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SPECIFICATIONS FOR GRANULAR BASE COURSE

700. 1 SCOPE

These Specifications govern all operations necessary for and pertaining to the construction of a granular base course.

1.1 Pre-Construction Meeting

The Contractor and his Superintendent shall attend a pre-construction meeting with the Regional Construction Engineer and Departmental staff, at a mutually agreed upon date, to discuss the project. The meeting shall be initiated by the Contractor and be held in advance of commencing his field operations. Topics to be discussed will include the type and quantity of equipment to be used, sequence of work, traffic control and other pertinent topics.

700. 3 MATERIALS

3.1 Granular Base Course Aggregate

The Contractor shall supply aggregates in accordance with the requirements of the Specifications for Aggregate for Granular Base Course.

3.2 Water

The Contractor shall supply water for surface preparation, to dilute SS-1 emulsified asphalt and for the construction of granular base course. No direct payment will be made for water as this work will be considered incidental to the unit price for Surface Preparation or Granular Base Course.

3.3 Emulsified Asphalt

Emulsified asphalt supplied by the Department will be transported to the job site storage by means of tank trucks. The Contractor shall perform the following at his own expense and to the satisfaction of the Engineer:

- a) Arrange with the supplying company the points of delivery and the time and quantity to be shipped. Deliveries shall be made during hours when staff of the Department are normally working on the project. When requested, the Contractor shall supply the Engineer with a copy of orders and instructions respecting the shipment.
- b) Provide and maintain a storage area, and upon completion of the work, restore the area to a satisfactory condition.
- c) Provide storage facilities of sufficient capacity to store all emulsified asphalt ordered to the job site.
- d) When requested, calibrate storage tanks and make calibration tables or charts available to the Engineer prior to the start of operations, and make convenient provision for samples of emulsified asphalt to be taken from storage tanks by the Engineer.
- e) Make provision for the Department to verify the quantity of emulsified asphalt delivered in trucks by weighing the truck or dipping the truck tank before and after unloading. Axle loadings will be permitted for the verification of emulsified asphalt delivered. In the case of dipping, the Contractor shall provide an inspection platform, meeting the requirements of the Workplace Safety and Health Act, and a dipstick to verify the level of asphalt in the truck tank.
- f) Provide suitable unloading facilities and unload the emulsified asphalt.

- g) Pay overtime standby charges for the Supplier's trucks except when the Supplier is responsible for the delay. Overtime standby is defined as the waiting period at the job site unloading point, after a free waiting time allowance of 2½ hours has been exceeded for unloading any delivery of emulsified asphalt.
- h) Pay transportation charges on emulsified asphalt returned to the Supplier for all causes, except in the case of the Supplier making a faulty delivery.

The Contractor will be permitted to order a partial load of emulsified asphalt to complete the work.

On projects where the emulsified asphalt is supplied by the Department and the Contractor arrives on the project with emulsified asphalt products not owned by the Department, the Department will purchase the emulsified asphalt by Extra Work providing the emulsified asphalt is suitable. The price to be paid will be the price, which the Department will pay for emulsified asphalt to be used on the project. Item (vi) of Section 4.5(c) of the General Conditions (15% overhead) will not be paid.

When the Contractor completes a project, where the emulsified asphalt is supplied by the Department and the Contractor is not proceeding directly to another Department project, the Contractor shall purchase surplus emulsified asphalt from the Department at the unit price shown on the Purchase Order, plus tax. The cost of surplus emulsified asphalt will be deducted from progress payments.

700. 5 EQUIPMENT

5.1 Inspection of Equipment

Equipment required for this work shall be in satisfactory working condition and so maintained for the duration of the work.

Equipment shall be on the site and available for inspection, testing and approval before base laying operations commence.

The Engineer shall have access at all times to all parts of the equipment for purposes pertaining to the work.

5.2 Spraying of Equipment

Water or dilute emulsified asphalt required for compaction shall be supplied in motor propelled units equipped with a spray system. Spray bars, if used, shall be at least 1.83 m in length.

The on-off valve regulating the flow to the spray system shall be controllable from the operator's position.

A pump shall be provided on units spraying dilute emulsified asphalt to ensure that the asphalt is dispensed under pressure at a uniform rate.

5.3 Pugmill

The pugmill shall have a manufacturer's rated capacity of not less than 200 tonnes per hour. It shall be equipped with an adjustable aggregate feed that allows for convenient calibration by weighing the amount of aggregate entering the pugmill. The rate of aggregate flow to the pugmill shall be uniform. The mixing unit shall be designed so as to ensure complete mixing of the material.

The pugmill shall be equipped with separate spray bars for the addition of water and emulsified asphalt and shall be constructed in such a manner that water is introduced to the mix before the emulsified asphalt.

The water dispensing system shall contain an adjustable valve with a positive lock, a meter and provision for calibrating the system by weighing the amount of water added to the mix.

The pugmill will be calibrated to allow up to 2% water to be added to the base course after delivery to the road, if requested by the Contractor.

The emulsion dispensing system shall contain an adjustable valve with a positive lock, a meter and a pressure gauge located between the spray bar and the pump. Provision shall be made for calibrating the system by weighing the amount of emulsion added to the mix.

The pugmill shall be equipped with a discharge hopper, or a surge bin of sufficient size, to ensure continuous production during mixing and hauling operations.

5.4 Weigh scale

The Contractor will be permitted to locate the weigh scale for base course at or near the source of supply.

700. 7 CONSTRUCTION METHODS

7.1 Surface Preparation

Surface preparation shall be performed on all existing unpaved surfaces prior to placing granular base course thereon. The surface shall be prepared at least one but not more than three kilometres in advance of placing granular base course. Material that is blade mixed and watered shall be compacted in maximum lifts of 150 mm to a minimum of 95% AASHTO Standard Dry Density. No direct payment will be made for providing water for compaction. Surfaces shall be maintained to the required cross section and density, free from ruts and waves until covered by a lift of base course.

7.1.1 Type "A" Surface Preparation

Type A Surface Preparation shall be performed where no provision is made for Type B, Type C or Type D Surface Preparation.

The work shall consist of using motor graders to spread loose gravel that is on the surface of the roadway or in windrows on the shoulders. The material shall be compacted prior to constructing a granular base course thereon.

No direct payment will be made for Type A Surface Preparation, as this work will be considered as an incidental operation to Granular Base Course.

If unstable material is to be excavated from the embankment or other specialized procedures are required, the work will be paid for on the basis of Extra Work.

7.1.2 Type "B" Surface Preparation

Type B Surface Preparation shall consist of re-shaping the subgrade to proper cross section by subcutting the surface to a maximum depth of 100 mm. The re-shaped subgrade shall be compacted prior to constructing a granular base course thereon.

If unstable material is to be excavated from the embankment or other specialized procedures are required, the work will be paid for on the basis of Extra Work.

7.1.3 Type "C" Surface Preparation

Type C Surface Preparation shall consist of re-shaping and compacting the subgrade by scarifying to a sufficient depth (not exceeding 250 mm) so as to produce a 150 mm depth of reconstructed subgrade at the required cross-section.

During Type C Surface Preparation, the provisions for In Situ Moisture will apply for drying material that is deemed to be excessively wet as defined in Specification 500.2.7.5.2. If, during Type C Surface Preparation, the Contractor is directed to excavate unstable material from the embankment, such work will be paid for on the basis of Extra Work.

7.1.4 Type "D" Surface Preparation

Type D Surface Preparation shall consist of subcutting the surface to a maximum depth of 250 mm and windrowing the material. The material below the subcut shall be aerated or scarified to a depth of 150 mm and compacted. The windrowed material shall then be blade mixed, spread and shaped to the required profile and cross-section and compacted.

In general, Type D Surface Preparation shall be performed on not more than one-half of the roadway width at any one time with the subcut material being placed in windrow on the other portion of the roadway.

During Type D Surface Preparation, the provisions for In Situ Moisture will apply for drying material that is deemed to be excessively wet as defined in Specification 500.2.7.5.2. If the Contractor is directed to excavate unstable material from the embankment, such work will be paid for on the basis of Extra Work.

7.1.5 New Material

When the Engineer requires new material to be added during surface preparation, it will be paid for at the unit price for the type of material specified. Spreading and compacting new material will be considered as incidental operation to the unit price for the type of material used. Where no unit price is provided in the Contract for any new material required, it will be paid for on the basis of Extra Work.

7.2 Placing and Spreading

7.2.1 Restricted Hauling

Hauling and depositing granular base course will not be permitted until frost-free ground conditions exist in the upper 750 mm of the embankment.

7.2.2 Road Mixed Based Course

The following shall apply unless otherwise approved by the Engineer:

Granular base course shall be hauled to the road, deposited, and uniformly windrowed on the prepared surface. The quantity of base course hauled and deposited shall not exceed the quantity for a 100 mm compacted lift.

Base course in each work area shall be deposited for not more than 2.5 km in advance of spreading and compacting operations.

The length of exposed Class "C" base course in any area shall not be greater than 3 km. Class "C" base course shall not be hauled to the road until sufficient Class "A" base course is in stockpile to cover it.

Windrowed base course shall be spread by motor grader and manipulated to eliminate segregation and to uniformly incorporate water or dilute emulsified asphalt required for compaction. Each lift shall be spread to the full width of the prepared surface and shall be shaped to the required cross-section.

7.2.3 Pugmill Mixed Base Course

Hauling, spreading and compaction equipment used for a pug mill mixed base course shall be of sufficient size and capacity to ensure continuous operation of the pugmill.

Pugmill mixed base course hauled to the road shall be spread with an approved hopper-equipped mechanical spreader to the specified width and cross-section and to a depth not exceeding 150 mm when compacted.

The moisture content of the aggregate received at the road shall be within the range of optimum to 2% below optimum.

The length of roadway which may be covered with uncompacted base course will be as discussed and agreed to at the Pre-Construction Meeting.

7.3 Base Course Shoulders

7.3.1 Shoulder Preparation

7.3.1.1 General

Shoulders adjacent to existing paved surfaces shall be prepared on all pavement projects. No direct payment will be made for providing water for compaction.

7.3.1.2 Type I Shoulder Preparation

Type I Shoulder Preparation shall be performed where no provision is made for Type II Shoulder Preparation. Type I Shoulder Preparation will involve cutting to remove ridges and undulations, and general levelling and compaction of the existing shoulders.

No direct payment will be made for Type I Shoulder Preparation as the work will be considered an incidental operation to Granular Base Course.

7.3.1.3 Type II Shoulder Preparation

Type II Shoulder Preparation will involve cutting the existing shoulder adjacent to the pavement and blading the resulting material outward to achieve a crossfall and width as shown in the Tender. If the existing shoulders are not uniform, varying depths of cut may be required to achieve the necessary width. New granular base course shall be added and compacted to the level of the existing pavement prior to constructing the first lift of pavement adjacent thereto.

The prepared shoulders shall be sufficiently compacted to allow for the placement of new granular material.

New granular material shall be compacted as follows:

- a) to 98% AASHTO Standard Dry Density when the shoulders are to be paved; or
- b) to 95% AASHTO Standard Dry Density when the shoulders are to be granular.

The Contractor shall schedule this work to ensure that drop-offs are backfilled and compacted, or a fillet constructed, before terminating work each day.

7.3.2 Depositing Base Course

Approved hopper equipped mechanical spreaders shall be used to deposit the top lift of base course material on the shoulders adjacent to newly paved surfaces. Depositing aggregate on newly paved surfaces will not be permitted. Centre dump trucks may be used on all other lifts or shoulders.

The requirement for an approved hopper equipped mechanical spreader to deposit other lifts of base course material shall be identified in the Special Provision.

Notwithstanding the above, where safety is a concern, centre dump trucks may be approved for use through superelevated curves, provided the Contractor is able to produce an acceptable finished product.

7.3.3 Controlling and Delineating Drop-off

When two or more lifts of bituminous pavement are to be constructed and the roadway is to remain open to traffic, base course shoulders shall be constructed in a minimum of two lifts. A granular fillet can be considered to be a lift.

A decision will be made at the Pre-Construction meeting as to what stage the first lift of base course shoulders shall be constructed. The existing conditions, the depth of levelling course and the depth of pavement to be constructed will be considered in making the decision so as to best minimize the pavement edge drop-off. The decision shall not be changed without the mutual consent of both parties.

When the depth of pavement drop-off exceeds 50 mm, the outside edge of the pavement shall be temporarily delineated until the shoulder has been constructed. Delineation will not be permitted as an alternate to shoulder construction.

Base course shoulders shall be constructed with new material by one of the following methods;

- (a) construct full width shoulders to the level of the adjacent bituminous pavement; or
- (b) construct a granular fillet tapering outward a minimum distance of 1.5 m from the top edge of the pavement. The fillet shall be watered, compacted and maintained.

When the final lift of bituminous pavement has been constructed and the shoulder width is 2.4 m or greater the fillet shall be levelled immediately in advance of constructing the final lift of base course shoulders. The length of roadway on which the fillet is levelled shall not exceed a distance greater than that required for one days shoulder construction operation.

When construction ceases for the day, the fillet on uncompleted portions shall be reconstructed or delineated. When the final lift of bituminous pavement has been constructed and the shoulder width is less than 2.4 metres, levelling of the fillet is not required prior to constructing the final lift of base course shoulders.

7.3.4 Delineators

The Contractor shall supply and maintain approved delineators and install them at 100 m intervals on tangents and 50 m on curves.

Approved delineators will be available for purchase from the Department.

7.3.5 Shoulders on Concrete Pavement

Granular base course shoulders constructed adjacent to concrete pavement shall be compacted in maximum lifts of 150 mm when the aggregate is mixed in a pugmill or in maximum lifts of 100 mm when using other methods. Lifts shall be compacted to 98% AASHTO Standard Dry Density.

7.4 Use of Emulsified Asphalt

When there is a bid item for Binder Material, it will indicate that the Department does not anticipate providing emulsified asphalt for stabilizing gravel base course. The Contractor may elect to provide, at his own expense, an SS-1 emulsified asphalt to stabilize Class "A" gravel base course (road mixed or pugmill).

The minimum quantity of undiluted SS-1 to be added to the aggregate shall be;

4 litres per tonne for road mixed base course,

10 litres per tonne for pugmill mixed based course.

When there is no bid item for Binder Material, emulsified asphalt will normally be provided by the Department as a substitute for binder clay.

If the Contractor, however, can supply a binder material within 100 km of the project, the Department will accept a clay stabilized base course and will compensate the Contractor at a rate of \$1.40 per tonne for binder material added plus the cost of hauling the binder material as set forth in the Specifications for Aggregate for Granular Base Course. The use of binder material will be governed by the terms of the Specification and emulsified asphalt will not be supplied for stabilization. Notwithstanding, emulsified asphalt will be supplied for prime and the Contractor shall prime the granular base with SS1 in accordance with Specification 805.

If limestone is used for base course, neither binder material nor emulsion will be required. For a pugmill mixed base course, the emulsified asphalt shall be added at the pugmill.

For a road mixed base course, the emulsified asphalt shall be mixed with water in the spraying unit. To ensure proper mixing, the emulsified asphalt shall be placed in the spraying unit prior to introducing water.

Emulsified asphalt, when used as a binder on shoulder construction, shall be added and mixed with base course aggregate in a pugmill or other approved type of mixer prior to being hauled to the road.

The use of emulsified asphalt as a binder, and any costs incurred in the storage, hauling, and introduction of emulsified asphalt into the pugmill or water for compaction will not be paid for directly but will be considered as incidental to the construction of the granular base course.

7.5 Compaction of Granular Base Course

Granular base course shall be compacted using pneumatic tired rollers or other approved equipment. Water or dilute emulsified asphalt shall be added as required to ensure aggregate compaction at the optimum moisture content.

Each layer shall be compacted full width to a minimum density of 98% AASHTO standard dry density. Blading will be required in conjunction with the rolling operations to maintain the specified cross section. The Contractor shall not place additional material on a compacted layer until the moisture content of the layer is at or below optimum.

If the Contractor conducts the work in such a manner that the mixed materials become segregated, the Contractor shall scarify, re-mix, re-shape and re-compact the layer.

7.6 Maintenance of Lift

The Contractor shall maintain each lift of base course material constructed under the terms of the contract. Where inclement weather or traffic necessitates re-shaping, re-laying or re-compaction of a completed base course such work will not be paid for directly but will be considered as incidental to the construction of the base course. Emulsified asphalt required for corrective

repairs will be supplied by the Department, providing the Contractor was not grossly negligent in his operations.

At the request of the Contractor, when priming is to be done by the Department, acceptance will be given for a satisfactorily completed base course surface having a minimum length of 2.5 km, providing:

- a) the Contractor's construction equipment will not be hauling through the Section; and
- b) the surface is ready for priming and the request is received by the Engineer on any day other than a Saturday, Sunday or Statutory Holiday.

If re-laying, re-shaping or re-compacting is required after the Section has been accepted by the Department, the Contractor shall, at the Engineer's request, perform the work on the basis of Extra Work.

7.7 Trimming

As a final operation the Contractor shall restore the slopes to a condition equal to that prevailing prior to the commencement of construction. This work will include bringing up and spreading any material that may have been pushed over the shoulders or down the slopes during construction operations and levelling vehicle tracks made by the Contractor's equipment. This work will be incidental to the contract.

7.8 Crossings and Intersecting Roads

Some work will be required on each crossing and at each intersecting road. Work done on crossings and intersections for which a unit price is provided in the contract will be paid for at the applicable unit price. Work for which no unit prices are provided will be done by the Contractor on the basis of Extra Work.

7.9 Acceptance of Base Course on Asphalt Surface Treatment Projects

The Department will not provide final acceptance on the top lift of Class "A" granular base course which is laid after October 15.

Base course that is laid after October 15 will be primed providing that ground and atmospheric conditions are suitable. The decision to prime after October 15 will not imply acceptance of the base course. If it is necessary to relay the base course the following construction season, the work shall be done at the expense of the Contractor. Costs associated with re-priming will be treated as if it were the original prime.

700. 9 METHOD OF MEASUREMENT

9.1 Surface Preparation, Type "B," "C" and "D"

Surface Preparation, Type B, Type C and Type D will be measured in stations of 100 m in length along the centerline of the roadway.

The measurement for each station will include all surface preparation within that station whether full or partial roadway width.

9.2 Shoulder Preparation, Type II

Shoulder Preparation, Type II will be measured in stations of 100 m in length along the centerline of the roadway. The measurement for each station will include all shoulder preparation within that station whether full or partial shoulder width on one or both shoulders or any combination of these.

9.3 Granular Base Course

Granular Base Course will be measured by weight in tonnes of material delivered on the road.

700. 11 BASIS OF PAYMENT

11.1 Surface Preparation, Type "B," "C" and "D"

Surface Preparation, Type B, Type C and Type D will be paid for at the unit price per station, as set forth in the Contract, and will be payment in full for performing all operations described herein and those incidental to the work, except for drying of excessively wet material during Surface Preparation, Types "C" and "D" (see clauses 700.7.1.3 and 700.7.1.4).

11.2 Shoulder Preparation, Type II

Shoulder Preparation, Type II will be paid for at the unit price per station, as set forth in the Contract, and will be payment in full for performing all operations described herein and those incidental to the work.

11.3 Granular Base Course

Granular Base Course will be paid for at the unit price per tonne, as set forth in the Contract, and will be payment in full for supplying materials and performing all operations pertaining or incidental thereto, as herein described, except for Surface Preparation, Type B, Type C and Type D.