determine if any damage has resulted. The Contractor shall record all incidents of any damage or injury, which shall be reported immediately in writing to the Contract Administrator. All other complaints shall be reported to the Contract Administrator in writing within 24 hours of receipt. Each complaint report shall include the name and address of the complainant, time received, and description of the circumstances that led to the complaint.

120.07.09 Management of Excess Material

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

120.10 BASIS OF PAYMENT

Payment at the Contract price for the appropriate tender items that requires the use of explosives shall be full compensation for all labour, Equipment, and Material to do the work.

When the Contract contains separate items for work required by this specification, payment shall be at the Contract prices and according to the specifications for such work.

The cost of standby crews and equipment required by Utility authorities shall be the responsibility of the Contractor.

120.10.01 Claims

The Contractor shall be responsible for the management of all claims and payment arising from the hauling, handling, use of, and storing of explosives and all effects, directly or indirectly related to the blasting operation.

TABLE 1
Maximum Peak Particle Velocity Values

Element	Frequency Hz	Peak Particle Velocity (PPV) mm/s
Structures and Pipelines	≤ 40	20
	> 40	50
Concrete and Grout < 72 hours from placement	N/A	10

Identification of Waterbodies for Application of DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters

120.07 CONSTRUCTION

120.07.01 General

Subsection 120.07.01 of OPSS 120 is amended by deleting the last paragraph in its entirety and replacing it with the following:

Protection of fish and fish habitat shall be according to the Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters within waterbodies specified below:

* Designer Fill-in – See Notes to Designer

NOTES TO DESIGNER:

Designer Fill-In:

* List all waterbodies that are of concern for the contract.

This SP is to be included in contracts when it is determined that the requirements to protect fish and fish habitat in the DFO Guidelines can be met. If it is determined that the DFO Guidelines cannot be met it is the responsibility of the contract designer/consultant to ensure that authorization is obtained from DFO and appropriate design measures incorporated into the contract documents.

WARRANT: When using confined explosives in or near Canadian fisheries waters and the requirements and limitations in the DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters can be met.

AMENDMENT TO OPSS 120, APRIL 2025

Special Provision No. 101F02 April 2025

Identification of Waterbodies for Application of DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters

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* List all waterbodies that are of concern for the contract.

This SP is to be included in contracts when it is determined that the requirements to protect fish and fish habitat in the DFO Guidelines can be met. If it is determined that the DFO Guidelines cannot be met it is the responsibility of the contract designer/consultant to ensure that authorization is obtained from DFO and appropriate design measures incorporated into the contract documents.

WARRANT: When using confined explosives in or near Canadian fisheries waters and the requirements and limitations in the DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters can be met.

Ontario Provincial Standard Specifications (OPSSs)					
202	November 2013	April 2025	TBD	Rev: Construction Specification for Rock Removal by Manual Scaling, Machine Scaling, Trim Blasting, or Controlled Blasting is implemented. The specification has been updated to new PROV format with no technical content changes. Legacy Appendix A removed. Applicable content from SSP 202S01 has been incorporated into OPSS 202.	Mike Pearsall
Standard Special Provisions (SSPs)					
202S01	February 2018	April 2025	TBD	Can: SSP Amendment to Rock Removal by Manual Scaling, Machine Scaling, Trim Blasting, or Controlled Blasting is cancelled. Applicable content has been incorporated into OPSS 202.	Mike Pearsall

Note: The 202 implemented in April 2025 replaces 202, November 2013 with no technical content changes.

CONSTRUCTION SPECIFICATION FOR ROCK REMOVAL BY MANUAL SCALING, MACHINE SCALING, TRIM BLASTING, OR CONTROLLED BLASTING

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202.01 SCOPE

This specification covers the requirements for removing rock by manual scaling, machine scaling, trim blasting, or controlled blasting.

~~202.01.01 Specification Significance and Use~~

~~This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.~~

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

~~202.01.02 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.~~

202.02 REFERENCES

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

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

Ontario Provincial Standard Specifications, Construction

OPSS 206 Grading

202.03 DEFINITIONS

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

Controlled Blasting means cushion blasting, line drilling, and pre-shearing as defined in OPSS 206.

Grubbing means as defined in OPSS 206.

Mucking means as defined in OPSS 206.

Rock Cut Sounding means any non-destructive method using mechanical or electronic devices to acoustically determine areas where rock is partially or completely detached from the main rock mass.

Rock Face means as defined in OPSS 206.

Scaling means as defined in OPSS 206.

Trim Blasting means a blasting technique involving the drilling of a single row of closely-spaced holes along the excavation limits, loading them with light, well-distributed charges, completely stemmed, and simultaneously firing the charges.

Wall Control Blasting means as defined in OPSS 206.

202.04 DESIGN AND SUBMISSION REQUIREMENTS

202.04.02 Submission Requirements

A minimum of 5 Business Days prior to beginning the Work, the name and contact number of the on-site person that is responsible for the Work being carried out (i.e., foreman) and a written statement showing that the person has had at least 5 years of related work experience, including dates, and has taken all appropriate safety training shall be submitted to the Contract Administrator.

A minimum 5 Business Days prior to beginning the manual scaling work, the following shall be submitted to the Contract Administrator:

a) Proof of training certification for all staff performing the manual scaling work.

b) A safety plan which may include the assignment of additional equipment and personnel or the use of special work methods & procedures, including site-specific communication and rescue procedures, to ensure that, in the event of an incident, all appropriate emergency personnel are immediately informed, and the Contractor is able to affect their own recovery of an injured worker suspended at height or any other member of the work unit, in a timely manner.

A copy of the safety plan shall be kept on site both prior to and during the manual scaling work.

202.06 EQUIPMENT

202.06.01 Lifting Equipment

Lifting equipment shall consist of a two-person aerial lift, crane, or other equipment suitable to access the Work.

202.06.02 Drilling Equipment

Drilling equipment shall consist of a hydraulic track drill or other suitable drilling equipment acceptable to the Contract Administrator and capable of producing holes accurately and uniformly across the top of a rock cut to the depth specified in the Contract Documents.

202.06.03 Backhoe Excavator

Backhoe excavators shall have a minimum operating weight of 30,000 kg and shall be capable of operating to a minimum height of 10 m.

202.06.04 Hoe-Ram Excavator

A backhoe excavator shall be equipped with a minimum 5,200 Joule hydraulic impact hammer.

202.07 CONSTRUCTION

202.07.01 General

The work of the removal of rock by scaling or blasting or both shall include the following:

1. a) All equipment, including any lifting equipment, materials, and labour that is:

i. necessary to gain access to the rock removal locations specified in the Contract Documents.
ii. required by the Owner to obtain access to any areas where:

(1) the Work is being inspected;
(2) quantities are to be measured; or
(3) quality assurance and acceptance procedures are being conducted.

2. b) All associated mucking, hauling, and management of rock material.

Removal of rock shall always be carried out in such a manner as to minimize fracturing and all other disturbance to the surrounding rock beyond the removal limits specified in the Contract Documents.

All blasting, including the use of explosives, shall be as specified in the Contract Documents.

202.07.02 Scaling

202.07.02.01 General

Scaling shall consist of the complete removal of all loose and partially-detached rock at the locations and heights specified in the Contract Documents.

Scaling shall begin at the top of the rock cut and progress to lower elevations as the work proceeds. As the scaling progresses, care shall be taken to avoid undercutting the upper sections of the scaled rock cut.

The scaling crew shall be in continuous full-time radio contact with the foreman to permit direct and immediate control.

Each day, the scaling crew shall inspect the rock cut:

a) prior to the start of work and remove any identified loose or visually unstable rock that may endanger workers.

b) prior to shutdown and remove any identified loose or visually unstable rock that may endanger the traveling public.

202.07.02.02 Manual Scaling

The work of manual scaling shall consist of the complete removal of all loose and partially-detached rock at the locations and heights specified in the Contract Documents by the manual scaling work unit and in addition to all of the other items specified in the Contact Documents, shall also include the following:

a) Rock cut sounding.

b) Scaling of the rock cut with hand tools and hand-held machine tools.

Manual scaling may include blasting with small quantities of explosives, but only when specified as an option in the Contract Documents.

As a minimum, the manual scaling work unit shall consist of the following:

a) Two labourers that are experienced in doing scaling work at the heights required in the Contract and have taken the appropriate safety training.

b) All tools and materials required for the performance of the work.

202.07.02.03 Machine Scaling

The work of machine scaling shall consist of the complete removal of all loose rock and partially-detached rock at the locations and heights specified in the Contract Documents by the machine scaling work unit and in addition to all of the other items specified in the Contact Documents, shall also include the following:

a) Grubbing.

b) Rock cut sounding.

c) Scaling of the rock cut.

As a minimum, the machine scaling work unit shall consist of the following:

a) Either a:

i). Backhoe excavator equipped with a narrow scaling/ditching bucket and hydraulic thumbs; or
ii). Hoe-ram excavator.

b) Backhoe and hoe-ram excavator operators with experience in machine scaling work.

c) All tools and materials required for the performance of the work.

202.07.03 Trim Blasting or Controlled Blasting

202.07.03.01 General

The work of trim blasting or controlled blasting shall consist of drilling and blasting to remove the rock specified for removal in the Contract Documents, while minimizing damage to the surrounding rock.

Any loosened or partially-detached rock shall be properly scaled, as specified in the Scaling subsection.

202.07.03.02 Trim Blasting

In addition to all of the other items specified in the Contact Documents, the work of trim blasting shall also include locating and drilling 50 mm diameter vertical holes along the perimeter of the specified trim at a maximum spacing of 750 mm or at a spacing approved by the Contract Administrator.

202.07.03.03 Controlled Blasting

In addition to all of the other items specified in the Contact Documents, the work of controlled blasting shall also include the appropriate wall control blasting techniques, as specified for rock face in OPSS 206.

202.07.04 Management of Excess Material

Management of excess material shall be as specified in the Contract Documents.

When possible, excess rock material shall be managed within the right-of-way by slope flattening at locations approved by the Contract Administrator or as specified in the Contract Documents.

202.09 MEASUREMENT FOR PAYMENT

202.09.01 Actual Measurement

202.09.01.01 Rock Excavation, Manual Scaling

Measurement of rock excavation by manual scaling shall be by time in hours that the scaling crew is in effective operation.

Effective operation shall not include the time taken for the management and disposal of the materials generated by the scaling operation.

202.09.01.02 Rock Excavation, Machine Scaling

Measurement of rock excavation by machine scaling shall be the cumulative sum of the time in hours that each individual scaling unit is working on the site in effective operation.

Effective operation shall not include the time taken for the management and disposal of all materials generated by the scaling operation or for the construction of any associated ramps.

202.09.01.03 Rock Excavation, Trim Blasting

Measurement of rock excavation by trim blasting shall be by vertical length in metres of drilling required.

202.09.01.04 Rock Excavation, Controlled Blasting

Measurement of rock excavation by controlled blasting shall be by volume in cubic metres of rock measured in-place.

202.09.02 Plan Quantity Measurement

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

202.10 BASIS OF PAYMENT

202.10.01 Rock Excavation, Manual Scaling - Item
Rock Excavation, Machine Scaling - Item
Rock Excavation, Trim Blasting - Item
Rock Excavation, Controlled Blasting - Item

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

Appendix 202-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

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.

Note: The 202 implemented in April 2025 replaces 202, November 2013 with no technical content changes.

CONSTRUCTION SPECIFICATION FOR ROCK REMOVAL BY MANUAL SCALING, MACHINE SCALING, TRIM BLASTING, OR CONTROLLED BLASTING

TABLE OF CONTENTS

202.01 SCOPE

This specification covers the requirements for removing rock by manual scaling, machine scaling, trim blasting, or controlled blasting.

202.02 REFERENCES

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

Ontario Provincial Standard Specifications, Construction

OPSS 206 Grading

202.03 DEFINITIONS

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

Controlled Blasting means cushion blasting, line drilling, and pre-shearing as defined in OPSS 206.

Grubbing means as defined in OPSS 206.

Mucking means as defined in OPSS 206.

Rock Cut Sounding means any non-destructive method using mechanical or electronic devices to acoustically determine areas where rock is partially or completely detached from the main rock mass.

Rock Face means as defined in OPSS 206.

Scaling means as defined in OPSS 206.

Trim Blasting means a blasting technique involving the drilling of a single row of closely-spaced holes along the excavation limits, loading them with light, well-distributed charges, completely stemmed, and simultaneously firing the charges.

Wall Control Blasting means as defined in OPSS 206.

202.04 DESIGN AND SUBMISSION REQUIREMENTS

202.04.02 Submission Requirements

A minimum of 5 Business Days prior to beginning the Work, the name and contact number of the on-site person that is responsible for the Work being carried out (i.e., foreman) and a written statement showing that the person has had at least 5 years of related work experience, including dates, and has taken all appropriate safety training shall be submitted to the Contract Administrator.

A minimum 5 Business Days prior to beginning the manual scaling work, the following shall be submitted to the Contract Administrator:

a) Proof of training certification for all staff performing the manual scaling work.

b) A safety plan which may include the assignment of additional equipment and personnel or the use of special work methods & procedures, including site-specific communication and rescue procedures, to ensure that, in the event of an incident, all appropriate emergency personnel are immediately informed, and the Contractor is able to affect their own recovery of an injured worker suspended at height or any other member of the work unit, in a timely manner.

A copy of the safety plan shall be kept on site both prior to and during the manual scaling work.

202.06 EQUIPMENT

202.06.01 Lifting Equipment

Lifting equipment shall consist of a two-person aerial lift, crane, or other equipment suitable to access the Work.

202.06.02 Drilling Equipment

Drilling equipment shall consist of a hydraulic track drill or other suitable drilling equipment acceptable to the Contract Administrator and capable of producing holes accurately and uniformly across the top of a rock cut to the depth specified in the Contract Documents.

202.06.03 Backhoe Excavator

Backhoe excavators shall have a minimum operating weight of 30,000 kg and shall be capable of operating to a minimum height of 10 m.

202.06.04 Hoe-Ram Excavator

A backhoe excavator shall be equipped with a minimum 5,200 Joule hydraulic impact hammer.

202.07 CONSTRUCTION

202.07.01 General

The work of the removal of rock by scaling or blasting or both shall include the following:

a) All equipment, including any lifting equipment, materials, and labour that is:

   i. necessary to gain access to the rock removal locations specified in the Contract Documents.
   ii. required by the Owner to obtain access to any areas where:

      (1) the Work is being inspected;
      (2) quantities are to be measured; or
      (3) quality assurance and acceptance procedures are being conducted.

b) All associated mucking, hauling, and management of rock material.

Removal of rock shall always be carried out in such a manner as to minimize fracturing and all other disturbance to the surrounding rock beyond the removal limits specified in the Contract Documents.

All blasting, including the use of explosives, shall be as specified in the Contract Documents.

202.07.02 Scaling

202.07.02.01 General

Scaling shall consist of the complete removal of all loose and partially-detached rock at the locations and heights specified in the Contract Documents.

Scaling shall begin at the top of the rock cut and progress to lower elevations as the work proceeds. As the scaling progresses, care shall be taken to avoid undercutting the upper sections of the scaled rock cut.

The scaling crew shall be in continuous full-time radio contact with the foreman to permit direct and immediate control.

Each day, the scaling crew shall inspect the rock cut:

a) prior to the start of work and remove any identified loose or visually unstable rock that may endanger workers.

b) prior to shutdown and remove any identified loose or visually unstable rock that may endanger the traveling public.

202.07.02.02 Manual Scaling

The work of manual scaling shall consist of the complete removal of all loose and partially-detached rock at the locations and heights specified in the Contract Documents by the manual scaling work unit and in addition to all of the other items specified in the Contact Documents, shall also include the following:

a) Rock cut sounding.

b) Scaling of the rock cut with hand tools and hand-held machine tools.

Manual scaling may include blasting with small quantities of explosives, but only when specified as an option in the Contract Documents.

As a minimum, the manual scaling work unit shall consist of the following:

a) Two labourers that are experienced in doing scaling work at the heights required in the Contract and have taken the appropriate safety training.

b) All tools and materials required for the performance of the work.

202.07.02.03 Machine Scaling

The work of machine scaling shall consist of the complete removal of all loose rock and partially-detached rock at the locations and heights specified in the Contract Documents by the machine scaling work unit and in addition to all of the other items specified in the Contact Documents, shall also include the following:

a) Grubbing.

b) Rock cut sounding.

c) Scaling of the rock cut.

As a minimum, the machine scaling work unit shall consist of the following:

a) Either a:

   i. Backhoe excavator equipped with a narrow scaling/ditching bucket and hydraulic thumbs; or
   ii. Hoe-ram excavator.

b) Backhoe and hoe-ram excavator operators with experience in machine scaling work.

c) All tools and materials required for the performance of the work.

202.07.03 Trim Blasting or Controlled Blasting

202.07.03.01 General

The work of trim blasting or controlled blasting shall consist of drilling and blasting to remove the rock specified for removal in the Contract Documents, while minimizing damage to the surrounding rock.

Any loosened or partially-detached rock shall be properly scaled, as specified in the Scaling subsection.

202.07.03.02 Trim Blasting

In addition to all of the other items specified in the Contact Documents, the work of trim blasting shall also include locating and drilling 50 mm diameter vertical holes along the perimeter of the specified trim at a maximum spacing of 750 mm or at a spacing approved by the Contract Administrator.

202.07.03.03 Controlled Blasting

In addition to all of the other items specified in the Contact Documents, the work of controlled blasting shall also include the appropriate wall control blasting techniques, as specified for rock face in OPSS 206.

202.07.04 Management of Excess Material

Management of excess material shall be as specified in the Contract Documents.

When possible, excess rock material shall be managed within the right-of-way by slope flattening at locations approved by the Contract Administrator or as specified in the Contract Documents.

202.09 MEASUREMENT FOR PAYMENT

202.09.01 Actual Measurement

202.09.01.01 Rock Excavation, Manual Scaling

Measurement of rock excavation by manual scaling shall be by time in hours that the scaling crew is in effective operation.

Effective operation shall not include the time taken for the management and disposal of the materials generated by the scaling operation.

202.09.01.02 Rock Excavation, Machine Scaling

Measurement of rock excavation by machine scaling shall be the cumulative sum of the time in hours that each individual scaling unit is working on the site in effective operation.

Effective operation shall not include the time taken for the management and disposal of all materials generated by the scaling operation or for the construction of any associated ramps.

202.09.01.03 Rock Excavation, Trim Blasting

Measurement of rock excavation by trim blasting shall be by vertical length in metres of drilling required.

202.09.01.04 Rock Excavation, Controlled Blasting

Measurement of rock excavation by controlled blasting shall be by volume in cubic metres of rock measured in-place.

202.09.02 Plan Quantity Measurement

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

202.10 BASIS OF PAYMENT

202.10.01 Rock Excavation, Manual Scaling - Item
Rock Excavation, Machine Scaling - Item
Rock Excavation, Trim Blasting - Item
Rock Excavation, Controlled Blasting - Item

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

Ontario Provincial Standard Specifications (OPSSs)					
206	November 2014	April 2025	TBD	Rev: Construction Specification for Grading is implemented. The specification has been updated to new PROV format with no technical content changes. Legacy Appendix A removed. Applicable content from SSP 102S05 has been incorporated into OPSS 206.	Mike Pearsall
Standard Special Provisions (SSPs)					
102S05	May 2017	April 2025	TBD	Can: SSP Amendment to Grading is cancelled. Applicable content has been incorporated into OPSS 206.	Mike Pearsall
206F04	December 2014	April 2025	TBD	Rev: SSP Amendment to Construction Specification for Grading is revised to reflect the new publication version of OPSS 206.	Mike Pearsall
206F06	September 2017	April 2025	TBD	Rev: SSP Amendment to Construction Specification for Grading is revised to reflect the new publication version of OPSS 206.	Mike Pearsall

Note: The 206 implemented in April 2025 replaces 206, November 2014 with no technical content changes.

CONSTRUCTION SPECIFICATION FOR GRADING

TABLE OF CONTENTS

206.01 SCOPE

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

~~206.01.01 Specification Significance and Use~~

~~This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.~~

~~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 provincial-oriented specifications are to be used and there is a provincial-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.PROV, unless use of a municipal-oriented specification is specified in the Contract Documents. When there is not a corresponding provincial-oriented specification, the references below shall be considered to be to the OPSS listed, unless use of a municipal-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	Embankments Over Swamps and Compressible Soils
OPSS 212	Earth Borrow
OPSS 501	Compacting
OPSS 802	Topsoil
OPSS 804	Seed and Cover

Ontario Provincial Standard Specifications, Materials

OPSS 1010	Aggregates - Base, Subbase, Select Subgrade and Backfill Material

Ontario Ministry of Transportation Publications

MTO Form:

PH-CC-820	Certification of Grade Elevation - Crossfall

MTO Laboratory Testing Manual:

LS-706	Moisture-Density Relationship of Soils Using 2.5 kg Rammer and 305 mm Drop

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 into existing slopes by excavating horizontal planes. Benching also means the stepping of cut slopes at intermediate levels in deep cuts.

Berm means an extension of an embankment constructed to a lower height and designed to provide road embankment stability.

Bulking Factor means the ratio of the volume of rock material following excavation, placement, and compacting to the original in situ volume of the same material. The bulking factor for rock 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 as specified in the Contract Documents. Widening, flattening, or other placement of material adjacent to or on top of sideslopes beyond that specified in the Contract Documents is excluded.

Existing Rock Surface means either the rock surface that is exposed at ground level prior to the beginning of the Contract or the rock surface that is exposed after the overburden above it has been removed during the Contract.

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

Grubbing means the removal of all stumps, roots, embedded logs, debris, and secondary growth.

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

Mucking means the picking up of broken rock prior to haulage.

Overbreak means any broken, displaced, or loosened rock that originates outside the designated rock excavation limits as specified in the Contract Documents, regardless of whether that rock has been excavated, displaced, or loosened due to the inherent character of the rock formation itself or due to any other cause.

Pre-Shearing means the placing of a single row of closely-spaced lightly-loaded holes along the rock excavation limits as specified in the Contract Documents that are fired simultaneously before and independently of the main excavation blast. Pre-shearing is sometimes referred to as pre-splitting.

Reclaimed Asphalt Pavement (RAP) means the processed hot mix asphalt material that is recovered by partial or full depth removal.

Reclaimed Concrete Material (RCM) means removed or processed old Portland cement concrete.

Roadside Ditch means a ditch with one of its slopes 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, that may or may not be weathered and includes boulders having a volume of 1 m^3 or greater.

Rock Face means the uniform, relatively planar, maintenance-free, vertical or near vertical rock surface between the top of the existing rock surface and the designated rock or ditch grade line that is generally characterized by noticeable drill hole traces and a minimum of blast-induced fractures beyond the rock excavation limits.

Rock Surplus means the rock excavation original tender quantity multiplied by the bulking factor, plus the volume of rock material excavated from all other items as specified in the Contract Documents, minus the rock embankment original tender quantity. Rock overbreak and rock materials resulting from scaling are specifically excluded.

Scaling means the removal of loose, broken, or overhanging rock fragments from an existing rock surface or the removal of loose, broken, or overhanging rock fragments from a rock face that remain in place after the rock has been blasted and mucked.

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 layer of soil, that is predominantly organic, too soft, or wet and otherwise unsuitable for the construction of embankments that is done prior to and usually independent of earth excavation or the placement of fill materials or both.

Tolerance means a construction working tolerance only that is considered to be:

a) Minus when it is:

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

b) Plus when it is:

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

Wall Control Blasting means a blasting method using carefully-spaced and aligned drill holes intended to produce a relatively flat, maintenance-free, rock surface or rock face as 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 (RMMP)

For each construction stage, 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 as specified 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 the bulking factor 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 within the Contract limits to be processed into granular material or other aggregates as specified in the Contract Documents.
   v. Excavated rock to be used for other purposes in completing the Work, such as rock protection, rip rap, or river stone and the types and locations of that Work.
   vi. Excavated rock not incorporated into the Work and the locations and uses of that material.

b) A plan for the construction of rock embankments that identifies each location and volume in cubic metres where the material is going to be supplied to the corresponding station intervals as specified in the Contract Documents.

c) The locations and volume in cubic metres for the sources where rock materials are obtained for the rock supply item.

d) The location and volume in cubic metres for each source when additional rock or granular material or both are required to complete the Work.

e) The amount of rock surplus, if any, during the applicable construction stage.

The Contractor shall be solely responsible for the assumptions and the reasonableness of the RMMP.

In addition, for each construction stage, on a monthly basis, an updated RMMP shall be submitted to the Contract Administrator which shall include an ongoing tabulation of all rock materials that have been removed by the Contractor from the rock excavation or not incorporated in embankments, shown as a cumulative reduction in rock surplus.

The work of rock excavation or rock embankment shall not commence until the RMMP in accordance with the above requirements is submitted.

206.04.01.02 Trial Section for Modified Layer Compaction Method

If the Contractor wishes to request to use the modified layer compaction method as specified in the Modified Layer Compaction Method clause, a detailed plan shall then be submitted in writing to the Contract Administrator a minimum of 48 hours prior to commencing any work on the required trial section. The plan shall include full details of the placing of material and its compaction, including layer thickness; number and type of compaction units and number of passes.

206.06 EQUIPMENT

206.06.01 Tractor Bulldozer - Crawler Type for Rock Embankment Construction

Tractor bulldozer, crawler type for rock embankment construction required in the General clause of the Rock Embankments clause shall have a minimum net flywheel power of 200 kW.

206.06.02 Rollers for Shale Embankment Construction

Sheepsfoot, packall, padfoot, or tamping foot rollers required for the construction of shale embankments shall weigh a minimum of 18 tonnes and vibratory steel drum or pneumatic-tired rollers shall weigh a minimum of 9 tonnes.

206.06.03 Nuclear Moisture and Density Gauge

Nuclear moisture and density gauges shall meet the requirements of the Nuclear Moisture and Density Gauge subsection of OPSS 501.

206.06.04 Hydraulic Excavator - Crawler Mounted for Rock Embankment Construction

Hydraulic excavator, crawler mounted for rock embankment construction required in the General clause of the Rock Embankments clause shall have a minimum operating weight of 32,000 kg.

206.07 CONSTRUCTION

206.07.01 General

206.07.01.01 Removal of Ice, Snow, and Frozen Ground

The Contractor shall remove and dispose of all ice, snow, and frozen material from all earth, rock, or granular surfaces prior to placing fill and from all earth, rock, or granular materials being used for backfill, embankments, or any other construction purposes.

206.07.01.02 Compaction

Earth and granular materials shall be compacted according to OPSS 501.

For compaction purposes, reclaimed asphalt pavement (RAP) or reclaimed concrete material (RCM) or both shall be treated as earth or rock when such material is respectively included in an earth embankment or a rock embankment.

206.07.01.03 Earth Borrow

When earth borrow is specified in the Contract Documents, it shall be according to OPSS 212.

206.07.01.04 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.

206.07.01.04.01 Tolerances for Earth

Upon completion, all earth grade surfaces, excluding swamp excavations, shall be shaped to the grades and cross-sections as 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 when 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 when 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 in earth cut sections:

+ 30 mm
- 0 mm

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

206.07.01.04.02 Tolerances for Rock

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

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

For cut sections:

+ 30 mm
- 100 mm

For fill sections:

+ 30 mm
- 75 mm

Excavation below the minus tolerances may be accepted by the Contract Administrator when it is not detrimental to the work and is brought up to grade as specified in the Rock Excavation, Grading clause.

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 when 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 when the Owner deems it is not detrimental to the work or contribute to additional rock surplus.

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

+ 30 mm
- 30 mm

Excavation below the minus tolerance may be accepted by the Contract Administrator when 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 a manner to avoid water saturation of embankment material and roadway foundation material and to avoid leaving undrained pockets in excavations by providing effective drainage during all stages of the work.

In excavations below subgrade and in stripping operations when 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. When pipe subdrains are required in the bases of roadway cuts, such work shall be carried out at the time that the roadside ditches are being constructed.

206.07.03 Excavation and Grading

206.07.03.01 Earth Excavation - Grading

206.07.03.01.01 General

The work shall include excavating, hauling, handling and placing, shaping, compacting, trimming of earth material, applying temporary cover, and the management of excavated and excess materials as specified in the Contract Documents.

The work shall also include the excavation and removal of pipes and culverts smaller than 200 mm in diameter and expanded polystyrene insulation when located within the limits of the earth excavation, grading work.

Suitable and non-excess earth material excavated from roadway cuts, ditching, and other associated sites shall be used in earth grading and embankment construction, unless otherwise specified in the Contract Documents.

206.07.03.01.02 Stripping

Except when swamp treatment is required, the original ground shall be stripped at the locations and to the depths specified elsewhere in the Contract Documents.

Material meeting the requirements of topsoil according to OPSS 802 that is required for re-use shall be stockpiled as specified in the Contract Documents. Other material obtained from stripping shall be managed as specified in the Management of Excavated Materials clause.

206.07.03.01.03 Excavation Below Subgrade

Unsuitable materials, other than material excavated from swamps, shall be removed below the subgrade to the lengths, widths, and depths as specified in the Contract Documents. The resulting excavation shall be backfilled with material acceptable to the Contract Administrator and compacted according to OPSS 501.

206.07.03.01.04 Swamp Excavation

Swamp excavation shall be according to OPSS 209.

206.07.03.01.05 Backfilling of Overexcavated Areas

When overexcavation occurs, the overexcavated area shall be backfilled with granular material according to OPSS 1010 and compacted according to OPSS 501 at no additional cost the Owner. With the exception of frontslopes and when boulders are encountered in the excavated slopes, backfilling shall not be permitted to obtain the required slopes for excavations.

When boulders are encountered in the excavated slopes, the boulders shall be removed at the direction of the Contract Administrator and the resulting cavity or cavities shall be backfilled with properly-compacted granular material according to OPSS 1010.

206.07.03.02 Rock Excavation - General

Except where shatter is required, drilling shall not be performed outside of or extend beyond the design excavation limits as specified in the Contract Documents.

The use of explosives for rock excavation shall be as specified in the Contract Documents.

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

Any excavated rock remaining after constructing the embankments shall be managed as specified in the Management of Excavated Materials clause.

206.07.03.02.01 Rock Excavation - Grading

The work shall include drilling and blasting to obtain the required rock excavation and shatter, mucking, and bringing to grade any overexcavation. Hauling shall only be part of the work when the excavated material is part of the rock surplus or is in excess of the rock embankment requirements.

When rock is to be excavated, all overlying stumps, roots, and vegetation shall be managed as excess material as specified in the Contract Documents. When earth overlies the rock to be excavated, the earth shall be removed. This work shall be performed sufficiently in advance of any blasting or rock excavation operations to allow rock cross-sections to be taken.

Scaling shall be carried out during mucking. All rock fragments or boulders either within or outside the excavated areas that are likely to slide or roll down rock cuts or are otherwise deemed to be unstable by the Contract Administrator shall be removed. 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 rock shatter or other approved material at no additional cost to the Owner.

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.

Rock scaling and the removing of all overbreak and scaled materials shall be included in the rock excavation, grading item, unless a rock face item is included in the Contract Documents.

206.07.03.02.01.01 Shale

Shale shall be excavated using methods appropriate for the site conditions. Side slopes in shale shall be as specified in the Contract Documents. Rock face and subgrade shatter are not required in shale.

206.07.03.02.02 Rock Face

The work shall include drilling and blasting using one or more wall control blasting techniques to produce the rock face required in the Contract Documents and all associated scaling, mucking, hauling and management of all overbreak and scaled rock as specified in the Management of Excavated Materials clause.

The Contractor shall decide the required spacing, diameter, and loading of all drill holes for wall control blasting in order to ensure a uniform shear face between the holes and to meet the tolerance requirements stated in the Tolerances for Rock clause for rock face. In no case shall the diameter and spacing of these holes be more than 100 mm and 0.75 m centre-to-centre, respectively,

The Contractor shall also decide the required spacing, diameter, and loading of the adjacent line of production drill holes located inside the controlled blasting limits in order to ensure that wall control blasting is able to produce the required rock face.

However, in no case shall any portion of a production drill hole be within 0.75 m of the line formed by the drill holes for wall control blasting.

206.07.03.03 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 as specified in the Contract Documents. Any such excavation shall be backfilled and compacted with material as specified in the Contract Documents, prior to closing down operations each day.

206.07.03.04 Excavation for Pavement Widening

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

206.07.03.05 Management of Excavated Materials

Excavated materials shall be used within the Contract limits as specified in the Contract Documents.

When the Contract Administrator has deemed that the Contractor's sequence of operations, inadequate drainage measures, or handling processes or all have caused earth materials that were identified in the Contract Documents as being suitable for embankment or other construction purposes to become unsuitable for such purposes then, at no additional cost to the Owner, the Contractor shall either condition that material until it is suitable or manage it as excess material as specified in the Contract Documents and, if necessary, replace it with an equivalent volume of earth borrow. When the Contractor's operations have caused the material to become unsuitable due to excessive moisture content, conditioning may then involve re-working the material as necessary or spreading out the material in layers or both so that the material is thin enough to allow it to sufficiently dry out.

Quantities of unsuitable earth as specified in the Contract Documents and deemed suitable for use by the Contract Administrator at the time of excavation shall be used to offset borrow quantities.

Rock excavated from within the right-of-way (ROW) may be used for aggregate production up to the rock surplus quantity.

Earth or rock that is surplus to embankment requirements may be placed adjacent to the embankments by widening embankments, flattening side slopes, or constructing berms if optional cross sections or locations or both have been specified for such material in the Contract Documents or as requested by the Contractor and agreed to, in writing, by the Contract Administrator.

Surplus material may only be used within the Contract limits with the written consent of the Contract Administrator.

Surplus materials that cannot be accommodated as above and unsuitable materials shall be managed as excess material as specified in the Contract Documents.

206.07.03.06 Provision for Temporary Cover

Cover used in temporary applications shall be applied according to OPSS 804 to areas as specified in the Contract Documents.

206.07.04 Rock Supply

The work shall include any required clearing, grubbing, and stripping of the source; construction and maintenance of access roads; excavating and hauling of rock materials, regardless of whether the hauling is to the Contract limits or for rock surplus; and source rehabilitation.

The rock surplus quantity, if any, is an entitlement of the Contractor. Excavated rock may be removed for the Contractor's purposes or disposed of as the Contractor deems appropriate up to the rock surplus quantity as the staging of the work allows. All materials removed from rock excavation and not placed in rock embankment shall be deemed to be removed as part of the Contractor's rock surplus quantity.

All materials removed as part of the rock surplus quantity shall be accurately measured as specified in the Measurement of Rock Surplus clause and recorded by the Contractor at no additional cost to the Owner. Whenever such measurements are to be taken, the Contractor shall inform the Contract Administrator at least 1 Business Day in advance of such measurements.

All weighing of materials shall be as specified in the Contract Documents.

Within 7 Business Days of the Contractor taking a set of measurements, the Contractor shall:

a) Provide the Contract Administrator with a copy of those measurements and the calculations based on those measurements.

b) Advise the Contract Administrator, in writing, that the locations where the measurements were taken are ready for verification.

In the event that the Contract Administrator chooses to verify those measurements, such verification shall be undertaken within 3 Business Days of the Contract Administrator being advised that the locations are ready for verification and for those 3 Days, the Contractor shall not:

a) Place rock on or remove rock materials, as the case may be, from the measured locations; or

b) Impede the Contract Administrator in any way during the verification of those measurements.

206.07.04.01 Measurement of Rock Surplus

Rock removed as part of the rock surplus quantity shall be measured by the Contractor and verified by the Contract Administrator as specified in the Rock Supply subsection using one or more of the following 4 methods given below:

a) Weighed Aggregate Production Quantity

All locations to be used for stockpiling processed aggregates shall be identified in writing to the Contract Administrator no less than 3 Business Days prior to production.

At each stockpile location, the Contractor shall complete an accurate survey of the initial ground elevations subject to verification by the Contract Administrator prior to any materials, including materials used for a granular pad, are placed at that location.

All aggregate materials removed from each stockpile within the Contract limits shall be weighed by the Contractor for reconciliation with the rock surplus quantity by converting the mass to a bulked broken rock volume using a factor of 0.519 m^3/tonne.

Once all of the aggregates have been removed, each stockpile shall be re-surveyed by the Contractor, the measurements verified by the Contract Administrator, and the volume of material remaining determined by the Contractor.

Quantities of rock used for aggregate production and quantities of materials remaining in aggregate stockpiles shall be deducted from the rock surplus quantity.

Any materials that are added to an aggregate production stockpile within the Contract limits that do not come from rock that was excavated on the Contract shall be weighed by the Contractor and subtracted from the weighed aggregate quantity provided. If such materials are not weighed or the Contract Administrator was not given sufficient notice or opportunity by the Contractor to verify the weight of those materials, then no deduction shall be made for those materials.

b) Stockpile Volume

Excavated rock forming part of the rock surplus may be measured in stockpiles constructed by the Contractor. The Contractor shall inform the Contract Administrator, in writing, of the location where each stockpile is to be established a minimum of 3 Business Days prior to commencing any work at that stockpile location. Disposal sites shall be treated as stockpiles.

At each stockpile location, the Contractor shall complete an accurate survey of the initial ground elevations and allow the Contract Administrator to verify those measurements prior to any rock materials are placed at that location.

Once the stockpile has been completed, the stockpile shall then be resurveyed by the Contractor, the measurements verified by the Contract Administrator, and the final volume determined by the Contractor. The Contractor shall not remove any rock material from any such stockpile prior to completion of its final survey and verification by the Contract Administrator.

With the exception of excavated rock placed in rock embankment, the quantity of all other excavated rock placed within the Contract limits (e.g., for widening of pre-existing embankments, construction of access roads, crane bases, etc.) shall be measured in the same manner as the stockpiles described above. Such quantities shall be deducted from the rock surplus quantity.

At the request of the Contract Administrator, the Contractor may be required to conduct backhoe or other subsurface investigations in the Contract Administrator's presence to determine if compressible soils are present at the Contractor's proposed stockpile locations. Backfilling of such investigated areas shall be carried out using properly-compacted material acceptable to the Contract Administrator.

If the Contractor Administrator deems that compressible soils are present, the Contractor shall then re-locate the proposed stockpile or the Contractor shall install monitoring devices at the affected location. Each monitoring device shall consist of a circular 1.0 m diameter 6 mm thick steel plate with a 3.0 m length of 50 mm diameter steel pipe securely welded vertically to the centre of the plate. Whenever the level of rock placement surrounding the monitoring device is vertically within 300 mm of the top of a monitoring device, successive 3.0 m lengths of 50 mm diameter steel pipe shall be welded to the top of that device. The length of each new section shall be added to the original elevation. The Contractor shall be paid to supply and place each monitoring device as specified in the Contract Documents. Any monitoring devices damaged during placement of materials shall be replaced at no additional cost to the Owner.

The Contractor shall survey the top of each monitoring device prior to rock material placement. The Contractor shall resurvey the top of each monitoring device when the placement of rock materials is complete. Both sets of measurements shall be verified by the Contract Administrator. If the difference in elevation between the two surveys is greater than 300 mm, the initial ground elevations for this location shall then be lowered universally by the difference in monitoring device elevation. When more than one monitoring device is placed at a given location, the differences in elevations shall be averaged together.

The Contractor shall ensure that the Contract Administrator has free and unencumbered access to any location where excavated rock is being placed.

c) Weighed Broken Rock

Excavated rock forming part of the rock surplus quantity shall be weighed by the Contractor prior to exiting the Contract limits. The Contract Administrator shall be informed, in writing, at least 2 Business Days in advance that such rock materials are to be weighed as rock surplus, the specific locations where the broken rock material is to be obtained, and the locations where it is to be placed.

Excavated rock weighed as part of the rock surplus shall be converted to a bulked broken rock volume using a factor of 0.519 m^3/tonne.

d) In-situ Measure of Distinct Rock Cut

Excavated rock from distinct rock cut locations may be removed as part of the rock surplus specified in the Contractor's RMMP. A distinct rock cut location shall be one that begins with and ends at points of zero rock excavation. The excavated rock shall be used in it's entirety as rock surplus material from distinct rock cuts and shall not be split between Contract rock embankment requirements and the rock surplus quantity. This quantity shall be the quantity of the distinct rock cut in cubic meters, multiplied by the bulking factor.

206.07.05 Embankments

Only materials that are specified in the Contract Documents for use in embankments shall be used, unless approved by the Owner, in writing, prior to placement.

Materials shall not be placed over either frozen earth or ice surfaces. Ice, frozen earth, or other unsuitable materials shall not be incorporated into embankments.

RAP materials used in embankments shall be surplus to the recycling requirements of the Contract.

The Contractor shall notify the Contract Administrator, in writing, when an embankment has been completed to the dimensions that are as specified in the Contract Documents, at least 3 Business Days prior to the Contractor places any topsoil or any other material on the embankment slopes.

206.07.05.01 Earth Embankments

206.07.05.01.01 General

Material for earth embankments shall be deposited and spread in uniform layers for the full width of the embankment, except as otherwise permitted for berms. Each layer shall be compacted prior to the succeeding layer is placed. The lower portion of side hill or sloping sections shall be similarly constructed in layers and compacted until the full width surface of the specified cross-section is obtained. The embankment shall be completed thereafter with full width layers or as staged construction allows.

The construction of a core through the embankment and the subsequent completion of the embankment are prohibited, except when core construction is permitted in swamps according to OPSS 209.

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

Boulders, cobbles, and fragments of rock, RAP, and RCM 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.

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

Berms may be constructed separately, but shall be completed prior to the road embankment is built to a higher level than the berm.

Any excavation necessary for establishing compaction results throughout any embankment or any trial areas such as the one described in the Modified Layer Compaction Method clause shall be done by hand and the excavated areas shall be backfilled with the same material or material otherwise acceptable to the Contract Administrator and properly re-compacted by the Contractor.

206.07.05.01.02 Layer Compaction Method

Earth embankments shall be built using the layer compaction method, unless otherwise specified in the Contract Documents or the requirements specified in the Modified Layer Compaction Method clause have been met.

In the layer compaction method, the embankment material shall be spread out 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 as specified in the Contract Documents prior to the succeeding layer is placed.

All boulders, cobbles, fragments of rock, RAP, and RCM shall have a maximum vertical dimension after placement, not greater than the fully compacted layer depth.

When the ground cannot support construction equipment using this method then, at the discretion of the Contract Administrator, the first layer may be increased in thickness as specified in the Modified Layer Compaction Method clause.

206.07.05.01.03 Modified Layer Compaction Method

The modified layer compaction method may be used if the Contract Administrator deems that it is practical to construct an earth embankment or a portion of an earth embankment in thicker lifts than that specified in the Layer Compaction Method clause.

In this case, the embankment material shall be spread out in uniform full width layers not more than 600 mm in depth prior to compaction. Each layer shall be shaped and compacted to the line and cross-section specified prior to the succeeding layer is placed.

All boulders, cobbles, and fragments of rock shall have a maximum vertical dimension when placed not exceeding the modified layer depth. All RAP and RCM shall have a maximum vertical dimension after placement not exceeding 300 mm.

Prior to placing any material, the Contractor shall provide proof to the Contract Administrator of the ability of the proposed method to achieve the specified density by means of a trial section consisting of a single uniform lift covering a minimum area of 400 m^2 as specified in the Trial Section for Modified Layer Compaction Method clause. The location and extent of the trial section shall be acceptable to the Contract Administrator.

Prior to the construction of the trial section, the maximum dry density (MDD) of the material to be compacted shall be determined according to LS-706 from a minimum of 3 independent samples of the material.

Acceptance of the trial section shall be based on compaction testing within the trial section lift. For testing within the lift, the trial section shall be a single lot with 4 sublots of equal area. At a random location within each sublot, a level surface shall be prepared at a depth that permits the probe of a nuclear moisture and

density gauge to extend to the bottom of the lift. Field wet density and moisture content shall be determined at each random location using the gauge and the dry density value calculated for each sublot.

If the quality index for the lot, calculated according to the Quality Index clause of OPSS 501, is equal to or greater than 1.47, the trial section shall be accepted. If the quality index for the lot is less than 1.47, the method of construction of the trial section shall not be accepted. The target density for the purpose of the quality index calculation shall be the average of the 3 MDD values determined according to LS-706.

If the trial section has been accepted, field wet density and moisture content testing shall be carried out at 10 random locations on the trial section surface using a nuclear moisture and density gauge. The average dry density from the 10 locations shall be calculated and used as the target density for acceptance, according to OPSS 501, for further placement of the material by the modified layer compaction method.

The same procedure used for the construction of the accepted trial section, including compaction equipment, vibration characteristics, and number of passes, shall be used for the further placement and compaction of the same material by the modified layer compaction method.

A new trial section shall be required for the material when one or more of the following apply:

a) A new target density is required according to the Target Density clause of OPSS 501.

b) The Contractor wants to change the accepted modified layer compaction method procedure.

c) An accepted modified layer compaction method procedure is no longer producing the required degree of compaction.

When requested by the Contract Administrator, compacted material shall be removed to verify the thickness and/or complete compaction testing on a levelled surface within any compacted lift.

All excavation, backfilling, and re-compaction necessary for thickness verification and compaction testing within the trial section lift and as requested by the Contract Administrator at other locations shall be completed to the satisfaction of the Contract Administrator at no additional cost to the Owner.

206.07.05.02 Rock Embankments

206.07.05.02.01 General

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

Excavated rock used to construct rock embankments shall be obtained from within the Contract limits. If there is insufficient material to complete the rock embankments, the additional material shall then be provided and paid for under the rock supply item.

All rock from other items as specified in Contract Documents shall be used to construct rock embankments.

Rock embankments shall be constructed by placing embankment materials full width in successive uniform layers.

For rock embankments, other than shale, the layers shall not exceed 1.5 m thickness prior to compaction. The material in each layer shall be fully compacted before the succeeding layer is placed. Each rock fill layer shall be compacted with a tractor bulldozer, crawler type, as specified in the Tractor Bulldozer - Crawler Type for Rock Embankment Construction subsection. In confined areas or in any other areas where the Contract Administrator agrees that a tractor bulldozer, crawler type, cannot be reasonably used, then each rock fill layer may be compacted using a hydraulic excavator, crawler mounted, as specified in the Hydraulic Excavator - Crawler Mounted for Rock Embankment Construction subsection. The minimum number of complete passes shall be six and the maximum number of passes shall be eight for either type

of equipment. A complete pass shall be defined as 100% coverage of the layer surface. The maximum speed of the equipment during each pass shall be 3.2 km/h.

For all rock embankments, materials shall be placed in their final position by blading when using a tractor bulldozer, crawler type for or by raking and chinking when using a hydraulic excavator, crawler mounted or a combination of both types of equipment, providing that the total number of complete passes over the same area specified in the paragraph given above is achieved. 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.

Rock fragments exceeding a maximum of 1.0 m in any dimension shall be well distributed throughout the embankment. Rock fragments up to a maximum of 3.0 m in any dimension 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 shall be sufficiently spaced to allow free access of the specified equipment to compact the intervening fill.

Placement and compaction in layers is not required when rock is placed under water. In this case, end dumping may be used. However, end dumping shall only be used to an elevation of 1.0 m above the water level that is present at the time of placement. After that, the rock embankment shall be constructed using the equipment and method specified in the paragraphs above. The materials shall be well distributed to form a solid embankment constructed to full width as the work progresses or as staged construction allows.

When a 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 so that mud waves generated by the rock placement are able to move away from the embankment. Mud waves shall be displaced or removed to prevent their entrapment below or within the embankment.

End dumping from the top of the embankments may also be carried out at locations as specified in the Contract Documents when narrow and relatively shallow widening of an existing embankment is required for the shoulder portion of the highway.

The top surface of the embankment shall be chinked with rock fragments and spalls to form the subgrade prior to the placement of the roadway subbase in order to minimize voids and prevent migration of the subbase material into the rock fill.

Care shall be taken to avoid large boulders and rock fragments protruding above the average embankment surface within a distance of 3 m beyond the edge of shoulder.

With the written approval of the Contract Administrator, dumping of surplus rock over the sides of rock embankments by the Contractor is permitted as follows:

a) After the rock embankments have been completed to the grades and tolerances specified in the Contract Documents and all such measurements have been verified by the Contract Administrator.

b) Only in areas that do not affect features that are located within the right-of-way (e.g., ditches, culverts, and signs) or the right-of-way limits and shall not detrimentally affect stability or drainage or cause other potentially negative impacts.

c) At the direction of the Owner.

206.07.05.02.02 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. When a harder, more

durable rock (e.g., limestone) is present as an integral part of a shale formation, no pieces shall be placed in the embankment that after placement are greater than 150 mm measured vertically or greater than 600 mm measured parallel to the embankment layers, respectively.

Compaction of each layer shall be in two stages using equipment specified in the Rollers for Shale Embankment Construction subsection. In the first stage, a minimum of 2 passes shall be made with a static sheepsfoot, packall, padfoot, or tamping foot type roller. In the second stage, a minimum of 2 passes shall be made with a vibratory steel drum or pneumatic-tired roller. The maximum speed of rollers shall not exceed 5 km/hr.

206.07.06 Rock Backfill to Structure

When rock backfill to structures is specified, the rock backfill shall only be comprised of rock fragments no larger than 250 mm in their greatest dimension and free of all debris, earth, topsoil, wood, chemical, or other contamination.

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

206.07.07 Quality Control

206.07.07.01 Grade Checks

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

A competent survey crew shall carry out grade checks on all finished earth and rock grade surfaces. QC of earth and rock grade surfaces shall be based on horizontal and vertical grading tolerances as specified in the Tolerances for Earth and Tolerances for Rock clauses, respectively. The grade shall be certified at the stations and offsets shown in the grading templates or where grading templates are not available, at the frequency requirements specified for the layout elsewhere in the Contract Documents.

206.07.07.01.01 Submission of Grade Checks

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

When grading templates are available, the Contractor shall sign and certify on the grading template that the components of the work indicated on that template have been correctly constructed to the specified line and grade tolerances. If a template is not available, then the Contractor shall complete, sign, and submit MTO form PH-CC-820 to the Contract Administrator.

206.07.07.02 Compaction Quality Control

The Contractor shall use Method B according to OPSS 501 for quality control of compaction.

206.07.08 Management of Excess Material

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

206.08 QUALITY ASSURANCE

206.08.01 Grade Checks

The Owner may conduct random QA grade checks to verify horizontal and vertical grading tolerances.

Provided that the Owner's grade checks conform to those determined by the Contractor, no action shall be taken. If discrepancies between QA and QC grade checks occur, the Owner may then conduct additional QA grade checks at the Owner's discretion.

If the finished grade or cross-section is found to be outside the specification limits specified in the Tolerances - General clause, then:

a) The Contract Administrator shall notify the Contractor.

b) The Contractor shall be charged for each station where the finished grade is outside of the specification limits, at the rate specified in the Finished Grade Checks Outside Specification Limits subsection.

c) The Contractor shall then bring the earth or rock grade surface to within the specified tolerances for grade, at no additional cost to the Owner.

206.09 MEASUREMENT FOR PAYMENT

206.09.01 Actual Measurement

206.09.01.01 Earth Excavation, Grading

Measurement for earth excavation, grading shall be the in-place volume of earth in cubic metres computed from field measurements of cross-sections taken both prior to grubbing and upon completion of the work.

When benching is required to key-in new fills into existing slopes, the quantity of materials that are excavated as part of that operation shall not be included in the measurement for payment.

206.09.01.01.01 Overbuilding, Earth

When the Contract requires earth borrow, the quantity of material placed beyond the earth grading tolerances shall be deducted from the measured quantity of earth borrow on a cubic metre for cubic metre basis, with no correction for changes in the 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 the existing pavement when 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 the in-place volume in cubic metres computed from field measurements of cross-sections bounded by the original rock line after the earth overburden has been removed and the theoretical rock face and the bottom excavation limits designated in the Contract Documents. Where shatter is specified, the bottom of the cut shall be 300 mm below the designated rock grade.

The quantity of rock excavation shall also include:

a) All shatter that is specified in the Contract Documents.

b) Any rock that is excavated beyond the limits that are as specified in the Contract Documents at the Contract Administrator's written instructions.

206.09.01.03.02 Overbuilding, Rock

When the Contract has a rock supply item, the quantity of excavated rock placed beyond the rock grading tolerance at the top of subgrade and beyond the angle of repose for rock fills shall be deducted from the rock surplus quantity on a cubic metre for cubic metre basis with no correction for changes in density of the material.

206.09.01.03.03 Boulders

Measurement of each boulder classified as rock shall be by volume in cubic metres computed on the basis of the product of the actual rock measurement of the 3 maximum rectilinear dimensions in metres of the boulder.

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 Supply

The quantity of rock supply shall be determined in cubic metres either at the end of a distinct stage or at the end of the Contract.

The quantity shall be determined as one of the following:

a) The rock surplus quantity less the quantities of rock materials removed as part of the rock surplus and measured as specified in the Measurement of Rock Surplus clause.

b) The quantity of rock materials determined by the Contract Administrator required to complete the embankments.

c) The total of both a) and b).

At the discretion of the Contract Administrator, earlier access to the rock supply item may be granted; however, the quantities shall be reconciled at the end of the stage or Contract.

The rock supply quantity shall be measured in-situ by the Contractor in neat lines at the source. The in-situ volume shall be the rock supply quantity divided by the bulking factor.

For rock materials supplied under the rock supply item for the completion of rock embankments, any rock materials remaining at the rock supply source after rock embankment construction has been completed or otherwise used on the Contract as specified in the Management of Excavated Materials clause, shall be paid for as specified in the Rock Supply subsection under the Basis of Payment section.

The Contract Administrator shall be informed in writing 2 Business Days prior to commencing drilling operations at the rock supply source or 2 Business Days prior to removing rock from the rock pile or both. The Contract Administrator reserves the right to verify any measurements at any source. The Contractor shall give the Contract Administrator complete access to all such sources.

206.09.01.06 Rock Embankment

Measurement of rock embankment shall be by volume in cubic metres of rock embankments. Adjustments to the Plan Quantity shall be limited to those supported with topographic survey information.

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.

Payment for earth grade checks, including provision of all labour, Equipment, and Material to conduct quality control testing shall be included in the Contract price as part of the work of earth excavation, grading.

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.

When the Contract Administrator directs that material excavated under this item is to be handled other than as specified in the Excavation for Pavement Widening clause, then such material shall be managed in accordance with the Contract Documents and treated as a Change in the Work.

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

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 embankment shall be included in the rock excavation, grading item.

When excavated rock is to be used for any other Contract item work (e.g., rock embankment, granular materials, or rip-rap), the hauling costs are deemed to be included in payment for the work associated with the appropriate tender item. However, when excavated rock is not to be used for any other Contract item work, the hauling costs are then deemed to be included in payment for the work under the rock excavation, grading item.

Payment for rock grade checks, including provision of all labour, Equipment, and Material to conduct quality control testing, shall be included in the Contract price as part of the work of rock excavation, grading.

When 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.

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

On completion of mucking, a progress payment of an additional 25% of this tender item shall be made.

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.

206.10.05 Rock Supply - 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, and all costs for fees and royalties.

When 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.

The unit price tendered for this item is excluded from the provisions specified in the Contract Documents for renegotiation of unit prices.

For rock materials supplied under the rock supply item for completion of rock embankments as specified in the Contract Documents, any rock materials remaining at the rock supply source after completion of all rock excavation and rock embankment construction shall be paid at 50% of the tender unit rate for rock supply.

As specified in part b) of the Measurement of Rock Surplus clause, the Contractor shall be paid $400.00 for each monitoring device used to monitor compressible soils, regardless of the number of additional pipe sections that are required.

206.10.06 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.

206.10.07 Backfill for Overexcavation

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

206.10.08 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.

206.10.09 Finished Grade Checks Outside Specification Limits

As specified in the Grade Checks subsection of the Quality Assurance section, for each station where the QA grade check of the finished grade is outside of specification limits, the Contractor shall be charged $250.00.

Appendix 206-A, November 2014
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

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.

Note: The 206 implemented in April 2025 replaces 206, November 2014 with no technical content changes.

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, rock face, and the management of excavated materials.

206.02 REFERENCES

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

Ontario Provincial Standard Specifications, Construction

OPSS 209 Embankments Over Swamps and Compressible Soils
OPSS 212 Earth Borrow
OPSS 501 Compacting
OPSS 802 Topsoil
OPSS 804 Seed and Cover

Ontario Provincial Standard Specifications, Materials

OPSS 1010 Aggregates - Base, Subbase, Select Subgrade and Backfill Material

Ontario Ministry of Transportation Publications

MTO Form:
PH-CC-820 Certification of Grade Elevation - Crossfall

MTO Laboratory Testing Manual:
LS-706 Moisture-Density Relationship of Soils Using 2.5 kg Rammer and 305 mm Drop

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 into existing slopes by excavating horizontal planes. Benching also means the stepping of cut slopes at intermediate levels in deep cuts.

Berm means an extension of an embankment constructed to a lower height and designed to provide road embankment stability.

Bulking Factor means the ratio of the volume of rock material following excavation, placement, and compacting to the original in situ volume of the same material. The bulking factor for rock 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 as specified in the Contract Documents. Widening, flattening, or other placement of material adjacent to or on top of sideslopes beyond that specified in the Contract Documents is excluded.

Existing Rock Surface means either the rock surface that is exposed at ground level prior to the beginning of the Contract or the rock surface that is exposed after the overburden above it has been removed during the Contract.

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

Grubbing means the removal of all stumps, roots, embedded logs, debris, and secondary growth.

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

Mucking means the picking up of broken rock prior to haulage.

Overbreak means any broken, displaced, or loosened rock that originates outside the designated rock excavation limits as specified in the Contract Documents, regardless of whether that rock has been excavated, displaced, or loosened due to the inherent character of the rock formation itself or due to any other cause.

Pre-Shearing means the placing of a single row of closely-spaced lightly-loaded holes along the rock excavation limits as specified in the Contract Documents that are fired simultaneously before and independently of the main excavation blast. Pre-shearing is sometimes referred to as pre-splitting.

Reclaimed Asphalt Pavement (RAP) means the processed hot mix asphalt material that is recovered by partial or full depth removal.

Reclaimed Concrete Material (RCM) means removed or processed old Portland cement concrete.

Roadside Ditch means a ditch with one of its slopes 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, that may or may not be weathered and includes boulders having a volume of 1 m^3 or greater.

Rock Face means the uniform, relatively planar, maintenance-free, vertical or near vertical rock surface between the top of the existing rock surface and the designated rock or ditch grade line that is generally characterized by noticeable drill hole traces and a minimum of blast-induced fractures beyond the rock excavation limits.

Rock Surplus means the rock excavation original tender quantity multiplied by the bulking factor, plus the volume of rock material excavated from all other items as specified in the Contract Documents, minus the rock embankment original tender quantity. Rock overbreak and rock materials resulting from scaling are specifically excluded.

Scaling means the removal of loose, broken, or overhanging rock fragments from an existing rock surface or the removal of loose, broken, or overhanging rock fragments from a rock face that remain in place after the rock has been blasted and mucked.

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 layer of soil, that is predominantly organic, too soft, or wet and otherwise unsuitable for the construction of embankments that is done prior to and usually independent of earth excavation or the placement of fill materials or both.

Tolerance means a construction working tolerance only that is considered to be:

a) Minus when it is:

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

b) Plus when it is:

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

Wall Control Blasting means a blasting method using carefully-spaced and aligned drill holes intended to produce a relatively flat, maintenance-free, rock surface or rock face as 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 (RMMP)

For each construction stage, 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 as specified 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 the bulking factor 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 within the Contract limits to be processed into granular material or other aggregates as specified in the Contract Documents.
   v. Excavated rock to be used for other purposes in completing the Work, such as rock protection, rip rap, or river stone and the types and locations of that Work.
   vi. Excavated rock not incorporated into the Work and the locations and uses of that material.

b) A plan for the construction of rock embankments that identifies each location and volume in cubic metres where the material is going to be supplied to the corresponding station intervals as specified in the Contract Documents.

c) The locations and volume in cubic metres for the sources where rock materials are obtained for the rock supply item.

d) The location and volume in cubic metres for each source when additional rock or granular material or both are required to complete the Work.

e) The amount of rock surplus, if any, during the applicable construction stage.

The Contractor shall be solely responsible for the assumptions and the reasonableness of the RMMP.

In addition, for each construction stage, on a monthly basis, an updated RMMP shall be submitted to the Contract Administrator which shall include an ongoing tabulation of all rock materials that have been removed by the Contractor from the rock excavation or not incorporated in embankments, shown as a cumulative reduction in rock surplus.

The work of rock excavation or rock embankment shall not commence until the RMMP in accordance with the above requirements is submitted.

206.04.01.02 Trial Section for Modified Layer Compaction Method

If the Contractor wishes to request to use the modified layer compaction method as specified in the Modified Layer Compaction Method clause, a detailed plan shall then be submitted in writing to the Contract Administrator a minimum of 48 hours prior to commencing any work on the required trial section. The plan shall include full details of the placing of material and its compaction, including layer thickness; number and type of compaction units and number of passes.

206.06 EQUIPMENT

206.06.01 Tractor Bulldozer - Crawler Type for Rock Embankment Construction

Tractor bulldozer, crawler type for rock embankment construction required in the General clause of the Rock Embankments clause shall have a minimum net flywheel power of 200 kW.

206.06.02 Rollers for Shale Embankment Construction

Sheepsfoot, packall, padfoot, or tamping foot rollers required for the construction of shale embankments shall weigh a minimum of 18 tonnes and vibratory steel drum or pneumatic-tired rollers shall weigh a minimum of 9 tonnes.

206.06.03 Nuclear Moisture and Density Gauge

Nuclear moisture and density gauges shall meet the requirements of the Nuclear Moisture and Density Gauge subsection of OPSS 501.

206.06.04 Hydraulic Excavator - Crawler Mounted for Rock Embankment Construction

Hydraulic excavator, crawler mounted for rock embankment construction required in the General clause of the Rock Embankments clause shall have a minimum operating weight of 32,000 kg.

206.07 CONSTRUCTION

206.07.01 General

206.07.01.01 Removal of Ice, Snow, and Frozen Ground

The Contractor shall remove and dispose of all ice, snow, and frozen material from all earth, rock, or granular surfaces prior to placing fill and from all earth, rock, or granular materials being used for backfill, embankments, or any other construction purposes.

206.07.01.02 Compaction

Earth and granular materials shall be compacted according to OPSS 501.

For compaction purposes, reclaimed asphalt pavement (RAP) or reclaimed concrete material (RCM) or both shall be treated as earth or rock when such material is respectively included in an earth embankment or a rock embankment.

206.07.01.03 Earth Borrow

When earth borrow is specified in the Contract Documents, it shall be according to OPSS 212.

206.07.01.04 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.

206.07.01.04.01 Tolerances for Earth

Upon completion, all earth grade surfaces, excluding swamp excavations, shall be shaped to the grades and cross-sections as 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 when 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 when 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 in earth cut sections:

+ 30 mm
- 0 mm

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

206.07.01.04.02 Tolerances for Rock

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

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

For cut sections:

+ 30 mm
- 100 mm

For fill sections:

+ 30 mm
- 75 mm

Excavation below the minus tolerances may be accepted by the Contract Administrator when it is not detrimental to the work and is brought up to grade as specified in the Rock Excavation, Grading clause.

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 when 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 when the Owner deems it is not detrimental to the work or contribute to additional rock surplus.

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

+ 30 mm
- 30 mm

Excavation below the minus tolerance may be accepted by the Contract Administrator when 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 a manner to avoid water saturation of embankment material and roadway foundation material and to avoid leaving undrained pockets in excavations by providing effective drainage during all stages of the work.

In excavations below subgrade and in stripping operations when 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. When pipe subdrains are required in the bases of roadway cuts, such work shall be carried out at the time that the roadside ditches are being constructed.

206.07.03 Excavation and Grading

206.07.03.01 Earth Excavation - Grading

206.07.03.01.01 General

The work shall include excavating, hauling, handling and placing, shaping, compacting, trimming of earth material, applying temporary cover, and the management of excavated and excess materials as specified in the Contract Documents.

The work shall also include the excavation and removal of pipes and culverts smaller than 200 mm in diameter and expanded polystyrene insulation when located within the limits of the earth excavation, grading work.

Suitable and non-excess earth material excavated from roadway cuts, ditching, and other associated sites shall be used in earth grading and embankment construction, unless otherwise specified in the Contract Documents.

206.07.03.01.02 Stripping

Except when swamp treatment is required, the original ground shall be stripped at the locations and to the depths specified elsewhere in the Contract Documents.

Material meeting the requirements of topsoil according to OPSS 802 that is required for re-use shall be stockpiled as specified in the Contract Documents. Other material obtained from stripping shall be managed as specified in the Management of Excavated Materials clause.

206.07.03.01.03 Excavation Below Subgrade

Unsuitable materials, other than material excavated from swamps, shall be removed below the subgrade to the lengths, widths, and depths as specified in the Contract Documents. The resulting excavation shall be backfilled with material acceptable to the Contract Administrator and compacted according to OPSS 501.

206.07.03.01.04 Swamp Excavation

Swamp excavation shall be according to OPSS 209.

206.07.03.01.05 Backfilling of Overexcavated Areas

When overexcavation occurs, the overexcavated area shall be backfilled with granular material according to OPSS 1010 and compacted according to OPSS 501 at no additional cost the Owner. With the exception of frontslopes and when boulders are encountered in the excavated slopes, backfilling shall not be permitted to obtain the required slopes for excavations.

When boulders are encountered in the excavated slopes, the boulders shall be removed at the direction of the Contract Administrator and the resulting cavity or cavities shall be backfilled with properly-compacted granular material according to OPSS 1010.

206.07.03.02 Rock Excavation - General

Except where shatter is required, drilling shall not be performed outside of or extend beyond the design excavation limits as specified in the Contract Documents.

The use of explosives for rock excavation shall be as specified in the Contract Documents.

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

Any excavated rock remaining after constructing the embankments shall be managed as specified in the Management of Excavated Materials clause.

206.07.03.02.01 Rock Excavation - Grading

The work shall include drilling and blasting to obtain the required rock excavation and shatter, mucking, and bringing to grade any overexcavation. Hauling shall only be part of the work when the excavated material is part of the rock surplus or is in excess of the rock embankment requirements.

When rock is to be excavated, all overlying stumps, roots, and vegetation shall be managed as excess material as specified in the Contract Documents. When earth overlies the rock to be excavated, the earth shall be removed. This work shall be performed sufficiently in advance of any blasting or rock excavation operations to allow rock cross-sections to be taken.

Scaling shall be carried out during mucking. All rock fragments or boulders either within or outside the excavated areas that are likely to slide or roll down rock cuts or are otherwise deemed to be unstable by the Contract Administrator shall be removed. 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 rock shatter or other approved material at no additional cost to the Owner.

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.

Rock scaling and the removing of all overbreak and scaled materials shall be included in the rock excavation, grading item, unless a rock face item is included in the Contract Documents.

206.07.03.02.01.01 Shale

Shale shall be excavated using methods appropriate for the site conditions. Side slopes in shale shall be as specified in the Contract Documents. Rock face and subgrade shatter are not required in shale.

206.07.03.02.02 Rock Face

The work shall include drilling and blasting using one or more wall control blasting techniques to produce the rock face required in the Contract Documents and all associated scaling, mucking, hauling and management of all overbreak and scaled rock as specified in the Management of Excavated Materials clause.

The Contractor shall decide the required spacing, diameter, and loading of all drill holes for wall control blasting in order to ensure a uniform shear face between the holes and to meet the tolerance requirements stated in the Tolerances for Rock clause for rock face. In no case shall the diameter and spacing of these holes be more than 100 mm and 0.75 m centre-to-centre, respectively,

The Contractor shall also decide the required spacing, diameter, and loading of the adjacent line of production drill holes located inside the controlled blasting limits in order to ensure that wall control blasting is able to produce the required rock face.

However, in no case shall any portion of a production drill hole be within 0.75 m of the line formed by the drill holes for wall control blasting.

206.07.03.03 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 as specified in the Contract Documents. Any such excavation shall be backfilled and compacted with material as specified in the Contract Documents, prior to closing down operations each day.

206.07.03.04 Excavation for Pavement Widening

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

206.07.03.05 Management of Excavated Materials

Excavated materials shall be used within the Contract limits as specified in the Contract Documents.

When the Contract Administrator has deemed that the Contractor's sequence of operations, inadequate drainage measures, or handling processes or all have caused earth materials that were identified in the Contract Documents as being suitable for embankment or other construction purposes to become unsuitable for such purposes then, at no additional cost to the Owner, the Contractor shall either condition that material until it is suitable or manage it as excess material as specified in the Contract Documents and, if necessary, replace it with an equivalent volume of earth borrow. When the Contractor's operations have caused the material to become unsuitable due to excessive moisture content, conditioning may then involve re-working the material as necessary or spreading out the material in layers or both so that the material is thin enough to allow it to sufficiently dry out.

Quantities of unsuitable earth as specified in the Contract Documents and deemed suitable for use by the Contract Administrator at the time of excavation shall be used to offset borrow quantities.

Rock excavated from within the right-of-way (ROW) may be used for aggregate production up to the rock surplus quantity.

Earth or rock that is surplus to embankment requirements may be placed adjacent to the embankments by widening embankments, flattening side slopes, or constructing berms if optional cross sections or locations or both have been specified for such material in the Contract Documents or as requested by the Contractor and agreed to, in writing, by the Contract Administrator.

Surplus material may only be used within the Contract limits with the written consent of the Contract Administrator.

Surplus materials that cannot be accommodated as above and unsuitable materials shall be managed as excess material as specified in the Contract Documents.

206.07.03.06 Provision for Temporary Cover

Cover used in temporary applications shall be applied according to OPSS 804 to areas as specified in the Contract Documents.

206.07.04 Rock Supply

The work shall include any required clearing, grubbing, and stripping of the source; construction and maintenance of access roads; excavating and hauling of rock materials, regardless of whether the hauling is to the Contract limits or for rock surplus; and source rehabilitation.

The rock surplus quantity, if any, is an entitlement of the Contractor. Excavated rock may be removed for the Contractor's purposes or disposed of as the Contractor deems appropriate up to the rock surplus quantity as the staging of the work allows. All materials removed from rock excavation and not placed in rock embankment shall be deemed to be removed as part of the Contractor's rock surplus quantity.

All materials removed as part of the rock surplus quantity shall be accurately measured as specified in the Measurement of Rock Surplus clause and recorded by the Contractor at no additional cost to the Owner. Whenever such measurements are to be taken, the Contractor shall inform the Contract Administrator at least 1 Business Day in advance of such measurements.

All weighing of materials shall be as specified in the Contract Documents.

Within 7 Business Days of the Contractor taking a set of measurements, the Contractor shall:

a) Provide the Contract Administrator with a copy of those measurements and the calculations based on those measurements.

b) Advise the Contract Administrator, in writing, that the locations where the measurements were taken are ready for verification.

In the event that the Contract Administrator chooses to verify those measurements, such verification shall be undertaken within 3 Business Days of the Contract Administrator being advised that the locations are ready for verification and for those 3 Days, the Contractor shall not:

a) Place rock on or remove rock materials, as the case may be, from the measured locations; or

b) Impede the Contract Administrator in any way during the verification of those measurements.

206.07.04.01 Measurement of Rock Surplus

Rock removed as part of the rock surplus quantity shall be measured by the Contractor and verified by the Contract Administrator as specified in the Rock Supply subsection using one or more of the following 4 methods given below:

a) Weighed Aggregate Production Quantity

   All locations to be used for stockpiling processed aggregates shall be identified in writing to the Contract Administrator no less than 3 Business Days prior to production.

At each stockpile location, the Contractor shall complete an accurate survey of the initial ground elevations subject to verification by the Contract Administrator prior to any materials, including materials used for a granular pad, are placed at that location.

All aggregate materials removed from each stockpile within the Contract limits shall be weighed by the Contractor for reconciliation with the rock surplus quantity by converting the mass to a bulked broken rock volume using a factor of 0.519 m^3/tonne.

Once all of the aggregates have been removed, each stockpile shall be re-surveyed by the Contractor, the measurements verified by the Contract Administrator, and the volume of material remaining determined by the Contractor.

Quantities of rock used for aggregate production and quantities of materials remaining in aggregate stockpiles shall be deducted from the rock surplus quantity.

Any materials that are added to an aggregate production stockpile within the Contract limits that do not come from rock that was excavated on the Contract shall be weighed by the Contractor and subtracted from the weighed aggregate quantity provided. If such materials are not weighed or the Contract Administrator was not given sufficient notice or opportunity by the Contractor to verify the weight of those materials, then no deduction shall be made for those materials.

b) Stockpile Volume

Excavated rock forming part of the rock surplus may be measured in stockpiles constructed by the Contractor. The Contractor shall inform the Contract Administrator, in writing, of the location where each stockpile is to be established a minimum of 3 Business Days prior to commencing any work at that stockpile location. Disposal sites shall be treated as stockpiles.

At each stockpile location, the Contractor shall complete an accurate survey of the initial ground elevations and allow the Contract Administrator to verify those measurements prior to any rock materials are placed at that location.

Once the stockpile has been completed, the stockpile shall then be resurveyed by the Contractor, the measurements verified by the Contract Administrator, and the final volume determined by the Contractor. The Contractor shall not remove any rock material from any such stockpile prior to completion of its final survey and verification by the Contract Administrator.

With the exception of excavated rock placed in rock embankment, the quantity of all other excavated rock placed within the Contract limits (e.g., for widening of pre-existing embankments, construction of access roads, crane bases, etc.) shall be measured in the same manner as the stockpiles described above. Such quantities shall be deducted from the rock surplus quantity.

At the request of the Contract Administrator, the Contractor may be required to conduct backhoe or other subsurface investigations in the Contract Administrator's presence to determine if compressible soils are present at the Contractor's proposed stockpile locations. Backfilling of such investigated areas shall be carried out using properly-compacted material acceptable to the Contract Administrator.

If the Contractor Administrator deems that compressible soils are present, the Contractor shall then re-locate the proposed stockpile or the Contractor shall install monitoring devices at the affected location. Each monitoring device shall consist of a circular 1.0 m diameter 6 mm thick steel plate with a 3.0 m length of 50 mm diameter steel pipe securely welded vertically to the centre of the plate. Whenever the level of rock placement surrounding the monitoring device is vertically within 300 mm of the top of a monitoring device, successive 3.0 m lengths of 50 mm diameter steel pipe shall be welded to the top of that device. The length of each new section shall be added to the original elevation. The Contractor shall be paid to supply and place each monitoring device as specified in the Contract Documents. Any monitoring devices damaged during placement of materials shall be replaced at no additional cost to the Owner.

The Contractor shall survey the top of each monitoring device prior to rock material placement. The Contractor shall resurvey the top of each monitoring device when the placement of rock materials is complete. Both sets of measurements shall be verified by the Contract Administrator. If the difference in elevation between the two surveys is greater than 300 mm, the initial ground elevations for this location shall then be lowered universally by the difference in monitoring device elevation. When more than one monitoring device is placed at a given location, the differences in elevations shall be averaged together.

The Contractor shall ensure that the Contract Administrator has free and unencumbered access to any location where excavated rock is being placed.

c) Weighed Broken Rock

Excavated rock forming part of the rock surplus quantity shall be weighed by the Contractor prior to exiting the Contract limits. The Contract Administrator shall be informed, in writing, at least 2 Business Days in advance that such rock materials are to be weighed as rock surplus, the specific locations where the broken rock material is to be obtained, and the locations where it is to be placed.

Excavated rock weighed as part of the rock surplus shall be converted to a bulked broken rock volume using a factor of 0.519 m^3/tonne.

d) In-situ Measure of Distinct Rock Cut

Excavated rock from distinct rock cut locations may be removed as part of the rock surplus specified in the Contractor's RMMP. A distinct rock cut location shall be one that begins with and ends at points of zero rock excavation. The excavated rock shall be used in it's entirety as rock surplus material from distinct rock cuts and shall not be split between Contract rock embankment requirements and the rock surplus quantity. This quantity shall be the quantity of the distinct rock cut in cubic meters, multiplied by the bulking factor.

206.07.05 Embankments

Only materials that are specified in the Contract Documents for use in embankments shall be used, unless approved by the Owner, in writing, prior to placement.

Materials shall not be placed over either frozen earth or ice surfaces. Ice, frozen earth, or other unsuitable materials shall not be incorporated into embankments.

RAP materials used in embankments shall be surplus to the recycling requirements of the Contract.

The Contractor shall notify the Contract Administrator, in writing, when an embankment has been completed to the dimensions that are as specified in the Contract Documents, at least 3 Business Days prior to the Contractor places any topsoil or any other material on the embankment slopes.

206.07.05.01 Earth Embankments

206.07.05.01.01 General

Material for earth embankments shall be deposited and spread in uniform layers for the full width of the embankment, except as otherwise permitted for berms. Each layer shall be compacted prior to the succeeding layer is placed. The lower portion of side hill or sloping sections shall be similarly constructed in layers and compacted until the full width surface of the specified cross-section is obtained. The embankment shall be completed thereafter with full width layers or as staged construction allows.

The construction of a core through the embankment and the subsequent completion of the embankment are prohibited, except when core construction is permitted in swamps according to OPSS 209.

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

Boulders, cobbles, and fragments of rock, RAP, and RCM 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.

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

Berms may be constructed separately, but shall be completed prior to the road embankment is built to a higher level than the berm.

Any excavation necessary for establishing compaction results throughout any embankment or any trial areas such as the one described in the Modified Layer Compaction Method clause shall be done by hand and the excavated areas shall be backfilled with the same material or material otherwise acceptable to the Contract Administrator and properly re-compacted by the Contractor.

206.07.05.01.02 Layer Compaction Method

Earth embankments shall be built using the layer compaction method, unless otherwise specified in the Contract Documents or the requirements specified in the Modified Layer Compaction Method clause have been met.

In the layer compaction method, the embankment material shall be spread out 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 as specified in the Contract Documents prior to the succeeding layer is placed.

All boulders, cobbles, fragments of rock, RAP, and RCM shall have a maximum vertical dimension after placement, not greater than the fully compacted layer depth.

When the ground cannot support construction equipment using this method then, at the discretion of the Contract Administrator, the first layer may be increased in thickness as specified in the Modified Layer Compaction Method clause.

206.07.05.01.03 Modified Layer Compaction Method

The modified layer compaction method may be used if the Contract Administrator deems that it is practical to construct an earth embankment or a portion of an earth embankment in thicker lifts than that specified in the Layer Compaction Method clause.

In this case, the embankment material shall be spread out in uniform full width layers not more than 600 mm in depth prior to compaction. Each layer shall be shaped and compacted to the line and cross-section specified prior to the succeeding layer is placed.

All boulders, cobbles, and fragments of rock shall have a maximum vertical dimension when placed not exceeding the modified layer depth. All RAP and RCM shall have a maximum vertical dimension after placement not exceeding 300 mm.

Prior to placing any material, the Contractor shall provide proof to the Contract Administrator of the ability of the proposed method to achieve the specified density by means of a trial section consisting of a single uniform lift covering a minimum area of 400 m^2 as specified in the Trial Section for Modified Layer Compaction Method clause. The location and extent of the trial section shall be acceptable to the Contract Administrator.

Prior to the construction of the trial section, the maximum dry density (MDD) of the material to be compacted shall be determined according to LS-706 from a minimum of 3 independent samples of the material.

Acceptance of the trial section shall be based on compaction testing within the trial section lift. For testing within the lift, the trial section shall be a single lot with 4 sublots of equal area. At a random location within each sublot, a level surface shall be prepared at a depth that permits the probe of a nuclear moisture and density gauge to extend to the bottom of the lift. Field wet density and moisture content shall be determined at each random location using the gauge and the dry density value calculated for each sublot.

If the quality index for the lot, calculated according to the Quality Index clause of OPSS 501, is equal to or greater than 1.47, the trial section shall be accepted. If the quality index for the lot is less than 1.47, the method of construction of the trial section shall not be accepted. The target density for the purpose of the quality index calculation shall be the average of the 3 MDD values determined according to LS-706.

If the trial section has been accepted, field wet density and moisture content testing shall be carried out at 10 random locations on the trial section surface using a nuclear moisture and density gauge. The average dry density from the 10 locations shall be calculated and used as the target density for acceptance, according to OPSS 501, for further placement of the material by the modified layer compaction method.

The same procedure used for the construction of the accepted trial section, including compaction equipment, vibration characteristics, and number of passes, shall be used for the further placement and compaction of the same material by the modified layer compaction method.

A new trial section shall be required for the material when one or more of the following apply:

a) A new target density is required according to the Target Density clause of OPSS 501.

b) The Contractor wants to change the accepted modified layer compaction method procedure.

c) An accepted modified layer compaction method procedure is no longer producing the required degree of compaction.

When requested by the Contract Administrator, compacted material shall be removed to verify the thickness and/or complete compaction testing on a levelled surface within any compacted lift.

All excavation, backfilling, and re-compaction necessary for thickness verification and compaction testing within the trial section lift and as requested by the Contract Administrator at other locations shall be completed to the satisfaction of the Contract Administrator at no additional cost to the Owner.

206.07.05.02 Rock Embankments

206.07.05.02.01 General

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

Excavated rock used to construct rock embankments shall be obtained from within the Contract limits. If there is insufficient material to complete the rock embankments, the additional material shall then be provided and paid for under the rock supply item.

All rock from other items as specified in Contract Documents shall be used to construct rock embankments.

Rock embankments shall be constructed by placing embankment materials full width in successive uniform layers.

For rock embankments, other than shale, the layers shall not exceed 1.5 m thickness prior to compaction. The material in each layer shall be fully compacted before the succeeding layer is placed. Each rock fill layer shall be compacted with a tractor bulldozer, crawler type, as specified in the Tractor Bulldozer - Crawler Type for Rock Embankment Construction subsection. In confined areas or in any other areas where the Contract Administrator agrees that a tractor bulldozer, crawler type, cannot be reasonably used, then each rock fill layer may be compacted using a hydraulic excavator, crawler mounted, as specified in the Hydraulic Excavator - Crawler Mounted for Rock Embankment Construction subsection. The minimum number of complete passes shall be six and the maximum number of passes shall be eight for either type of equipment. A complete pass shall be defined as 100% coverage of the layer surface. The maximum speed of the equipment during each pass shall be 3.2 km/h.

For all rock embankments, materials shall be placed in their final position by blading when using a tractor bulldozer, crawler type for or by raking and chinking when using a hydraulic excavator, crawler mounted or a combination of both types of equipment, providing that the total number of complete passes over the same area specified in the paragraph given above is achieved. 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.

Rock fragments exceeding a maximum of 1.0 m in any dimension shall be well distributed throughout the embankment. Rock fragments up to a maximum of 3.0 m in any dimension 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 shall be sufficiently spaced to allow free access of the specified equipment to compact the intervening fill.

Placement and compaction in layers is not required when rock is placed under water. In this case, end dumping may be used. However, end dumping shall only be used to an elevation of 1.0 m above the water level that is present at the time of placement. After that, the rock embankment shall be constructed using the equipment and method specified in the paragraphs above. The materials shall be well distributed to form a solid embankment constructed to full width as the work progresses or as staged construction allows.

When a 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 so that mud waves generated by the rock placement are able to move away from the embankment. Mud waves shall be displaced or removed to prevent their entrapment below or within the embankment.

End dumping from the top of the embankments may also be carried out at locations as specified in the Contract Documents when narrow and relatively shallow widening of an existing embankment is required for the shoulder portion of the highway.

The top surface of the embankment shall be chinked with rock fragments and spalls to form the subgrade prior to the placement of the roadway subbase in order to minimize voids and prevent migration of the subbase material into the rock fill.

Care shall be taken to avoid large boulders and rock fragments protruding above the average embankment surface within a distance of 3 m beyond the edge of shoulder.

With the written approval of the Contract Administrator, dumping of surplus rock over the sides of rock embankments by the Contractor is permitted as follows:

a) After the rock embankments have been completed to the grades and tolerances specified in the Contract Documents and all such measurements have been verified by the Contract Administrator.

b) Only in areas that do not affect features that are located within the right-of-way (e.g., ditches, culverts, and signs) or the right-of-way limits and shall not detrimentally affect stability or drainage or cause other potentially negative impacts.

c) At the direction of the Owner.

206.07.05.02.02 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. When a harder, more durable rock (e.g., limestone) is present as an integral part of a shale formation, no pieces shall be placed in the embankment that after placement are greater than 150 mm measured vertically or greater than 600 mm measured parallel to the embankment layers, respectively.

Compaction of each layer shall be in two stages using equipment specified in the Rollers for Shale Embankment Construction subsection. In the first stage, a minimum of 2 passes shall be made with a static sheepsfoot, packall, padfoot, or tamping foot type roller. In the second stage, a minimum of 2 passes shall be made with a vibratory steel drum or pneumatic-tired roller. The maximum speed of rollers shall not exceed 5 km/hr.

206.07.06 Rock Backfill to Structure

When rock backfill to structures is specified, the rock backfill shall only be comprised of rock fragments no larger than 250 mm in their greatest dimension and free of all debris, earth, topsoil, wood, chemical, or other contamination.

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

206.07.07 Quality Control

206.07.07.01 Grade Checks

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

A competent survey crew shall carry out grade checks on all finished earth and rock grade surfaces. QC of earth and rock grade surfaces shall be based on horizontal and vertical grading tolerances as specified in the Tolerances for Earth and Tolerances for Rock clauses, respectively. The grade shall be certified at the stations and offsets shown in the grading templates or where grading templates are not available, at the frequency requirements specified for the layout elsewhere in the Contract Documents.

206.07.07.01.01 Submission of Grade Checks

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

When grading templates are available, the Contractor shall sign and certify on the grading template that the components of the work indicated on that template have been correctly constructed to the specified line and grade tolerances. If a template is not available, then the Contractor shall complete, sign, and submit MTO form PH-CC-820 to the Contract Administrator.

206.07.07.02 Compaction Quality Control

The Contractor shall use Method B according to OPSS 501 for quality control of compaction.

206.07.08 Management of Excess Material

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

206.08 QUALITY ASSURANCE

206.08.01 Grade Checks

The Owner may conduct random QA grade checks to verify horizontal and vertical grading tolerances.

Provided that the Owner's grade checks conform to those determined by the Contractor, no action shall be taken. If discrepancies between QA and QC grade checks occur, the Owner may then conduct additional QA grade checks at the Owner's discretion.

If the finished grade or cross-section is found to be outside the specification limits specified in the Tolerances - General clause, then:

a) The Contract Administrator shall notify the Contractor.

b) The Contractor shall be charged for each station where the finished grade is outside of the specification limits, at the rate specified in the Finished Grade Checks Outside Specification Limits subsection.

c) The Contractor shall then bring the earth or rock grade surface to within the specified tolerances for grade, at no additional cost to the Owner.

206.09 MEASUREMENT FOR PAYMENT

206.09.01 Actual Measurement

206.09.01.01 Earth Excavation, Grading

Measurement for earth excavation, grading shall be the in-place volume of earth in cubic metres computed from field measurements of cross-sections taken both prior to grubbing and upon completion of the work.

When benching is required to key-in new fills into existing slopes, the quantity of materials that are excavated as part of that operation shall not be included in the measurement for payment.

206.09.01.01.01 Overbuilding, Earth

When the Contract requires earth borrow, the quantity of material placed beyond the earth grading tolerances shall be deducted from the measured quantity of earth borrow on a cubic metre for cubic metre basis, with no correction for changes in the 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 the existing pavement when 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 the in-place volume in cubic metres computed from field measurements of cross-sections bounded by the original rock line after the earth overburden has been removed and the theoretical rock face and the bottom excavation limits designated in the Contract Documents. Where shatter is specified, the bottom of the cut shall be 300 mm below the designated rock grade.

The quantity of rock excavation shall also include:

a) All shatter that is specified in the Contract Documents.

b) Any rock that is excavated beyond the limits that are as specified in the Contract Documents at the Contract Administrator's written instructions.

206.09.01.03.02 Overbuilding, Rock

When the Contract has a rock supply item, the quantity of excavated rock placed beyond the rock grading tolerance at the top of subgrade and beyond the angle of repose for rock fills shall be deducted from the rock surplus quantity on a cubic metre for cubic metre basis with no correction for changes in density of the material.

206.09.01.03.03 Boulders

Measurement of each boulder classified as rock shall be by volume in cubic metres computed on the basis of the product of the actual rock measurement of the 3 maximum rectilinear dimensions in metres of the boulder.

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 Supply

The quantity of rock supply shall be determined in cubic metres either at the end of a distinct stage or at the end of the Contract.

The quantity shall be determined as one of the following:

a) The rock surplus quantity less the quantities of rock materials removed as part of the rock surplus and measured as specified in the Measurement of Rock Surplus clause.

b) The quantity of rock materials determined by the Contract Administrator required to complete the embankments.

c) The total of both a) and b).

At the discretion of the Contract Administrator, earlier access to the rock supply item may be granted; however, the quantities shall be reconciled at the end of the stage or Contract.

The rock supply quantity shall be measured in-situ by the Contractor in neat lines at the source. The in-situ volume shall be the rock supply quantity divided by the bulking factor.

For rock materials supplied under the rock supply item for the completion of rock embankments, any rock materials remaining at the rock supply source after rock embankment construction has been completed or otherwise used on the Contract as specified in the Management of Excavated Materials clause, shall be paid for as specified in the Rock Supply subsection under the Basis of Payment section.

The Contract Administrator shall be informed in writing 2 Business Days prior to commencing drilling operations at the rock supply source or 2 Business Days prior to removing rock from the rock pile or both. The Contract Administrator reserves the right to verify any measurements at any source. The Contractor shall give the Contract Administrator complete access to all such sources.

206.09.01.06 Rock Embankment

Measurement of rock embankment shall be by volume in cubic metres of rock embankments. Adjustments to the Plan Quantity shall be limited to those supported with topographic survey information.

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.

Payment for earth grade checks, including provision of all labour, Equipment, and Material to conduct quality control testing shall be included in the Contract price as part of the work of earth excavation, grading.

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.

When the Contract Administrator directs that material excavated under this item is to be handled other than as specified in the Excavation for Pavement Widening clause, then such material shall be managed in accordance with the Contract Documents and treated as a Change in the Work.

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

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 embankment shall be included in the rock excavation, grading item.

When excavated rock is to be used for any other Contract item work (e.g., rock embankment, granular materials, or rip-rap), the hauling costs are deemed to be included in payment for the work associated with the appropriate tender item. However, when excavated rock is not to be used for any other Contract item work, the hauling costs are then deemed to be included in payment for the work under the rock excavation, grading item.

Payment for rock grade checks, including provision of all labour, Equipment, and Material to conduct quality control testing, shall be included in the Contract price as part of the work of rock excavation, grading.

When 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.

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

On completion of mucking, a progress payment of an additional 25% of this tender item shall be made.

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.

206.10.05 Rock Supply - 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, and all costs for fees and royalties.

When 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.

The unit price tendered for this item is excluded from the provisions specified in the Contract Documents for renegotiation of unit prices.

For rock materials supplied under the rock supply item for completion of rock embankments as specified in the Contract Documents, any rock materials remaining at the rock supply source after completion of all rock excavation and rock embankment construction shall be paid at 50% of the tender unit rate for rock supply.

As specified in part b) of the Measurement of Rock Surplus clause, the Contractor shall be paid $400.00 for each monitoring device used to monitor compressible soils, regardless of the number of additional pipe sections that are required.

206.10.06 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.

206.10.07 Backfill for Overexcavation

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

206.10.08 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.

206.10.09 Finished Grade Checks Outside Specification Limits

As specified in the Grade Checks subsection of the Quality Assurance section, for each station where the QA grade check of the finished grade is outside of specification limits, the Contractor shall be charged $250.00.

ROCK EXCAVATION, GRADING — Item No.

Special Provision No. 206F04 ~~December 2014~~April 2025

Amendment to OPSS 206, ~~November 2014~~April 2025

Bulking Factor for Shale

206.03 DEFINITIONS

Section 206.03 of OPSS 206 is amended by deleting the definition for **Bulking Factor** in its entirety and replacing it with the following:

Bulking Factor means the ratio of the volume of rock material following excavation, placement, and compacting to the original in-situ volume of the same material. The bulking factor for rock shall be 1.35, except for shale. For rock excavation quantities identified as shatter, the bulking factor shall be 0.35. For shale, the bulking factor shall be [* Designer Fill-in, See Notes to Designer].

206.07.04.01 Measurement of Rock Surplus

Clause 206.07.04.01 of OPSS 206 is amended by deleting the third paragraph in point a) in its entirety and replacing it with the following:

All aggregate materials removed from each stockpile within the Contract limits shall be weighed by the Contractor for reconciliation with the rock surplus quantity by converting the mass to a bulked broken rock volume using a factor of 0.519 m^3/tonne, except for shale. For shale, the conversion factor shall be [**Designer Fill-in, See Notes to Designer] m^3/tonne.

Clause 206.07.04.01 of OPSS 206 is further amended by deleting the second paragraph in point c) in its entirety and replacing it with the following:

Excavated rock weighed as part of the rock surplus shall be converted to a bulked broken rock volume using a factor of 0.519 m^3/tonne, except for shale. For shale, the conversion factor shall be [** Designer Fill-in, See Notes to Designer] m^3/tonne.

NOTES TO DESIGNER:

Designer Fill-ins:

* Insert the bulking factor for shale recommended by the Geotechnical Section.
** Insert the converting volume factor in m^3/tonne recommended by the Geotechnical Section.

WARRANT: Always with this item when shale is excavated as part of the Rock Excavation, Grading item.

ROCK EXCAVATION, GRADING - Item No.

Special Provision No. 206F04 April 2025

Amendment to OPSS 206, April 2025

Bulking Factor for Shale

206.03 DEFINITIONS

Section 206.03 of OPSS 206 is amended by deleting the definition for **Bulking Factor** in its entirety and replacing it with the following:

Bulking Factor means the ratio of the volume of rock material following excavation, placement, and compacting to the original in-situ volume of the same material. The bulking factor for rock shall be 1.35, except for shale. For rock excavation quantities identified as shatter, the bulking factor shall be 0.35. For shale, the bulking factor shall be [* Designer Fill-in, See Notes to Designer].

206.07.04.01 Measurement of Rock Surplus

Clause 206.07.04.01 of OPSS 206 is amended by deleting the third paragraph in point a) in its entirety and replacing it with the following:

All aggregate materials removed from each stockpile within the Contract limits shall be weighed by the Contractor for reconciliation with the rock surplus quantity by converting the mass to a bulked broken rock volume using a factor of 0.519 m^3/tonne, except for shale. For shale, the conversion factor shall be [**Designer Fill-in, See Notes to Designer] m^3/tonne.

Clause 206.07.04.01 of OPSS 206 is further amended by deleting the second paragraph in point c) in its entirety and replacing it with the following:

Excavated rock weighed as part of the rock surplus shall be converted to a bulked broken rock volume using a factor of 0.519 m^3/tonne, except for shale. For shale, the conversion factor shall be [** Designer Fill-in, See Notes to Designer] m^3/tonne.

NOTES TO DESIGNER:

Designer Fill-ins:

* Insert the bulking factor for shale recommended by the Geotechnical Section.
** Insert the converting volume factor in m^3/tonne recommended by the Geotechnical Section.

WARRANT: Always with this item when shale is excavated as part of the Rock Excavation, Grading item.

EARTH EXCAVATION, GRADING - Item No.

Special Provision No. 206F06 ~~September 2017~~April 2025

Amendment to OPSS 206, ~~November 2014~~April 2025

206.07.03.01 Earth Excavation - Grading

206.07.03.01.01 General

Clause 206.07.03.01.01 of OPSS 206 is amended by the addition of the following paragraph:

The work shall also include the excavation of pavement, treated base, concrete base, prime, surface treatment, and mulch pavements, including any buried layers of these materials, at the following locations:

* Designer Fill-In, See Notes to Designer

206.09.01.01 Earth Excavation, Grading

Clause 206.09.01.01 of OPSS 206 is amended by the addition of the following paragraph:

Where the work of earth excavation, grading includes the removal of pavement, treated base, concrete base, prime, surface treatment, and mulch pavements, including any buried layers of these materials, the measurement for payment of earth excavation, grading shall include the volume of these materials.

NOTES TO DESIGNER:

Designer Fill-In:

* Fill in the locations where the 2nd paragraph of CDED B206-1.8.6, Part B. applies, and pavement removal is to be included in the quantities for both this item and the appropriate removal of pavement item(s).

WARRANT: Include with this item when there are areas of pavement reconstruction and the pavement is included in the earth excavation quantity for these areas.

EARTH EXCAVATION, GRADING - Item No.

Special Provision No. 206F06 April 2025

Amendment to OPSS 206, April 2025

206.07.03.01 Earth Excavation - Grading

206.07.03.01.01 General

Clause 206.07.03.01.01 of OPSS 206 is amended by the addition of the following paragraph:

The work shall also include the excavation of pavement, treated base, concrete base, prime, surface treatment, and mulch pavements, including any buried layers of these materials, at the following locations:

* Designer Fill-In, See Notes to Designer

206.09.01.01 Earth Excavation, Grading

Clause 206.09.01.01 of OPSS 206 is amended by the addition of the following paragraph:

Where the work of earth excavation, grading includes the removal of pavement, treated base, concrete base, prime, surface treatment, and mulch pavements, including any buried layers of these materials, the measurement for payment of earth excavation, grading shall include the volume of these materials.

NOTES TO DESIGNER:

Designer Fill-In:

* Fill in the locations where the 2nd paragraph of CDED B206-1.8.6, Part B. applies, and pavement removal is to be included in the quantities for both this item and the appropriate removal of pavement item(s).

WARRANT: Include with this item when there are areas of pavement reconstruction and the pavement is included in the earth excavation quantity for these areas.

Ontario Provincial Standard Specifications (OPSSs)					
209	November 2014	April 2025	TBD	Rev: Construction Specification for Embankments over Swamps and Compressible Soils is implemented. The specification has been updated to new PROV format with no technical content changes. Legacy Appendix A removed. Applicable content from SSP 209F01 has been incorporated into OPSS 209.	Mike Pearsall
Standard Special Provisions (SSPs)					
209F01	December 2014	April 2025	TBD	Rev: SSP Amendment to Construction Specification for Embankments over Swamps and Compressible Soils is revised. Applicable content has been incorporated into OPSS 209.	Mike Pearsall

Note: The 209 implemented in April 2025 replaces 209, November 2014 with no technical content changes.

CONSTRUCTION SPECIFICATION FOR EMBANKMENTS OVER SWAMPS AND COMPRESSIBLE SOILS

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209.01 SCOPE

This specification covers the requirements for the construction of embankments over swamps and compressible soils using the excavation, floatation, or displacement method.

~~**209.01.01 Specification Significance and Use**~~

~~This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.~~

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

~~209.01.02 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.~~

209.02 REFERENCES

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

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

Ontario Provincial Standard Specifications, Construction

OPSS 201	Clearing, Close Cut Clearing, Grubbing, and Removal of Surface and Piled Boulders
OPSS 206	Grading
OPSS 212	Earth Borrow

Ontario Provincial Standard Specifications, Material

OPSS 1010	Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
OPSS 1860	Geotextiles

209.03 DEFINITIONS

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

Displacement Method means to build the embankment directly on the swamp such that the underlying swamp material is displaced away from the embankment fill.

Earth means earth as defined in OPSS 206.

Floatation Method means to build the embankment directly on the swamp minimizing the displacement of the swamp material.

Hydraulic Backhoe Reach means the distance from the bottom of the tracks to the tip of the bucket teeth when measured vertically with the bucket at the lowest point of the bucket swing path.

Rock means rock as defined in OPSS 206.

Swamp Material means the material within the swamp excavation, floatation, or displacement limits, except rock, masonry, natural wood, and manufactured products. ~~–~~Wood that has decomposed and breaks down readily upon handling shall be considered swamp material.

Swamp Wave means the swamp material that is displaced as a result of placement of embankment material.

209.05 MATERIALS

209.05.01 Embankment Material

Embankment material shall consist of earth, rock, select subgrade material, or other material specified in the Contract Documents.

209.05.01.01 Earth Borrow

Earth borrow shall be according to OPSS 212.

209.05.01.02 Select Subgrade Material

Select subgrade material shall be according to OPSS 1010.

209.05.02 Geotextiles

Geotextiles shall be according to OPSS 1860 and be of the type, class, and filtration opening size (FOS) range specified in the Contract Documents.

209.06 EQUIPMENT

209.06.01 Rented Swamp Excavator

The type of swamp excavator equipment shall be as specified in the Contract Documents.

All buckets shall be suitable for swamp excavation.

Dragline minimum operating weight shall be determined using the manufacturer's standard operating dragline configuration, boom length, counterweights and manufacturer's specified bucket.

The minimum size and requirements of the excavator(s) shall be as specified in the Contract Documents.

209.06.02 Spreading, Levelling, and Compacting Equipment

When the floatation method is used, spreading, levelling, and compacting equipment shall be restricted to a gross weight that is not detrimental to the structural integrity of the root mat.

209.07 CONSTRUCTION

209.07.01 General

The work of embankment construction shall be carried out using one or more of the following methods specified in the Contract Documents:

a) Excavation Method

b) Floatation Method

c) Displacement Method

209.07.02 Clearing and Close Cut Clearing

Prior to beginning embankment construction, the required clearing and close cut clearing shall be completed according to OPSS 201.

209.07.03 Excavation Method

The work shall include the excavation of all material, except rock from within the limits specified in the Contract Documents and the handling, placing, shaping, trimming and hauling of excavated material.

Excavation shall be to the full width and full depth. The excavation and backfilling shall be a controlled operation and carried out simultaneously.

Excavated material shall be placed clear of the sides of the embankment limits and any drainage facilities.

209.07.03.01 Embankment Construction and Backfill

Backfill shall be placed according to OPSS 206. However, when wet conditions exist, backfill material other than rock may be placed up to 600 mm above water level without compaction.

Embankment material placed subsequent to the backfill material shall be placed according to OPSS 206.

209.07.04 Floatation Method

The work shall consist of controlled placement of embankment material, removal of surcharges specified in the Contract Documents from above the subgrade, and hauling and incorporating of the surcharge material into the work according to OPSS 206.

209.07.04.01 Swamp Waves

Swamp waves shall not be excavated or otherwise disturbed.

209.07.04.02 Embankment Construction

The embankment shall be constructed according to OPSS 206, except that vibratory compaction equipment shall not be used within 1.0 m of the original surface of the swamp.

Each layer shall be built using an outside to inside sequence by keeping the outer one-third portions of the layer at least 30 m ahead of the centre portion.

209.07.04.03 Geotextile

When geotextile is to be placed, the area specified in the Contract Documents for geotextile shall be close cut cleared and cleared of objects that may damage the geotextile. Close cut clearing shall be carried out in such a manner as not to damage the structural integrity of the root mat.

The placement operation shall be such that the geotextile is not exposed to daylight for more than 72 hours.

Adjacent sections of the geotextile shall be overlapped a minimum of 1.0 m or shall be sewn together according to OPSS 1860.

Should the geotextile be damaged, it shall be repaired by placing a piece of geotextile large enough to cover the damaged section meeting the above requirements for overlapping.
If the geotextile is damaged due to the Contractor's operation during embankment construction, the embankment material shall be removed from the geotextile.

209.07.05 Displacement Method

The work shall consist of controlled placement of the embankment material, excavation of swamp waves and displaced material, removal of surcharges specified in the Contract Documents, and hauling and incorporating of this material into the work according to OPSS 206.

209.07.05.01 Embankment Construction

The embankment shall be built in such a manner as to displace as much of the material underlying the embankment as possible. An inside to outside construction sequence shall be used, keeping the inside one-third portion 30 m ahead of the outside portions.

When a stable platform has been established, embankment material placed 300 mm above original ground shall be placed according to OPSS 206.

209.07.06 Management of Excess Material

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

Manufactured products ~~are~~shall not ~~to~~ be used in the right-of-way.

Excavated swamp material shall be used as much as possible within the right-of-way adjacent to an embankment and conforming to standard right-of-way offset. This shall be done by widening embankments, flattening side slopes, and constructing modified cross-sections as specified in the Contract Documents. Such material shall be trimmed to provide smooth contours and to provide drainage.

The volume of excavated material to be used within the Contract limits or designated areas shall be as specified in the Contract Documents.

209.09 MEASUREMENT FOR PAYMENT

209.09.01 Actual Measurement

209.09.01.01 Excavation

Measurement shall be by volume in cubic metres by the method of average end areas. The quantity for payment shall be the lesser of the following:

a) Actual excavation.

b) Excavation to the length, width, and depth as specified in the Contract Documents.

209.09.01.02 Rental of Swamp Excavation Equipment

Measurement shall be by time in hours that the equipment is in effective operation. The equipment shall not be considered in effective operation when there are no trucks ready for loading, when hauling is required.

When the excavated material has been placed in a location that will not interfere with subsequent excavation, measurement shall not be made for the handling required in grading, levelling, and trimming of such material.

209.09.01.03 Select Subgrade Material

Measurement shall be by mass in tonnes or by volume in cubic metres as specified in the Contract Documents.

209.09.01.03.01 Cubic Metre Measurement

When measurement of select subgrade material is in cubic metres, one of the following methods, as specified in the Contract Documents, shall be used to calculate the volume of the material:

a) End Area Method

Volume of material shall be measured in their original location and computed in cubic metres by the method of average end areas.

Original cross-sections shall be taken after the area has been cleared, grubbed, and stripped of unsuitable surface material. These operations shall be completed a minimum of 3 Working Days in advance of excavation to allow for the required cross-sectioning.

b) Truck Box Method

Material shall be measured in cubic metres, loose, by predetermined truck box capacities. The predetermined capacity of each truck shall be that computed from its box dimensions.

Each truck shall be uniquely and readily identifiable.

209.09.01.04 Geotextile for Swamp Treatment

Measurement shall be by area, in place, in square metres, with no allowance for overlaps.

209.09.02 Plan Quantity Measurement

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

209.10 BASIS OF PAYMENT

209.10.01 Excavation

Payment for swamp excavation shall be at the Contract price for the tender item Earth Excavation, Grading, according to OPSS 206.

Payment shall not be made for the removal of materials that slide or slough inside the excavation limits.

209.10.02 Rental of Swamp Excavation Equipment, Dragline - Item
Rental of Swamp Excavation Equipment, Hydraulic Backhoe - Item

Payment at the Contract price for the above items shall be full compensation for furnishing and operating the minimum size equipment specified, including mats when necessary, for the excavation.

Payment for drainage of water in swamps prior to excavation is included in these tender items unless otherwise specified elsewhere in the Contract Documents.

When the Contract Administrator approves the use of larger equipment, the Contract price per hour will be adjusted by adding to the Contract price the difference between the rate set out in the Contract Documents for the minimum size equipment specified and the rate set out in the Contract Documents for the larger equipment to be employed. Where the standard operating weight for the equipment falls between increments and listed categories shown in the Contract Documents the lower rate shall apply. No interpolation between categories of standard operating weights will be made to determine payments. When larger equipment is approved for use, the estimated hours of swamp excavation equipment rental will be adjusted down by the Contract Administrator.

Payment shall be made only for the time in which the equipment is in effective operation.

209.10.03 Floatation and Displacement Method

Payment shall not be made for swamp material displaced by floatation or displacement.

209.10.04 Select Subgrade Material - Item
Geotextile for Swamp Treatment - Item

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

Repairs to geotextile damaged by the Contractor's operation shall be at no additional cost to the Owner.

209.10.05 Management of Swamp Material Excavated by Equipment Rental

All costs associated with the management of material, except trucking, are deemed to be included in the Contract unit price for rental of swamp excavation equipment.

Appendix 209-A, November 2014
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

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.

Note: The 209 implemented in April 2025 replaces 209, November 2014 with no technical content changes.

CONSTRUCTION SPECIFICATION FOR EMBANKMENTS OVER SWAMPS AND COMPRESSIBLE SOILS

TABLE OF CONTENTS

209.01 SCOPE

This specification covers the requirements for the construction of embankments over swamps and compressible soils using the excavation, floatation, or displacement method.

209.02 REFERENCES

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

Ontario Provincial Standard Specifications, Construction

OPSS 201 Clearing, Close Cut Clearing, Grubbing, and Removal of Surface and Piled Boulders
OPSS 206 Grading
OPSS 212 Earth Borrow

Ontario Provincial Standard Specifications, Material

OPSS 1010 Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
OPSS 1860 Geotextiles

209.03 DEFINITIONS

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

Displacement Method means to build the embankment directly on the swamp such that the underlying swamp material is displaced away from the embankment fill.

Earth means earth as defined in OPSS 206.

Floatation Method means to build the embankment directly on the swamp minimizing the displacement of the swamp material.

Hydraulic Backhoe Reach means the distance from the bottom of the tracks to the tip of the bucket teeth when measured vertically with the bucket at the lowest point of the bucket swing path.

Rock means rock as defined in OPSS 206.

Swamp Material means the material within the swamp excavation, floatation, or displacement limits, except rock, masonry, natural wood, and manufactured products. Wood that has decomposed and breaks down readily upon handling shall be considered swamp material.

Swamp Wave means the swamp material that is displaced as a result of placement of embankment material.

209.05 MATERIALS

209.05.01 Embankment Material

Embankment material shall consist of earth, rock, select subgrade material, or other material specified in the Contract Documents.

209.05.01.01 Earth Borrow

Earth borrow shall be according to OPSS 212.

209.05.01.02 Select Subgrade Material

Select subgrade material shall be according to OPSS 1010.

209.05.02 Geotextiles

Geotextiles shall be according to OPSS 1860 and be of the type, class, and filtration opening size (FOS) range specified in the Contract Documents.

209.06 EQUIPMENT

209.06.01 Rented Swamp Excavator

The type of swamp excavator equipment shall be as specified in the Contract Documents.

All buckets shall be suitable for swamp excavation.

Dragline minimum operating weight shall be determined using the manufacturer's standard operating dragline configuration, boom length, counterweights and manufacturer's specified bucket.

The minimum size and requirements of the excavator(s) shall be as specified in the Contract Documents.

209.06.02 Spreading, Levelling, and Compacting Equipment

When the floatation method is used, spreading, levelling, and compacting equipment shall be restricted to a gross weight that is not detrimental to the structural integrity of the root mat.

209.07 CONSTRUCTION

209.07.01 General

The work of embankment construction shall be carried out using one or more of the following methods specified in the Contract Documents:

a) Excavation Method

b) Floatation Method

c) Displacement Method

209.07.02 Clearing and Close Cut Clearing

Prior to beginning embankment construction, the required clearing and close cut clearing shall be completed according to OPSS 201.

209.07.03 Excavation Method

The work shall include the excavation of all material, except rock from within the limits specified in the Contract Documents and the handling, placing, shaping, trimming and hauling of excavated material.

Excavation shall be to the full width and full depth. The excavation and backfilling shall be a controlled operation and carried out simultaneously.

Excavated material shall be placed clear of the sides of the embankment limits and any drainage facilities.

209.07.03.01 Embankment Construction and Backfill

Backfill shall be placed according to OPSS 206. However, when wet conditions exist, backfill material other than rock may be placed up to 600 mm above water level without compaction.

Embankment material placed subsequent to the backfill material shall be placed according to OPSS 206.

209.07.04 Floatation Method

The work shall consist of controlled placement of embankment material, removal of surcharges specified in the Contract Documents from above the subgrade, and hauling and incorporating of the surcharge material into the work according to OPSS 206.

209.07.04.01 Swamp Waves

Swamp waves shall not be excavated or otherwise disturbed.

209.07.04.02 Embankment Construction

The embankment shall be constructed according to OPSS 206, except that vibratory compaction equipment shall not be used within 1.0 m of the original surface of the swamp.

Each layer shall be built using an outside to inside sequence by keeping the outer one-third portions of the layer at least 30 m ahead of the centre portion.

209.07.04.03 Geotextile

When geotextile is to be placed, the area specified in the Contract Documents for geotextile shall be close cut cleared and cleared of objects that may damage the geotextile. Close cut clearing shall be carried out in such a manner as not to damage the structural integrity of the root mat.

The placement operation shall be such that the geotextile is not exposed to daylight for more than 72 hours.

Adjacent sections of the geotextile shall be overlapped a minimum of 1.0 m or shall be sewn together according to OPSS 1860.

Should the geotextile be damaged, it shall be repaired by placing a piece of geotextile large enough to cover the damaged section meeting the above requirements for overlapping.

If the geotextile is damaged due to the Contractor's operation during embankment construction, the embankment material shall be removed from the geotextile.

209.07.05 Displacement Method

The work shall consist of controlled placement of the embankment material, excavation of swamp waves and displaced material, removal of surcharges specified in the Contract Documents, and hauling and incorporating of this material into the work according to OPSS 206.

209.07.05.01 Embankment Construction

The embankment shall be built in such a manner as to displace as much of the material underlying the embankment as possible. An inside to outside construction sequence shall be used, keeping the inside one-third portion 30 m ahead of the outside portions.

When a stable platform has been established, embankment material placed 300 mm above original ground shall be placed according to OPSS 206.

209.07.06 Management of Excess Material

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

Manufactured products shall not be used in the right-of-way.

Excavated swamp material shall be used as much as possible within the right-of-way adjacent to an embankment and conforming to standard right-of-way offset. This shall be done by widening embankments, flattening side slopes, and constructing modified cross-sections as specified in the Contract Documents. Such material shall be trimmed to provide smooth contours and to provide drainage.

The volume of excavated material to be used within the Contract limits or designated areas shall be as specified in the Contract Documents.

209.09 MEASUREMENT FOR PAYMENT

209.09.01 Actual Measurement

209.09.01.01 Excavation

Measurement shall be by volume in cubic metres by the method of average end areas. The quantity for payment shall be the lesser of the following:

a) Actual excavation.

b) Excavation to the length, width, and depth as specified in the Contract Documents.

209.09.01.02 Rental of Swamp Excavation Equipment

Measurement shall be by time in hours that the equipment is in effective operation. The equipment shall not be considered in effective operation when there are no trucks ready for loading, when hauling is required.

When the excavated material has been placed in a location that will not interfere with subsequent excavation, measurement shall not be made for the handling required in grading, levelling, and trimming of such material.

209.09.01.03 Select Subgrade Material

Measurement shall be by mass in tonnes or by volume in cubic metres as specified in the Contract Documents.

209.09.01.03.01 Cubic Metre Measurement

When measurement of select subgrade material is in cubic metres, one of the following methods, as specified in the Contract Documents, shall be used to calculate the volume of the material:

a) End Area Method

Volume of material shall be measured in their original location and computed in cubic metres by the method of average end areas.

Original cross-sections shall be taken after the area has been cleared, grubbed, and stripped of unsuitable surface material. These operations shall be completed a minimum of 3 Working Days in advance of excavation to allow for the required cross-sectioning.

b) Truck Box Method

Material shall be measured in cubic metres, loose, by predetermined truck box capacities. The predetermined capacity of each truck shall be that computed from its box dimensions.

Each truck shall be uniquely and readily identifiable.

209.09.01.04 Geotextile for Swamp Treatment

Measurement shall be by area, in place, in square metres, with no allowance for overlaps.

209.09.02 Plan Quantity Measurement

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

209.10 BASIS OF PAYMENT

209.10.01 Excavation

Payment for swamp excavation shall be at the Contract price for the tender item Earth Excavation, Grading, according to OPSS 206.

Payment shall not be made for the removal of materials that slide or slough inside the excavation limits.

209.10.02 Rental of Swamp Excavation Equipment, Dragline - Item
Rental of Swamp Excavation Equipment, Hydraulic Backhoe - Item

Payment at the Contract price for the above items shall be full compensation for furnishing and operating the minimum size equipment specified, including mats when necessary, for the excavation.

Payment for drainage of water in swamps prior to excavation is included in these tender items unless otherwise specified elsewhere in the Contract Documents.

When the Contract Administrator approves the use of larger equipment, the Contract price per hour will be adjusted by adding to the Contract price the difference between the rate set out in the Contract Documents for the minimum size equipment specified and the rate set out in the Contract Documents for the larger equipment to be employed. Where the standard operating weight for the equipment falls between increments and listed categories shown in the Contract Documents the lower rate shall apply. No interpolation between categories of standard operating weights will be made to determine payments. When larger equipment is approved for use, the estimated hours of swamp excavation equipment rental will be adjusted down by the Contract Administrator.

Payment shall be made only for the time in which the equipment is in effective operation.

209.10.03 Floatation and Displacement Method

Payment shall not be made for swamp material displaced by floatation or displacement.

209.10.04 Select Subgrade Material - Item
Geotextile for Swamp Treatment - Item

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

Repairs to geotextile damaged by the Contractor's operation shall be at no additional cost to the Owner.

209.10.05 Management of Swamp Material Excavated by Equipment Rental

All costs associated with the management of material, except trucking, are deemed to be included in the Contract unit price for rental of swamp excavation equipment.

RENTAL OF SWAMP EXCAVATION EQUIPMENT, DRAGLINE - Item No.
RENTAL OF SWAMP EXCAVATION EQUIPMENT, HYDRAULIC BACKHOE - Item No.
GEOTEXTILE FOR SWAMP TREATMENT - Item No.

Amendment to OPSS 209, ~~November 2014~~April 2025

~~209.03 DEFINITIONS~~

~~Section 209.03 of OPSS 209 is amended by the addition of the following definition:~~

~~**Hydraulic Backhoe Reach** means the distance from the bottom of the tracks to the tip of the bucket teeth when measured vertically with the bucket at the lowest point of the bucket swing path.~~

209.06 EQUIPMENT

209.06.01 Rented Swamp Excavator

Subsection 209.06.01 of OPSS 209 the last paragraph is deleted in its entirety and replaced by the following:

~~The type of swamp excavator equipment shall be as specified in the Contract Documents.~~

~~All buckets shall be suitable for swamp excavation.~~

~~Dragline minimum operating weight shall be determined using the manufacturer's standard operating dragline configuration, boom length, counterweights and manufacturer's specified bucket.~~

The minimum size and requirements of the excavator(s) shall be:

* Designer Fill-in - See Notes to Designer

209.07 CONSTRUCTION

~~209.07.03 Excavation Method~~

~~Subsection 209.07.03 of OPSS 209 is deleted in its entirety and replaced with the following:~~

~~The work shall include the excavation of all material, except rock from within the limits specified in the Contract Documents and the handling, placing, shaping, trimming and hauling of excavated material.~~

~~Excavation shall be to the full width and full depth. The excavation and backfilling shall be a controlled operation and carried out simultaneously.~~

~~Excavated material shall be placed clear of the sides of the embankment limits and any drainage facilities.~~

209.07.06 Management of Excess Material

Subsection 209.07.06, of OPSS 209 the first paragraph is deleted in its entirety and replaced with the following:

209.07.06 Management of Excavated Swamp Material

Management of excess material shall be according the Contract Documents. Material resulting from the operation of the swamp excavation equipment shall be managed as follows:

** Designer Fill-in - See Notes to Designer

~~Manufactured products are not to be used in the right-of-way.~~

~~Excavated swamp material shall be used as much as possible within the right-of-way adjacent to an embankment and conforming to standard right-of-way offset. This shall be done by widening embankments, flattening side slopes, and constructing modified cross-sections as specified in the Contract Documents. Such material shall be trimmed to provide smooth contours and to provide drainage.~~

~~The volume of excavated material to be used within the Contract limits or designated areas shall be as specified in the Contract Documents.~~

~~**209.09 MEASUREMENT FOR PAYMENT**~~

~~**209.09.01.02 Rental of Swamp Excavation Equipment**~~

~~Clause 209.09.01.02 of OPSS 209 is amended by deleting the first sentence and replacing it with the following:~~

~~Measurement shall be by time in hours that the equipment is in effective operation. The equipment shall not be considered in effective operation when there are no trucks ready for loading, when hauling is required.~~

~~**209.09.01.04 Geotextile**~~

~~Clause 209.09.01.04 of OPSS 209 is amended by deleting the title and replacing it with the following:~~

~~**Geotextile for Swamp Treatment.**~~

~~**209.10 BASIS OF PAYMENT**~~

~~Subsection 209.10.02of OPSS 209 is deleted in its entirety and replaced with the following:~~

~~**209.10.02 Rental of Swamp Excavation Equipment, Dragline Item**~~
~~**Rental of Swamp Excavation Equipment, Hydraulic Backhoe Item**~~

~~Payment at the Contract price for the above items shall be full compensation for furnishing and operating the minimum size equipment specified, including mats when necessary, for the excavation.~~

~~Payment for drainage of water in swamps prior to excavation is included in these tender items unless otherwise specified elsewhere in the Contract Documents.~~

~~When the Contract Administrator approves the use of larger equipment, the Contract price per hour will be adjusted by adding to the Contract price the difference between the rate set out in the Contract Documents for the minimum size equipment specified and the rate set out in the Contract Documents for the larger equipment to be employed. Where the standard operating weight for the equipment falls between increments and listed categories shown in the Contract Documents the lower rate shall apply. No interpolation between~~

~~categories of standard operating weights will be made to determine payments. When larger equipment is approved for use, the estimated hours of swamp excavation equipment rental will be adjusted down by the Contract Administrator.~~

~~Payment shall be made only for the time in which the equipment is in effective operation.~~

~~**209.10.04 Select Subgrade Material – Item**~~
~~**Geotextile – Item**~~

~~Subsection 209.10.04 of OPSS 209 is amended by deleting the title and replacing it with the following:~~

~~**Select Subgrade Material – Item**~~
~~**Geotextile for Swamp Treatment – Item**~~

~~**209.10.05 Management of Swamp Material Excavated by Equipment Rental**~~

~~Subsection 209.10.05 of OPSS 209 is deleted in its entirety and replaced with the following:~~

~~All costs associated with the management of material, except trucking, are deemed to be included in the Contract unit price for rental of swamp excavation equipment.~~

NOTES TO DESIGNER:

Designer Fill-In:

* State the required excavation equipment minimum type, minimum size, minimum reach (when applicable) and minimum bucket size.

Refer to CDED section B209 for more information on equipment configurations and contacts that may provide assistance with equipment selection. Typical configurations are as follows:

- 40,000 kg crawler mounted dragline with a 1.15 m^3 bucket, for side casting and trucking;
- 75,000 kg crawler mounted dragline with a 2.3 m^3 bucket, for side casting;
- 75,000 kg crawler mounted dragline with a 1.5 m^3 bucket, for trucking;
- 26,500 kg crawler mounted hydraulic backhoe with a 1.5 m^3 bucket, for side casting and trucking;
- 26,500 kg crawler mounted hydraulic backhoe with a minimum 12 m reach and a 1.5 m^3 bucket, for side casting and trucking;
- 32,000 kg crawler mounted hydraulic backhoe with a minimum 14 m reach and a 1.0 m^3 bucket, for side casting and trucking.

** State the material management locations, quantities (m3) at each location and requirements i.e.: 1. adjacent to operation, 2. at slope flattening locations as indicated elsewhere in the contract, 3. specific location, etc.

A chart in the Contract Documents may be needed to show the information if there are a large number of swamps and various management strategies.

WARRANT: Always with these tender items.

RENTAL OF SWAMP EXCAVATION EQUIPMENT, DRAGLINE - Item No.
RENTAL OF SWAMP EXCAVATION EQUIPMENT, HYDRAULIC BACKHOE - Item No.
GEOTEXTILE FOR SWAMP TREATMENT - Item No.

Special Provision No. 209F01 April 2025

Amendment to OPSS 209, April 2025

209.06 EQUIPMENT

209.06.01 Rented Swamp Excavator

Subsection 209.06.01 of OPSS 209 the last paragraph is deleted in its entirety and replaced by the following:

The minimum size and requirements of the excavator(s) shall be:

* Designer Fill-in - See Notes to Designer

209.07 CONSTRUCTION

209.07.06 Management of Excess Material

Subsection 209.07.06, of OPSS 209 the first paragraph is deleted in its entirety and replaced with the following:

209.07.06 Management of Excavated Swamp Material

Management of excess material shall be according the Contract Documents. Material resulting from the operation of the swamp excavation equipment shall be managed as follows:

** Designer Fill-in - See Notes to Designer

NOTES TO DESIGNER:

Designer Fill-In:

* State the required excavation equipment minimum type, minimum size, minimum reach (when applicable) and minimum bucket size.

  Refer to CDED section B209 for more information on equipment configurations and contacts that may provide assistance with equipment selection. Typical configurations are as follows:

  - 40,000 kg crawler mounted dragline with a 1.15 m^3 bucket, for side casting and trucking;
  - 75,000 kg crawler mounted dragline with a 2.3 m^3 bucket, for side casting;
  - 75,000 kg crawler mounted dragline with a 1.5 m^3 bucket, for trucking;
  - 26,500 kg crawler mounted hydraulic backhoe with a 1.5 m^3 bucket, for side casting and trucking;
  - 26,500 kg crawler mounted hydraulic backhoe with a minimum 12 m reach and a 1.5 m^3 bucket, for side casting and trucking;
  - 32,000 kg crawler mounted hydraulic backhoe with a minimum 14 m reach and a 1.0 m^3 bucket, for side casting and trucking.

** State the material management locations, quantities (m3) at each location and requirements i.e.: 1. adjacent to operation, 2. at slope flattening locations as indicated elsewhere in the contract, 3. specific location, etc.

A chart in the Contract Documents may be needed to show the information if there are a large number of swamps and various management strategies.

WARRANT: Always with these tender items.

Ontario Provincial Standard Specifications (OPSSs)					
212	November 2013	April 2025	TBD	Rev: Construction Specification for Earth Borrow is implemented. The specification has been updated to new PROV format with no technical content changes. Legacy Appendix A removed.	Mike Pearsall
Standard Special Provisions (SSPs)					
212F01	January 2014	April 2025	TBD	Rev: SSP Amendment to Construction Specification for Earth Borrow is revised to reflect the new publication version of OPSS 212.	Mike Pearsall

Note: The 212 implemented in April 2025 replaces 212, November 2013 with no technical content changes.

CONSTRUCTION SPECIFICATION FOR EARTH BORROW

TABLE OF CONTENTS

212.01 SCOPE

This specification covers the requirements for earth borrow.

212.~~01.01~~ ~~Specification Significance and Use~~

~~This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.~~

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

~~212.01.~~**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.~~

~~212.02~~ REFERENCES

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

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

Ontario Provincial Standard Specifications, Construction

OPSS 201	Clearing, Close Cut Clearing, Grubbing, and Removal of Surface and Piled Boulders
OPSS 206	Grading
OPSS 401	Trenching, Backfilling, and Compacting

Ontario Ministry of Transportation Publications

MTO Laboratory Testing Manual:

LS-702	Determination of Particle Size Analysis of Soils

MTO Form:

PH-D-10	Aggregate Sample Data Sheet

212.03 DEFINITIONS

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

Access Road means a private road built or an existing road used by the Contractor to gain access to the Work or to a source of material.

Borrow means earth material acquired from outside the right-of-way to complete the Work.

Haul Road means any public road, excluding the road under Contract, that forms part of a material haul route.

Quality Assurance (QA) means a system or series of activities carried out by the Owner to ensure that materials received from the Contractor meet the specified requirements.

Referee Testing means testing of a material attribute for the purpose of resolving acceptance issues at the request of the Contractor or the Owner.

212.04 DESIGN AND SUBMISSION REQUIREMENTS

212.04.01 Submission Requirements

A minimum of 14 Days prior to borrow material being used in the Work, the Contractor shall provide a list of intended borrow sources and the tonnage that is expected to be used from each source to the Contract Administrator.

A minimum of 48 hours prior to the placement of borrow in the Work, the following shall be submitted to the Contract Administrator:

a) Written proof for the right to occupy and operate each borrow source, including all appropriate permits.

b) Identification and description of any frost-susceptible materials that the Contractor intends to use as borrow and a detailed plan describing where the Contractor intends to use it.

212.05 MATERIALS

212.05.01 Earth Borrow

Earth borrow shall consist of earth as defined in OPSS 206 and shall be free from organic and foreign material.

Earth borrow with at least 50% of its particles by mass between 5 and 75 μm in size, as determined using LS-702, shall be considered frost-susceptible.

212.07 CONSTRUCTION

212.07.01 General

The work required for borrow shall include clearing, grubbing, and stripping of a borrow source according to OPSS 201 and 206; construction and maintenance of access roads; maintenance and restoration of haul roads; excavating, hauling, placing, and compacting borrow; and borrow source rehabilitation.

The construction of embankments and backfill areas with borrow shall be according to OPSS 206 and OPSS 401, respectively.

Frost-susceptible material shall not be placed in the following areas:

a) Within the zone between the frost penetration depth specified elsewhere in the Contract Documents and the final grade that will be established within the roadway upon completion of construction.

b) In any other areas, specified elsewhere in the Contract Documents.

When borrow is stockpiled prior to use, material from different sources shall be stockpiled separately from each other.

212.07.02 Owner's Properties

Unless otherwise specified, material shall not be supplied from the Owner's properties.

212.07.03 Clearing, Grubbing, and Stripping

Borrow sources shall be cleared, grubbed, and stripped of any unsuitable materials. These operations shall be completed a minimum of 3 Working Days in advance of any excavation where cross-sections are required.

Stripped material shall be piled sufficiently back from the face of the pit or quarry to prevent the contamination of the face material. The stripped material shall be piled such that the distance from the face being worked to the stripped material shall be:

a) For pits, at least equal to the depth of the face or 5 m, whichever is the greater distance.

b) For quarries, at least 5 m.

212.07.04 Haul Roads

Inspection of all haul roads prior to construction use shall be undertaken jointly by the Contract Administrator, the Contractor, and the owner of the haul road.

All required restoration work shall be performed when haul roads are damaged due to hauling operations.

Acceptable material shall be chosen and properly placed on the haul road to:

a) Provide safe passage and control of traffic at all times; and

b) Repair that road to the pre-contract condition upon completion of the hauling operations both to the satisfaction of the Contract Administrator and the owner of the road.

212.07.05 Borrow Source Rehabilitation

The borrow source shall be rehabilitated to comply with all applicable federal, provincial, and municipal requirements.

212.07.06 Management of Excess Material

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

212.08 QUALITY ASSURANCE

212.08.01 General

The Contract Administrator reserves the right to visually inspect borrow and reject any borrow material that does not meet the requirements specified herein and elsewhere in the Contract Documents.

All samples shall be obtained and delivered to the QA laboratory according to the Contract Documents. The data to be included with all samples shall be according to the requirements of the MTO form PH-D-10. ~~PH-D-10.~~

212.08.02 Acceptance of Earth Borrow

At the discretion of the Owner, the Quality Assurance (QA) laboratory designated by the Owner may carry out QA testing for the purposes of ensuring that earth borrow being placed above the frost penetration depth in the areas listed in the General subsection of the Construction section is not frost-susceptible.

For earth borrow material being placed within the frost penetration depth in the areas specified above, lots may be established at the discretion of the Contract Administrator, in accordance with the schedule shown in Table 1. In addition, any single lot or series of lots may be terminated and a new lot or series of lots re-established, at the discretion of the Contract Administrator.

A minimum of one randomly-obtained duplicate sample shall be obtained from each lot. Additional samples may also be taken at the discretion of the Contract Administrator. In the event that the Contractor is unavailable to take a designated sample for a lot, then no further earth materials from that lot shall be placed above the frost penetration depth until the designated sample is taken.

The Contract Administrator shall document and seal each sample container according to the Contract Documents.

For each duplicate sample, one sample shall be tested for QA purposes and the remaining sample shall be retained for referee testing, if necessary.

If a sample is found to contain more than 50% of its particles by mass between 5 and 75 μm when tested in accordance with LS-702, the Contract Administrator shall then notify the Contractor, in writing, within 2 Business Days of receiving the results, that any material within that lot represented by that sample including any material already within the Work or in stockpiles is frost susceptible and not acceptable for use above the frost penetration depth, wherever specified in the Contract Documents.

In addition, any of the material within that lot which has already been placed within the areas listed in the General subsection of the Construction section shall be removed at no additional cost to the Owner.

212.08.02.01 Referee Testing

The Contractor may invoke referee testing for any lot by submitting a written request to the Contract Administrator within 2 Business Days following notification from the Contract Administrator that the sampled material has been determined to be frost-susceptible.

The retained duplicate QA sample shall be used for referee testing. However, if a referee sample is not available, the Contractor shall then be responsible for obtaining a new sample from a location to be decided on by the Contract Administrator, at no additional cost to the Owner.

Referee testing shall be carried out, as specified herein and elsewhere in the Contract Documents.

All referee test results for a lot shall replace the respective QA tests for acceptance of the applicable lot and the referee results shall be binding on both the Owner and the Contractor.

212.09 MEASUREMENT FOR PAYMENT

212.09.01 Actual Measurement

212.09.01.01 Earth Borrow

Measurement of earth borrow shall be by volume in compacted cubic metres, excluding the volume of any boulders that cannot be accommodated in the Work.

Earth borrow shall be measured at the Contract site using the method of average end areas and surveyed cross-sections taken both prior to and after the placement of the material in the Work.

However, for borrow quantities that are less than 1,000 m^3, in areas where surveying may be impractical such as where borrow is being placed in areas of standing water, or where materials that are not designated as borrow are being placed and compacted in the same area and at the same time as borrow, then the truck box method may be used, at the discretion of the Contract Administrator.

In this case, each truck carrying borrow shall be readily-identifiable and the loose volume that it contains shall be calculated based on an estimated percentage of the truck box capacity which has been pre-determined from measurements taken by the Contract Administrator. The Contract Administrator shall then determine the compacted in-place volume of the borrow by dividing the estimated volume of the material within the truck box by an appropriate bulking factor determined by the Owner.

212.10 BASIS OF PAYMENT

212.10.01 Earth Borrow - 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.

Removal and replacement of localized soft spots identified by the Contract Administrator or removal of unacceptable material or both shall be at no additional cost to the Owner.

The Owner shall be responsible for the cost of referee testing, provided that the referee test results show that the material meets the applicable specifications. Otherwise, the Contractor shall be responsible for the costs.

212.10.02 Haul Roads

Payment at the Contract price for the appropriate tender items used to perform maintenance and restoration of haul roads shall be full compensation for all labour, Equipment, and Material to maintain and restore haul roads.

When the Contract does not include the appropriate tender items, prices shall be negotiated.

212.10.03 Access Roads

No separate or additional payment shall be made for the cost of construction and maintenance of access roads.

TABLE 1
Lot Schedule for Sampling and Testing Earth Borrow
Placed Above the Frost Penetration Depth

Expected Quantity from Each Source m^3	**Lot Size**
< 10,000	One lot
> 10,000 (Note 1)	10,000 m^3 lots up to 50,000 m^3 and 50,000 m^3 lots thereafter

Notes:

1. When the quantity of borrow is insufficient for a complete lot and is:

   a) less than one-half the quantity of a complete lot, then that quantity shall be added to the previous lot; or

   b) greater than or equal to one-half the quantity of a complete lot, then that quantity shall form its own lot.

~~**Appendix 212-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~~

~~No information provided here.~~

~~Related Ontario Provincial Standard Drawings~~

~~No information provided here.~~

Note: The 212 implemented in April 2025 replaces 212, November 2013 with no technical content changes.

CONSTRUCTION SPECIFICATION FOR EARTH BORROW

TABLE OF CONTENTS

212.01 SCOPE

This specification covers the requirements for earth borrow.

212.02 REFERENCES

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

Ontario Provincial Standard Specifications, Construction

OPSS 201 Clearing, Close Cut Clearing, Grubbing, and Removal of Surface and Piled Boulders
OPSS 206 Grading
OPSS 401 Trenching, Backfilling, and Compacting

Ontario Ministry of Transportation Publications

MTO Laboratory Testing Manual:
LS-702 Determination of Particle Size Analysis of Soils

MTO Form:
PH-D-10 Aggregate Sample Data Sheet

212.03 DEFINITIONS

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

Access Road means a private road built or an existing road used by the Contractor to gain access to the Work or to a source of material.

Borrow means earth material acquired from outside the right-of-way to complete the Work.

Haul Road means any public road, excluding the road under Contract, that forms part of a material haul route.

Quality Assurance (QA) means a system or series of activities carried out by the Owner to ensure that materials received from the Contractor meet the specified requirements.

Referee Testing means testing of a material attribute for the purpose of resolving acceptance issues at the request of the Contractor or the Owner.

212.04 DESIGN AND SUBMISSION REQUIREMENTS

212.04.01 Submission Requirements

A minimum of 14 Days prior to borrow material being used in the Work, the Contractor shall provide a list of intended borrow sources and the tonnage that is expected to be used from each source to the Contract Administrator.

A minimum of 48 hours prior to the placement of borrow in the Work, the following shall be submitted to the Contract Administrator:

a) Written proof for the right to occupy and operate each borrow source, including all appropriate permits.

b) Identification and description of any frost-susceptible materials that the Contractor intends to use as borrow and a detailed plan describing where the Contractor intends to use it.

212.05 MATERIALS

212.05.01 Earth Borrow

Earth borrow shall consist of earth as defined in OPSS 206 and shall be free from organic and foreign material.

Earth borrow with at least 50% of its particles by mass between 5 and 75 μm in size, as determined using LS-702, shall be considered frost-susceptible.

212.07 CONSTRUCTION

212.07.01 General

The work required for borrow shall include clearing, grubbing, and stripping of a borrow source according to OPSS 201 and 206; construction and maintenance of access roads; maintenance and restoration of haul roads; excavating, hauling, placing, and compacting borrow; and borrow source rehabilitation.

The construction of embankments and backfill areas with borrow shall be according to OPSS 206 and OPSS 401, respectively.

Frost-susceptible material shall not be placed in the following areas:

a) Within the zone between the frost penetration depth specified elsewhere in the Contract Documents and the final grade that will be established within the roadway upon completion of construction.

b) In any other areas, specified elsewhere in the Contract Documents.

When borrow is stockpiled prior to use, material from different sources shall be stockpiled separately from each other.

212.07.02 Owner's Properties

Unless otherwise specified, material shall not be supplied from the Owner's properties.

212.07.03 Clearing, Grubbing, and Stripping

Borrow sources shall be cleared, grubbed, and stripped of any unsuitable materials. These operations shall be completed a minimum of 3 Working Days in advance of any excavation where cross-sections are required.

Stripped material shall be piled sufficiently back from the face of the pit or quarry to prevent the contamination of the face material. The stripped material shall be piled such that the distance from the face being worked to the stripped material shall be:

a) For pits, at least equal to the depth of the face or 5 m, whichever is the greater distance.

b) For quarries, at least 5 m.

212.07.04 Haul Roads

Inspection of all haul roads prior to construction use shall be undertaken jointly by the Contract Administrator, the Contractor, and the owner of the haul road.

All required restoration work shall be performed when haul roads are damaged due to hauling operations. Acceptable material shall be chosen and properly placed on the haul road to:

a) Provide safe passage and control of traffic at all times; and

b) Repair that road to the pre-contract condition upon completion of the hauling operations both to the satisfaction of the Contract Administrator and the owner of the road.

212.07.05 Borrow Source Rehabilitation

The borrow source shall be rehabilitated to comply with all applicable federal, provincial, and municipal requirements.

212.07.06 Management of Excess Material

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

212.08 QUALITY ASSURANCE

212.08.01 General

The Contract Administrator reserves the right to visually inspect borrow and reject any borrow material that does not meet the requirements specified herein and elsewhere in the Contract Documents.

All samples shall be obtained and delivered to the QA laboratory according to the Contract Documents. The data to be included with all samples shall be according to the requirements of the MTO form PH-D-10.

212.08.02 Acceptance of Earth Borrow

At the discretion of the Owner, the Quality Assurance (QA) laboratory designated by the Owner may carry out QA testing for the purposes of ensuring that earth borrow being placed above the frost penetration depth in the areas listed in the General subsection of the Construction section is not frost-susceptible.

For earth borrow material being placed within the frost penetration depth in the areas specified above, lots may be established at the discretion of the Contract Administrator, in accordance with the schedule shown in Table 1. In addition, any single lot or series of lots may be terminated and a new lot or series of lots re-established, at the discretion of the Contract Administrator.

A minimum of one randomly-obtained duplicate sample shall be obtained from each lot. Additional samples may also be taken at the discretion of the Contract Administrator. In the event that the Contractor is unavailable to take a designated sample for a lot, then no further earth materials from that lot shall be placed above the frost penetration depth until the designated sample is taken.

The Contract Administrator shall document and seal each sample container according to the Contract Documents.

For each duplicate sample, one sample shall be tested for QA purposes and the remaining sample shall be retained for referee testing, if necessary.

If a sample is found to contain more than 50% of its particles by mass between 5 and 75 μm when tested in accordance with LS-702, the Contract Administrator shall then notify the Contractor, in writing, within 2 Business Days of receiving the results, that any material within that lot represented by that sample including any material already within the Work or in stockpiles is frost susceptible and not acceptable for use above the frost penetration depth, wherever specified in the Contract Documents.

In addition, any of the material within that lot which has already been placed within the areas listed in the General subsection of the Construction section shall be removed at no additional cost to the Owner.

212.08.02.01 Referee Testing

The Contractor may invoke referee testing for any lot by submitting a written request to the Contract Administrator within 2 Business Days following notification from the Contract Administrator that the sampled material has been determined to be frost-susceptible.

The retained duplicate QA sample shall be used for referee testing. However, if a referee sample is not available, the Contractor shall then be responsible for obtaining a new sample from a location to be decided on by the Contract Administrator, at no additional cost to the Owner.

Referee testing shall be carried out, as specified herein and elsewhere in the Contract Documents.

All referee test results for a lot shall replace the respective QA tests for acceptance of the applicable lot and the referee results shall be binding on both the Owner and the Contractor.

212.09 MEASUREMENT FOR PAYMENT

212.09.01 Actual Measurement

212.09.01.01 Earth Borrow

Measurement of earth borrow shall be by volume in compacted cubic metres, excluding the volume of any boulders that cannot be accommodated in the Work.

Earth borrow shall be measured at the Contract site using the method of average end areas and surveyed cross-sections taken both prior to and after the placement of the material in the Work.

However, for borrow quantities that are less than 1,000 m^3, in areas where surveying may be impractical such as where borrow is being placed in areas of standing water, or where materials that are not designated as borrow are being placed and compacted in the same area and at the same time as borrow, then the truck box method may be used, at the discretion of the Contract Administrator.

In this case, each truck carrying borrow shall be readily-identifiable and the loose volume that it contains shall be calculated based on an estimated percentage of the truck box capacity which has been pre-determined from measurements taken by the Contract Administrator. The Contract Administrator shall then determine the compacted in-place volume of the borrow by dividing the estimated volume of the material within the truck box by an appropriate bulking factor determined by the Owner.

212.10 BASIS OF PAYMENT

212.10.01 Earth Borrow - 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.

Removal and replacement of localized soft spots identified by the Contract Administrator or removal of unacceptable material or both shall be at no additional cost to the Owner.

The Owner shall be responsible for the cost of referee testing, provided that the referee test results show that the material meets the applicable specifications. Otherwise, the Contractor shall be responsible for the costs.

212.10.02 Haul Roads

Payment at the Contract price for the appropriate tender items used to perform maintenance and restoration of haul roads shall be full compensation for all labour, Equipment, and Material to maintain and restore haul roads.

When the Contract does not include the appropriate tender items, prices shall be negotiated.

212.10.03 Access Roads

No separate or additional payment shall be made for the cost of construction and maintenance of access roads.

TABLE 1
Lot Schedule for Sampling and Testing Earth Borrow
Placed Above the Frost Penetration Depth

Expected Quantity from Each Source m^3	**Lot Size**
< 10,000	One lot
> 10,000 (Note 1)	10,000 m^3 lots up to 50,000 m^3 and 50,000 m^3 lots thereafter

Notes:

1. When the quantity of borrow is insufficient for a complete lot and is:

   a) less than one-half the quantity of a complete lot, then that quantity shall be added to the previous lot; or

   b) greater than or equal to one-half the quantity of a complete lot, then that quantity shall form its own lot.

EARTH BORROW - Item No

Special Provision No. 212F01 ~~January 2014~~April 2025

Amendment to OPSS 212, ~~November 2013~~April 2025

212.05 MATERIALS

212.05.01 Earth Borrow

Subsection 212.05.01 of OPSS 212 is amended by the addition of the following clause:

212.05.01.01 Fly Ash

Fly ash materials shall be accepted as earth borrow.

Ontario Power Generation shall be contacted to arrange acquisition of the fly ash material from the following source(s):

* Designer Fill-in –- See Notes to Designer

212.07 CONSTRUCTION

212.07.01 General

Subsection 212.07.01 of OPSS 212 is amended by the addition of the following clause:

212.07.01.01 Earth Borrow with Fly Ash

Fly ash shall be placed according to earth borrow construction requirements and the following:

a) Fly ash shall not be mixed with earth material.

b) Fly ash shall be placed on a drainage bed constructed to the full width of the embankment and to a depth of ** Designer Fill-in –- See Notes to Designer

c) The drainage bed shall be constructed of the following material:
*** Designer Fill-in –- See Notes to Designer

d) Fly ash shall be covered with a minimum cover of earth of **** Designer Fill-in –- See Notes to Designer

212.10 BASIS OF PAYMENT

212.10.01 Earth Borrow - Item

Subsection 212.10.01 of OPSS 212 is amended by the addition of the following:

Granular material used to construct a drainage bed under fly ash shall be paid for at the Contract price for the appropriate granular item.

NOTES TO DESIGNER:

Designer Fill-ins:

*	Identify the source of fly ash.
**	Identify depth of drainage bed.
***	Identify material for drainage bed. (Usually an appropriate product tendered in the contract and as recommended by Geotechnical).
****	Identify depth of earth cover.

WARRANT: For use with this tender item on contracts within 50 km of a fly ash source.

EARTH BORROW - Item No

Special Provision No. 212F01 April 2025

Amendment to OPSS 212, April 2025

212.05 MATERIALS

212.05.01 Earth Borrow

Subsection 212.05.01 of OPSS 212 is amended by the addition of the following clause:

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212.07 CONSTRUCTION

212.07.01 General

Subsection 212.07.01 of OPSS 212 is amended by the addition of the following clause:

212.07.01.01 Earth Borrow with Fly Ash

Fly ash shall be placed according to earth borrow construction requirements and the following:

a) Fly ash shall not be mixed with earth material.

b) Fly ash shall be placed on a drainage bed constructed to the full width of the embankment and to a depth of ** Designer Fill-in - See Notes to Designer

c) The drainage bed shall be constructed of the following material:
*** Designer Fill-in - See Notes to Designer

d) Fly ash shall be covered with a minimum cover of earth of **** Designer Fill-in - See Notes to Designer

212.10 BASIS OF PAYMENT

212.10.01 Earth Borrow - Item

Subsection 212.10.01 of OPSS 212 is amended by the addition of the following:

Granular material used to construct a drainage bed under fly ash shall be paid for at the Contract price for the appropriate granular item.

NOTES TO DESIGNER:

Designer Fill-ins:

* Identify the source of fly ash.
** Identify depth of drainage bed.
*** Identify material for drainage bed. (Usually an appropriate product tendered in the contract and as recommended by Geotechnical).
**** Identify depth of earth cover.

WARRANT: For use with this tender item on contracts within 50 km of a fly ash source.

Ontario Provincial Standard Specifications (OPSSs)					
220	November 2014	April 2025	TBD	Rev: Construction Specification for Wick Drain Installation is implemented. The specification has been updated to new PROV format with no technical content changes. Legacy Appendix A removed. Applicable content from SSP 102S07 has been incorporated into OPSS 220.	Mike Pearsall
Standard Special Provisions (SSPs)					
102S07	March 2018	N/A	TBD	Can: SSP Amendment to Wick Drain Installation is cancelled. Applicable content has been incorporated into OPSS 220.	Mike Pearsall

Note: The 220 implemented in April 2025 replaces 220, November 2014 with no technical content changes.

CONSTRUCTION SPECIFICATION FOR WICK DRAIN INSTALLATION

TABLE OF CONTENTS

220.01 SCOPE

This specification covers the requirements for the supply and installation of wick drains, including granular blanket.

~~220.01.01 Specification Significance and Use~~

~~This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.~~

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

~~**220.01.02 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.~~

220.02 REFERENCES

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

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

Ontario Provincial Standard Specifications, Construction

OPSS 206 Grading
OPSS 501 Compacting

Ontario Provincial Standard Specifications, Material

OPSS 1010 Aggregates - Base, Subbase, Select Subgrade, and Backfill Material

Canadian General Standards Board (CGSB)

CAN/CGSB 148.1 No.10-94 Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size

ASTM International

~~D 638~~D638-10 Standard Test Method for Tensile Properties of Plastics
~~D 3776/D 3776M~~D3776/D3776M-09ae2 Standard Test Methods for Mass per Unit Area (Weight) of Fabric
~~D 4491~~D4491-99a(2009) Standard Test Methods for Water Permeability of Geotextiles by Permittivity
~~D 4533~~D4533-11 Standard Test Method for Trapezoid Tearing Strength of Geotextiles
~~D 4632~~D4632-08 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
~~D 4716~~D4716-08 Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
~~D 4833~~D4833-07 Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products

~~D 5199~~D5199-12 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
~~D 5261~~D5261-10 Standard Test Method for Measuring Mass per Unit Area of Geotextiles

220.03 DEFINITIONS

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

Geotechnical Instrumentation means equipment used to monitor the progress of settlement, displacement, and pore water pressure measurements and includes such equipment as piezometers, settlement cells, standpipes, settlement profilers, inclinometers, and settlement rods.

Granular Blanket means a layer of free draining granular material used to provide drainage of excess pore pressures due to soil consolidation.

Recognized Specialist Subcontractor means a subcontractor retained by the Contractor that has proven satisfactory experience in work of this type and magnitude and has completed a minimum of five wick drain installation projects in the last five years.

220.04 DESIGN AND SUBMISSION REQUIREMENTS

220.04.01 Submission Requirements

220.04.01.01 Qualifications

Prior to the commencement of the Work, the qualifications of the recognized specialist subcontractor shall be submitted to the Contract Administrator.

220.04.01.02 Materials

At least 3 weeks prior to the installation of wick drains, the Contractor shall submit to the Contract Administrator the following:

a) A minimum one metre sample of the wick drain.

b) The manufacturer's technical specifications indicating that the materials meet the requirements shown in Table 1.

c) A certificate for each production lot supplied indicating that the wick drain supplied was produced and tested according to the requirements shown in Table 1.

The Contractor shall have test results available for the aggregates to be used in the work. At the request of the Contract Administrator, the Contractor shall make available or submit quality control test results. When more than one aggregate source is used for supplying material, test data from each source shall be submitted separately.

220.04.01.03 Installation Procedures

At least 3 weeks prior to the installation of wick drains, the Contractor shall submit to the Contract Administrator the details of the sequence and method of installation outlining the following:

a) Size, type, weight, maximum pushing force, and configuration of the installation rig.

b) Dimensions of the mandrel to be used.

c) Details of wick drain anchorage.

d) Detailed description of proposed installation procedures.

e) Alternative methods for overcoming obstructions.

f) Methods for splicing wick drains.

220.05 MATERIALS

220.05.01 Wick Drains

Wick drains shall be prefabricated and shall consist of a continuous plastic drainage core wrapped in a non-woven geotextile. The geotextile, core, and composite wick drain shall meet the requirements shown in Table 1.

All wick drains shall be free of defects, rips, holes, and flaws.

220.05.02 Granular Blanket

The granular blanket shall be Granular B, Type I, Type II, or Type III, according to OPSS 1010, except that 100% shall pass the 37.5 mm sieve.

220.06 EQUIPMENT

The equipment used to install wick drains shall be of the type that minimizes the disturbance to the drainage blanket or the native subsoil during the installation operation.

Falling weight impact hammers shall not be permitted.

220.07 CONSTRUCTION

220.07.01 Operational Constraints

When a site is designated as an environmentally sensitive area, jetting techniques shall not be permitted.

Wick drains shall be installed subsequent to the construction of the granular blanket and prior to the installation of monitoring instruments and placement of any overlying material. Wick drains shall be protected by a minimum of 2 m of earth fill or 4 m of rock fill before the ground freezes. Wick drains shall not be installed in frozen ground.

Installation of the wick drains shall be coordinated with the placement of geotechnical instrumentation as specified in the Contract Documents. Wick drains shall be installed in a manner that does not disturb geotechnical instrumentation already in place. Geotechnical instrumentation damaged as a result of Contractor's activities shall be replaced by the Contractor.

220.07.02 Transportation and Storage

During transportation and storage, the wick drain materials shall be protected from damage.

The storage area shall be so that the wick drain materials are protected from sunlight, dirt, dust, mud, debris, and all other detrimental substances.

220.07.03 Granular Blanket

The granular blanket shall be placed subsequent to the excavation of unsuitable material and any backfilling specified in the Contract Documents.

The granular blanket shall be placed and compacted to the limits and grades specified in the Contract Documents.

The granular blanket shall be placed according to the earth embankment requirements of OPSS 206 and compacted to a minimum 90% of its maximum dry density measured according to OPSS 501.

When the granular blanket is placed under water, it shall be placed by end dumping.

220.07.04 Trial Wick Drains

Prior to the installation of wick drains within the areas designated in the Contract Documents, the Contractor's Engineer shall demonstrate that the proposed materials, equipment, and installation method produce a satisfactory wick drain installation in accordance with these specifications. The Contractor's Engineer shall install a minimum of 10 trial wick drains at permanent installation locations designated by the Contractor.

Provided the trial wick drains are installed to the satisfaction of the Contract Administrator, they shall be incorporated as part of the permanent installation.

The Contractor's Engineer shall monitor the wick drain installation on a full-time basis. If at any time the Contractor's Engineer considers that the method of installation does not produce a wick drain that satisfies the Contract requirements, the method or equipment or both, as necessary, shall be altered to comply with the requirements of the Contract Documents.

220.07.05 Installation

220.07.05.01 General

Wick drains shall be installed to the depths specified in the Contract Documents.

Wick drains shall be installed using a mandrel advanced through the granular blanket and the underlying soil. The mandrel shall protect the wick drain material from damage during installation and shall be withdrawn after the installation of the wick drain. The mandrel shall be provided with an anchor plate to prevent soil from entering the bottom of the mandrel during installation and to anchor the bottom of the wick drain at the required depth at the time of mandrel removal. The projected cross-sectional area of the mandrel and anchor combination shall not exceed 7,700 mm^2.

Augering or vibratory equipment may be used within the granular blanket and underlying soils to facilitate the installation of wick drains. The use of augering or vibratory equipment shall not extend more than 1 m into the soil to be consolidated.

220.07.05.02 Layout

Wick drains shall be located and staked out by the Contractor. The spacing of the wick drains shall not vary more than 150 mm from the spacing specified in the Contract Documents.

220.07.05.03 Vertical Alignment

Wick drains shall be installed vertically, within a tolerance of not more than 10 mm per 500 mm. The Contractor shall maintain a suitable method of verifying the vertical alignment of the mandrel and of determining the depth of the wick drain at all times.

220.07.05.04 Splices

Splices in the wick drain shall be made so as to ensure continuity and to prevent reduction in the wick drain discharge capacity. Splices shall be a minimum of 150 mm in length.

220.07.05.05 Cut-Off

The wick drain shall be cut at the surface of the granular blanket so that at least a 150 mm length protrudes above the top of the granular blanket at each wick drain location.

220.07.05.06 Obstructions

Where obstructions are encountered below the working surface that cannot be penetrated by the wick drain installation equipment, the Contractor shall complete the wick drain from the elevation of the obstruction to the working surface and notify the Contract Administrator. At the direction of the Contract Administrator, the Contractor shall attempt to install a new wick drain within a 500 mm radius of the obstructed wick drain. A maximum of two attempts shall be made as directed by the Contract Administrator.

~~**220.07.06 Management of Excess Material**~~

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

~~**220.07.07**~~ **Inspection after Wick Drain Installation**

A Certificate of Conformance shall be submitted to the Contract Administrator upon completion of the wick drain installation and prior to the placement of any overlying material.

220.07.07 Management of Excess Material

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

220.08 QUALITY ASSURANCE

220.08.01 Certificate

Certificates for each production lot indicating that the wick drain supplied was produced and tested according to the requirements of this specification shall be provided by the manufacturer for all wick drains delivered to the Contract.

220.08.02 Rejected Drains

Wick drains that are damaged or that do not meet the requirements of this specification shall be rejected and replaced. Replacement wick drains shall be installed within a 500 mm radius from the location of the rejected wick drain, as directed by the Contract Administrator.

220.09 MEASUREMENT FOR PAYMENT

220.09.01 Actual Measurement

220.09.01.01 Wick Drains

Measurement shall be by length in metres for all accepted wick drains, including the protruding portion up to 150 mm per installation.

Properly installed obstructed wick drains and replacement wick drains shall be measured for payment.

220.09.02 Plan Quantity Measurement

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

220.10 BASIS OF PAYMENT

220.10.01 Wick Drains - 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.

Geotechnical instrumentation damaged as a result of the Contractor's activities shall be replaced at no additional cost to the Owner.

Payment shall not be made for rejected wick drains or delays or expenses incurred by the Contractor as a result of improper or unacceptable material or installation.

All labour, Equipment and Material required for the granular blanket shall be paid for with the appropriate road base or subbase item, Granular B Type I, Granular B Type II, Granular B Type III, as specified.

TABLE 1
Wick Drain Property Requirements

Component	Property		Test Method	Unit	Requirement
Core	Physical	Material	--	--	Polypropylene, Studded or Grooved
		Thickness	ASTM ~~D~~ ~~5199~~D5199	mm	≥ 2
		Mass	ASTM ~~D~~ ~~3776~~D3776	g/m	≥ 40
	Mechanical	Tensile Strength	ASTM ~~D 638~~D638	N	≥ 800
Geotextile	Physical	Material	--	--	Polypropylene, Non-Woven
		Mass	ASTM ~~D~~ ~~5261~~D5261	g/m^2	≥ 110
	Mechanical	Grab Tensile Strength	ASTM ~~D~~ ~~4632~~D4632	N	≥ 600
		Puncture Strength	ASTM ~~D~~ ~~4833~~D4833	N	≥ 200
		Trapezoidal Tear	ASTM ~~D~~ ~~4533~~D4533	N	≥ 250
		Filtration Opening Size (FOS)	CAN/CGSB 148.1, Method No. 10	µm	≥ 40
		Permittivity	ASTM ~~D~~ ~~4491~~D4491	s^{-1}	≥ 0.5
Composite Wick Drain	Physical	Width	--	mm	≥ 100
		Thickness	ASTM ~~D~~ ~~5199~~D5199	mm	≥ 3
	Mechanical	Discharge Capacity @ 10 kPa	ASTM ~~D~~ ~~4716~~D4716	m^3/s	≥ 1.2×10^{-4}
		Discharge Capacity @ 240 kPa	ASTM ~~D~~ ~~4716~~D4716	m^3/s	≥ 1.0×10^{-4}

Appendix 220-A, November 2014
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

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.

Note: The 220 implemented in April 2025 replaces 220, November 2014 with no technical content changes.

CONSTRUCTION SPECIFICATION FOR WICK DRAIN INSTALLATION

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220.01 SCOPE

This specification covers the requirements for the supply and installation of wick drains, including granular blanket.

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OPSS 501 Compacting

Ontario Provincial Standard Specifications, Material

OPSS 1010 Aggregates - Base, Subbase, Select Subgrade, and Backfill Material

Canadian General Standards Board (CGSB)

CAN/CGSB 148.1 No.10-94 Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size

ASTM International

D638-10	Standard Test Method for Tensile Properties of Plastics
D3776/D3776M-09ae2	Standard Test Methods for Mass per Unit Area (Weight) of Fabric
D4491-99a(2009)	Standard Test Methods for Water Permeability of Geotextiles by Permittivity
D4533-11	Standard Test Method for Trapezoid Tearing Strength of Geotextiles
D4632-08	Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
D4716-08	Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
D4833-07	Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
D5199-12	Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
D5261-10	Standard Test Method for Measuring Mass per Unit Area of Geotextiles

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

Geotechnical Instrumentation means equipment used to monitor the progress of settlement, displacement, and pore water pressure measurements and includes such equipment as piezometers, settlement cells, standpipes, settlement profilers, inclinometers, and settlement rods.

Granular Blanket means a layer of free draining granular material used to provide drainage of excess pore pressures due to soil consolidation.

Recognized Specialist Subcontractor means a subcontractor retained by the Contractor that has proven satisfactory experience in work of this type and magnitude and has completed a minimum of five wick drain installation projects in the last five years.

220.04 DESIGN AND SUBMISSION REQUIREMENTS

220.04.01 Submission Requirements

220.04.01.01 Qualifications

Prior to the commencement of the Work, the qualifications of the recognized specialist subcontractor shall be submitted to the Contract Administrator.

220.04.01.02 Materials

At least 3 weeks prior to the installation of wick drains, the Contractor shall submit to the Contract Administrator the following:

a) A minimum one metre sample of the wick drain.

b) The manufacturer’s technical specifications indicating that the materials meet the requirements shown in Table 1.

c) A certificate for each production lot supplied indicating that the wick drain supplied was produced and tested according to the requirements shown in Table 1.

The Contractor shall have test results available for the aggregates to be used in the work. At the request of the Contract Administrator, the Contractor shall make available or submit quality control test results. When more than one aggregate source is used for supplying material, test data from each source shall be submitted separately.

220.04.01.03 Installation Procedures

At least 3 weeks prior to the installation of wick drains, the Contractor shall submit to the Contract Administrator the details of the sequence and method of installation outlining the following:

a) Size, type, weight, maximum pushing force, and configuration of the installation rig.

b) Dimensions of the mandrel to be used.

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220.06 EQUIPMENT

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220.07 CONSTRUCTION

220.07.01 Operational Constraints

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The granular blanket shall be placed and compacted to the limits and grades specified in the Contract Documents.

The granular blanket shall be placed according to the earth embankment requirements of OPSS 206 and compacted to a minimum 90% of its maximum dry density measured according to OPSS 501.

When the granular blanket is placed under water, it shall be placed by end dumping.

220.07.04 Trial Wick Drains

Prior to the installation of wick drains within the areas designated in the Contract Documents, the Contractor's Engineer shall demonstrate that the proposed materials, equipment, and installation method produce a satisfactory wick drain installation in accordance with these specifications. The Contractor's Engineer shall install a minimum of 10 trial wick drains at permanent installation locations designated by the Contractor.

Provided the trial wick drains are installed to the satisfaction of the Contract Administrator, they shall be incorporated as part of the permanent installation.

The Contractor's Engineer shall monitor the wick drain installation on a full-time basis. If at any time the Contractor's Engineer considers that the method of installation does not produce a wick drain that satisfies the Contract requirements, the method or equipment or both, as necessary, shall be altered to comply with the requirements of the Contract Documents.

220.07.05 Installation

220.07.05.01 General

Wick drains shall be installed to the depths specified in the Contract Documents.

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Augering or vibratory equipment may be used within the granular blanket and underlying soils to facilitate the installation of wick drains. The use of augering or vibratory equipment shall not extend more than 1 m into the soil to be consolidated.

220.07.05.02 Layout

Wick drains shall be located and staked out by the Contractor. The spacing of the wick drains shall not vary more than 150 mm from the spacing specified in the Contract Documents.

220.07.05.03 Vertical Alignment

Wick drains shall be installed vertically, within a tolerance of not more than 10 mm per 500 mm. The Contractor shall maintain a suitable method of verifying the vertical alignment of the mandrel and of determining the depth of the wick drain at all times.

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Splices in the wick drain shall be made so as to ensure continuity and to prevent reduction in the wick drain discharge capacity. Splices shall be a minimum of 150 mm in length.

220.07.05.05 Cut-Off

The wick drain shall be cut at the surface of the granular blanket so that at least a 150 mm length protrudes above the top of the granular blanket at each wick drain location.

220.07.05.06 Obstructions

Where obstructions are encountered below the working surface that cannot be penetrated by the wick drain installation equipment, the Contractor shall complete the wick drain from the elevation of the obstruction to the working surface and notify the Contract Administrator. At the direction of the Contract Administrator, the Contractor shall attempt to install a new wick drain within a 500 mm radius of the obstructed wick drain. A maximum of two attempts shall be made as directed by the Contract Administrator.

220.07.06 Inspection after Wick Drain Installation

A Certificate of Conformance shall be submitted to the Contract Administrator upon completion of the wick drain installation and prior to the placement of any overlying material.

220.07.07 Management of Excess Material

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

220.08 QUALITY ASSURANCE

220.08.01 Certificate

Certificates for each production lot indicating that the wick drain supplied was produced and tested according to the requirements of this specification shall be provided by the manufacturer for all wick drains delivered to the Contract.

220.08.02 Rejected Drains

Wick drains that are damaged or that do not meet the requirements of this specification shall be rejected and replaced. Replacement wick drains shall be installed within a 500 mm radius from the location of the rejected wick drain, as directed by the Contract Administrator.

220.09 MEASUREMENT FOR PAYMENT

220.09.01 Actual Measurement

220.09.01.01 Wick Drains

Measurement shall be by length in metres for all accepted wick drains, including the protruding portion up to 150 mm per installation.

Properly installed obstructed wick drains and replacement wick drains shall be measured for payment.

220.09.02 Plan Quantity Measurement

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

220.10 BASIS OF PAYMENT

220.10.01 Wick Drains - 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.

Geotechnical instrumentation damaged as a result of the Contractor's activities shall be replaced at no additional cost to the Owner.

Payment shall not be made for rejected wick drains or delays or expenses incurred by the Contractor as a result of improper or unacceptable material or installation.

All labour, Equipment and Material required for the granular blanket shall be paid for with the appropriate road base or subbase item, Granular B Type I, Granular B Type II, Granular B Type III, as specified.

TABLE 1
Wick Drain Property Requirements

Component	Property		Test Method	Unit	Requirement
Core	Physical	Material	--	--	Polypropylene, Studded or Grooved
		Thickness	ASTM D5199	mm	≥ 2
		Mass	ASTM D3776	g/m	≥ 40
	Mechanical	Tensile Strength	ASTM D638	N	≥ 800
Geotextile	Physical	Material	--	--	Polypropylene, Non-Woven
		Mass	ASTM D5261	g/m^2	≥ 110
	Mechanical	Grab Tensile Strength	ASTM D4632	N	≥ 600
		Puncture Strength	ASTM D4833	N	≥ 200
		Trapezoidal Tear	ASTM D4533	N	≥ 250
		Filtration Opening Size (FOS)	CAN/CGSB 148.1, Method No. 10	µm	≥ 40
		Permittivity	ASTM D4491	s^{-1}	≥ 0.5
Composite Wick Drain	Physical	Width	--	mm	≥ 100
		Thickness	ASTM D5199	mm	≥ 3
	Mechanical	Discharge Capacity @ 10 kPa	ASTM D4716	m^3/s	≥ 1.2×10^{-4}
		Discharge Capacity @ 240 kPa	ASTM D4716	m^3/s	≥ 1.0×10^{-4}