CONSTRUCTION SPECIFICATION FOR UNTREATED GRANULAR SUBBASE, BASE, SURFACE, SHOULDER, AND STOCKPILING

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314.01 SCOPE

This specification covers the requirements for the construction of untreated granular subbase, base, roadway surface and shoulder, edge ramping for bituminous pavements, and stockpiling at specified sites.

314.01.01 Specification Significance and Use

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

Use of this specification or any other specification shall be as specified in the Contract Documents.

314.01.02 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.

314.02 REFERENCES

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

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

Ontario Provincial Standard Specifications, Construction

OPSS 350 Concrete Pavement and Concrete Base
OPSS 501 Compacting

Ontario Provincial Standard Specifications, Material

OPSS 1001 Aggregates - General
OPSS 1010 Aggregates - Base, Subbase, Select Subgrade, and Backfill Material

Ontario Ministry of Transportation Publications

MTO Laboratory Testing Manual:
LS-282 Quantitative Extraction of Asphalt Cement and Analysis of Extracted Aggregate from Bituminous Paving Mixtures.

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

314.03 DEFINITIONS

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

Construction Grading Report means a tabular report provided by the Contract Administrator that identifies stations, offsets, and elevations for granular surfaces consistent with the design cross-section.

314.05 MATERIALS

314.05.01 Aggregates

Granular material and select subgrade material shall be according to OPSS.MUNI 1010.

314.05.02 RAP Shouldering

RAP obtained from this Contract milling operations may be used for shouldering, as long as the RAP, at the time of use, has:

a) 100% by mass passing the 26.5 mm sieve and no more than 75% by mass passing the 4.75 mm sieve; and

b) No visible contamination, as determined by the Contract Administrator.

RAP obtained from any other sources are not acceptable for shouldering without written consent from the Owner.

314.07 CONSTRUCTION

314.07.01 Granular Subbase, Base, and Surface

Material shall be kept free from clay and other types of deleterious material. The operations shall not disturb underlying work.

Material shall be placed without segregation in uniform layers such that the thickness of the compacted layer is not greater than 150 mm, except as provided under the Modified Layer Compaction Method clause.

Each layer shall be bladed to a smooth surface according to the required cross-section and maintained until placement of a subsequent layer, when applicable.

Prior to closing down operations for the completion of each Day's work, the subbase material shall be bladed and compacted and, if necessary, covered with sufficient base material to carry traffic.

The granular base shall be maintained to the tolerances in grade and cross-section and to the specified density until the project is accepted or, if the Contract includes paving, until the surface is paved.

314.07.02 Winter Grading of Granular

All ice and snow shall be removed from all portions of the Work Area. Frozen material shall not be incorporated into the Work. Material shall not be placed over frozen ground, except, at the Contractor's option, a single lift may be placed over frozen ground; in which case, final grading and compaction shall be done after the underlying material has thawed.

314.07.03 Edge Ramping of Bituminous Pavement

A ramp of the specified granular material shall be built along the outside edges of each bituminous pavement construction course. Such ramps shall be at a height level with the pavement course and fall away from its edge at a slope not steeper than 4H:1V. Care shall be taken to prevent any ramping material from being spilled or pushed onto the pavement. Any material that is spilled shall be removed immediately without damage to the pavement and the surface thoroughly cleaned with the use of a power broom or other suitable means.

Prior to paving any section, only sufficient material to construct the ramps shall be placed on the shoulders. No other shoulder material shall be placed until the conditions, as detailed in the Shoulders subsection, have been attained.

Edge ramps shall be completed prior to opening adjacent pavement to traffic.

314.07.04 Shoulders

Granular shouldering material shall be placed and compacted at locations and to the line, grade, and cross-section specified in the Contract Documents.

Before commencing shoulder construction, all debris and deleterious material shall be removed from the shoulder area.
Shouldering operations shall commence as soon as, but not before, the following pavement conditions are met:

a) Bituminous Pavements

   Placement of granular material for shouldering operations shall not commence along any section of pavement until 24 hours have elapsed from the time of completion of the final bituminous pavement course in that section. The shouldering operations shall be completed within 24 hours on sections of pavement that are open to traffic. When the pavement is not open to traffic, the shouldering shall be completed before traffic is permitted.

b) Concrete Pavement and Concrete Base

   Shouldering operations shall commence according to OPSS.MUNI 350. Shouldering shall be completed before opening the concrete base or concrete pavement to traffic.

All shoulder construction material shall be conveyed from the transport vehicle onto the shoulder area. End dumping of shoulder construction material directly on to the adjacent pavement surface or directly on to the shoulder shall not be permitted. The material shall be uniformly distributed within the specified shoulder limits without segregation. Grading and shaping operations shall confine all material to within the specified shoulder limits without overspill. Any shoulder construction material deposited, dragged, or inadvertently placed on the pavement surface shall be removed immediately and the pavement surface shall be thoroughly cleaned with the use of a power broom or other suitable means.

Operation of equipment shall not cause any damage to the pavement.

314.07.04.01 RAP Shouldering

RAP shouldering shall be according to and at the locations specified in the Contract Documents.

314.07.05 Compaction

314.07.05.01 General

Each layer of material shall be compacted as specified before the next layer is placed.

314.07.05.02 Compaction Requirements

The compaction requirements shall be according to OPSS.MUNI 501.

For Granular B Type II, compaction results may not be attainable with the use of a nuclear moisture and density gauge for larger gradation aggregates. Compaction methods may need to be modified and the use of a modified compaction method detailed in Appendix B shall be considered.

314.07.05.02.01 RAP Shouldering

314.07.05.02.01.01 Compaction Acceptance Based on LS-706

Where 100% RAP is being placed for shouldering, RAP shall be compacted, according to OPSS.MUNI 501, with the following changes and clarifications:

a) The RAP shall be considered to be a granular material;

b) Target densities shall be established, based on LS-706, according to the last paragraph of the Target Density Clause in OPSS 501; and

c) The moisture content readings obtained from a nuclear gauge shall be adjusted by deducting the AC-bias of the gauge for the purpose of calculating the field dry density. The AC-bias of the gauge shall be determined, at the start of the compaction work for the Contract, using the difference between the average moisture content readings measured using the nuclear gauge, at a minimum of 6 random locations and the field moisture content of samples of the RAP taken at the same locations. The moisture content of the RAP samples shall be determined according to the Determination of Moisture Content section of LS-282. A new AC-bias shall be generated whenever a different nuclear gauge is employed for the compaction work carried out on the Contract.

314.07.05.02.01.02 Compaction Acceptance Based on Specified Compaction Methods

Compaction acceptance, as described above in the Compaction Acceptance Based on LS-706 clause, may be waived at the Owner's discretion.

In this case, the RAP shouldering shall be placed and compacted at a moisture content which is no less than 2% lower than and no more than 1.0% greater than its optimum moisture content, as determined according to LS-706 and the Determination of Moisture Content section of LS-282 for the moisture content of the RAP. However, if the moisture content of the compacted RAP is being measured using a nuclear gauge, then those measurements must be adjusted for the AC-bias of the gauge, as specified in bullet c) of the list in the Compaction Acceptance Based on LS-706 clause.

Where the shoulder is wide enough, the RAP shouldering shall be compacted using a single drum, vibratory, smooth steel drum roller, with a minimum operating mass of 5,000 kilograms and a minimum operating dynamic force of 75 kN. Where narrower shoulders or guide rails prevent such equipment from being effectively used, then the RAP shall be compacted using hand-operated or excavator-mounted vibratory compaction equipment. Hand-operated equipment shall have a minimum operating mass of 400 kg and a maximum power output between 5.0 and 9.9 kW.

In all cases, a minimum of four passes shall be completed and where possible, each pass shall overlap the coverage of the preceding pass by a minimum of 0.5 m.

Regardless of the minimum number of passes being specified, additional passes may be required, at the discretion of the Contract Administrator.

314.07.05.03 Modified Layer Compaction Method

At the option of the Contractor, granular material may be placed in layers thicker than permitted under the Granular Subbase, Base, and Surface subsection, subject to the following provisions:

a) All material shall be placed in uniform layers such that each layer shall have a depth of not more than 300 mm after compaction.

b) Before placing each material in thicker layers, the ability of the proposed compaction method to achieve the specified density shall be proven in a two lane trial area. The location and extent of the trial area shall be approved by the Contract Administrator. At least 48 hours notice shall be given to the Contract Administrator before any work commences on the trial area. Full details of the proposed placing and compacting system or systems, including the rate of placing, depth of layer, number and type of compaction units, and number of passes shall be given to the Contract Administrator. The areas designated to evaluate each system shall be of sufficient length to be representative of the proposed method and shall normally be approximately 150 m in length.

c) When the Contract Administrator, on the basis of test results, approves a system of placing and compacting, the system shall be used for the remainder of the Work to which it is applicable, except that:

   i. Should the Contractor find it necessary at any time to change the system or any part of it, including the source of material or the rate of placing the material, the approval shall first be obtained from the Contract Administrator, who may require a further trial area.

   ii. If at any time tests show that a previously approved system is no longer producing the specified compaction, all changes that are necessary to satisfy the requirements of this specification shall be undertaken.

314.07.06 Tolerances

314.07.06.01 General

The surface of the uppermost layer of granular material shall be bladed, shaped, and compacted to produce the specified grade and cross-section.

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

314.07.06.02 Granular Courses

The finished granular courses shall not deviate more than 30 mm from the specified grade and cross-section and the surface shall not deviate more than 15 mm at any place as measured in any direction with a 3 m straight edge.

314.07.06.03 Bituminous Courses, Sidewalk, Curb, and Gutter

The finished granular surface shall not deviate more than 30 mm from the specified grade and cross-section, except when the finished bituminous grade is controlled by fixed components such as existing pavements and curbs, in which case the finished granular surface shall not deviate more than 10 mm from the specified grade. Granular surfaces shall not deviate more than 10 mm at any place as measured in any direction with a 3 m straight edge.

314.07.06.04 Concrete Courses, Sidewalk, Curb, and Gutter

The finished granular surface shall not deviate more than 10 mm from the specified grade and cross- section and the surface shall not deviate more than 10 mm at any place as measured in any direction with a 3 m straight edge.

314.07.07 Stockpiling of Granular Material

Stockpiles of granular material shall be constructed according to OPSS.MUNI 1001 at sites specified in the Contract Documents.

314.07.08 Quality Control

The Contractor shall carry out grade checks on the finished granular surfaces and carry out all QC grade checks required to ensure that the finished granular courses are built to within the specified tolerances for grade and cross-section. QC of granular grading shall be based on surface tolerances of the finished granular courses, as provided in the Tolerances subsection. The grade shall be certified at the stations and offsets shown in the Construction Grading Report.

314.07.09 Submission of Grade Checks

All grade checks relating to horizontal and vertical grading tolerances, including all non-compliances, shall be submitted to the Contract Administrator within 2 Business Days following completion of the grade.
The Contractor shall sign and certify the construction grading report as correct.

When grading templates are available, the Contractor shall sign and certify the template as correct. If no template is available, the Contractor shall complete, sign, and submit form OPSF 314-1 to the Contract Administrator.

314.07.10 Management of Excess Material

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

314.08 QUALITY ASSURANCE

314.08.01 General

The Contract Administrator may conduct random QA grade checks to verify that the grade and cross-section are within the specified tolerances.

314.08.02 Finished Grades Outside Specification

When the finished granular grade or cross-section or both do not meet the acceptance criteria, the granular course shall be brought to grade or cross-section or both within the specified tolerances.

314.08.03 Acceptance

Provided that the Contract Administrator's grade checks are according to those determined by the Contractor, no action shall be taken. If discrepancies between QA and QC grade checks occur, additional QA grade checks may be conducted by the Contract Administrator. If the Contract Administrator chooses not to take QA grade checks, the Work shall be accepted on the basis of QC grade checks.

314.09 MEASUREMENT FOR PAYMENT

314.09.01 Actual Measurement

314.09.01.01 Granular A, B Type I, B Type II, B Type III, M, O, and S
Granular A, B Type I, B Type II, B Type III, M, and O Stockpiled
Granular A, B Type I, B Type II, B Type III, M, and O from Stockpile
Select Subgrade Material
RAP Shouldering

314.09.01.01.01 Tonne

When payment is by the tonne:

a) When the Contractor supplies Granular A and M composed of air-cooled iron blast-furnace slag or nickel slag, the payment quantities shall be determined by applying the following factors:

   i. The total measured mass of air-cooled iron blast-furnace slag incorporated into the Work shall be multiplied by a factor of 1.116.
   ii. The total measured mass of nickel slag incorporated into the Work shall be multiplied by a factor of 0.85.

b) When Granular B is composed of slag, the payment quantities shall be determined by comparing the density of the material to the average density of granular material as set by the Owner for that specific area and applying the conversion factors so determined to the weighed tonnes.

c) When granular material is composed of slag, it is necessary to determine the amount of overrun or underrun. Such overrun and underrun shall be the difference between the tender quantity and the payment quantity as determined by applying the foregoing factors to the weighed tonnes.

314.09.01.01.02 Cubic Metre

When payment is by cubic metre, one of the following methods shall be employed as determined by the Contract Administrator:

a) End Area Method

   i. At Source

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

   Cross-sections shall be taken after the source has been cleared, grubbed, and stripped of all unsuitable surface material.

The volume of boulders removed from borrow pits that cannot be accommodated in embankments shall be deducted.

ii. In Place

When the measurement for payment of material in their original location is not possible, the measurement for payment shall be made of material measured in place with no allowance for shrinkage and computed in cubic metres by the method of average end areas.

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.

314.09.01.01.03 Square Metre

When payment is by square metre, the area shall be based on that shown in the Contract Documents.

314.09.02 Plan Quantity Measurement

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

314.10 BASIS OF PAYMENT

314.10.01

Granular A - Item
Granular A, Stockpiled - Item
Granular A, from Stockpile - Item

Granular B Type I - Item
Granular B Type I, Stockpiled - Item
Granular B Type I, from Stockpile - Item

Granular B Type II - Item
Granular B Type II, Stockpiled - Item
Granular B Type II, from Stockpile - Item

Granular B Type III - Item
Granular B Type III, Stockpiled - Item
Granular B Type III, from Stockpile - Item

Granular M - Item
Granular M, Stockpiled - Item
Granular M, from Stockpile - Item

Granular O - Item
Granular O, Stockpiled - Item
Granular O, from Stockpile - Item

Granular S - Item
Select Subgrade Material, Compacted - Item

RAP Shouldering - 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.

The cost of any additional QA grade checks on the recertified area shall be the responsibility of the Contractor. All grading carried out by the Contractor as a result of QA grade checks to ensure tolerances shall be carried out at no additional charge to the Owner.

Compensation for the cleanup of the stockpile site on completion of the operation, when required, shall be included as part of the granular item cost.

314.10.02 From Stockpile

Compensation for clearing, grubbing, stripping, cleanup of the stockpile site, and for supplying and placing a pad upon which the materials are to be stockpiled shall be included as part of the granular item cost.

CERTIFICATION OF GRADE ELEVATION / CROSSFALL

CONTRACT _____ **LOCATION** _____

COMPONENTS _____ **LOCATION** _____

In compliance with the Contract, I hereby certify that the following component of the Work has been correctly constructed to the specified line and grade tolerances.

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

OPSF 314-1

Appendix 314-A, Commentary for OPSS.MUNI 314, November 2023
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

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

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Location, line, grade, and cross-section for granular material. (314.07.04)
- Shoulders. (314.07.04)
- RAP shouldering. (314.07.04.01)
- Sites for stockpiles of granular material. (314.07.07)
- Payment by Square Metre. (314.09.01.01.03)

On projects requiring grading, the designer should provide a Construction Grading Report.

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

Related Ontario Provincial Standard Drawings

No information provided here.

Appendix 314-B, November 2023
FOR USE IN MUNICIPAL CONTRACTS, WHEN REFERENCED IN THE CONTRACT DOCUMENTS

Note: This is a non-mandatory Additional Information Appendix intended to provide supplementary requirements for the OPS specification in a municipal contract, when the appendix is invoked by the Owner. It is written in mandatory language to permit invoking it by reference in the Contract Documents. If the appendix has not been invoked by reference in the Contract Documents, it does not apply.

OPSS.MUNI 314, Untreated Granular Subbase, Base, Surface, Shoulder, and Stockpiling is amended as follows:

314.07.05.02 Compaction Requirements

Clause 314.07.05.02, Compaction Requirements, is amended by the addition of the following:

Material shall not be dumped into position, but shall be deposited on and pushed over the end of the lift being constructed by means of bulldozers or other approved equipment.

The placement of the first lift of material over wet or weak subgrade shall be monitored and the placement and compaction procedure modified as required, with the approval of the Contract Administrator, to minimize subgrade disturbance. Localized, unusually wet or weak subgrade areas shall be identified to the Contract Administrator for possible treatment

In restricted zones, as specified in OPSS.MUNI 501, Granular B, Type II shall be compacted using hand-operated vibratory equipment with a minimum operating mass of 400 kg and a maximum power output between 5.0 and 9.9 kW. Where confined areas are less than the minimum width and where such equipment can be used safely, then smaller vibratory hand-operated tampers shall be used. One hundred percent compaction coverage with a minimum of four passes shall be provided in all cases.

In non-restricted zones, Granular B, Type II shall be compacted using single drum, vibratory, smooth steel drum rollers, with a minimum operating mass of 5,000 kilograms and minimum operating dynamic force of 75 kN. One hundred percent roller pass coverage with a minimum number of four passes shall be provided. Each roller pass shall overlap the coverage of the preceding pass by a minimum of 0.5 m.