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SPECIFICATIONS FOR CONCRETE PAVEMENT

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SPECIFICATIONS FOR CONCRETE PAVEMENT

830. 1 SCOPE

These specifications govern all operations necessary for and pertaining to the construction of an air-entrained Portland Cement Concrete Pavement.

1.1 Pre-Construction Meeting

The Contractor and his Superintendent shall attend a pre-construction meeting with the Regional Construction Engineer and Departmental Staff, to discuss the project. The meeting shall be initiated by the Contractor and held at a mutually agreed upon date before starting 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.

1.2 Mobilization of Equipment

Mobilization of equipment includes assembling, transporting and setting up the Contractor's equipment; sleeping, kitchen and sanitary facilities; tools and supplies necessary for the maintenance and repair of equipment; all other items necessary for project completion and for moving all the items away when the project is completed.

The Department will make three payments. One-third of the lump sum price for "Mobilization of Equipment" will be paid when the crusher arrives on the project, one-third when paving operations start and one-third when work has been substantially completed.

830. 2 MATERIALS

2.1 Testing and Approval

Prior to approval for use, proposed materials will be subject to inspection and/or testing by the Testing Laboratory designated by the Department. When requested, the samples of materials shall be submitted at least 14 days before their intended use.

The Department shall not be charged for the sampling of the materials submitted for testing.

The Department will determine the compressive strength of the concrete produced. The compressive strength will be determined from concrete cylinder specimens cast and tested by the Department. If the cylinder specimens fail to meet the minimum compressive strength specified, core specimens will be obtained from the suspect areas of the concrete and their compressive strengths determined in accordance with the latest edition of CSA Standard A23.1 and A23.2.

If the core results determine that the concrete did not meet the minimum compressive strength requirement, then the areas represented by the cores will not be eligible for full payment.

If the compressive strengths of the cores are within 15% of the specified strength requirement and no single core is less than 75% of the specified strength, the concrete will have been deemed to have met the strength requirement. If the compressive strengths of the cores are less than 85% of the specified minimum compressive strength, the following will apply:

1. Greater than 15% but less than 20% - Payment for the concrete will be reduced by 25% of the unit price.

830. 2.1 Testing and Approval (Cont'd)

2. 20% to less than 30% - Payment for the concrete will be reduced by 50% of the unit price.
3. 30% or more - The concrete shall be removed and replaced at the Contractor's expense.

2.2 Supply

The Contractor shall be responsible for the supply, safe storage and handling of the following materials:

1. Concrete Constituent Materials
 - (i) Type 10 Normal Portland Cement
 - (ii) aggregates
 - (iii) water
 - (iv) air-entraining Agents
 - (v) admixtures
2. Reinforcing Steel (includes bar mats, dowels, tie bars, dowel assemblies, chairs and other accessories)
3. Joint Sealants
 - (i) preformed, fibre fillers
 - (ii) premoulded neoprene, its lubricant and adhesive
 - (iii) hot-poured, elastic compounds
4. Liquid, Membrane-Forming, Curing Compound
5. Epoxy Bonding Agents
6. Lubricant for Coating Dowels

A list of materials currently approved for use is available from the Department, and all materials to be used must be on this list. All materials shall be applied in strict accordance with the manufacturer's recommendations.

2.3 Cement

Cement for use in concrete shall meet the latest edition of CSA Standard A5.

The temperature of the cement supplied will not exceed 75° C.

The cement shall not contain fly ash.

2.4 Water

The water shall be free from injurious amount of oil, acid, organic matter, soluble chlorides, excess alkali, or other deleterious matter. All water for use in concrete shall be from a source which meets the requirements of the latest edition of AASHTO Specification M 157.

830. 2.5 Aggregates

Aggregates for use in concrete shall meet the "Specifications for Aggregate for Portland Cement Concrete."

830 3 MIX DESIGN

3.1 Mix Proportions

Before concrete mixing starts, the proportions of cement, water, fine and coarse aggregates and admixtures that are to be used in the concrete, will be determined by the Department. The mix design will be based on the test results of the samples previously tested and approved for concrete. The mix proportions will be based on the concrete meeting the following physical requirements:

3.1 Mix Proportions (Cont'd)

Type of Mix	Minimum Cement Content	Air Content	Slump	Min. 28 Day Strength	Max. Water/Cement Ratio
Normal	340 kg/m ³	5 – 8 %	30 – 80 mm	38 Mpa	0.45
Cold Weather or Early Strength	355 kg/m ³	5 – 8 %	30 – 80 mm	38 Mpa	0.45

3.2 Aggregate Samples

During aggregate production, the Contractor shall provide sufficient quantities of fine and coarse aggregate samples for concrete mix designs.

3.3 Mix Design Changes

Changes to the mix design shall not be made without the Department's approval.

830. 4 EQUIPMENT

4.1 Inspection of Plant & Equipment

The equipment provided by the Contractor shall be on site and available for inspection testing and approval, before paving starts.

4.2 Slip Form Paver

The equipment shall consist of a slip form paver and any additional equipment required to construct a stable and rigid pavement, which meets the specified widths, depths, crown, alignments and grades.

For pavement widths between 5.0 m and 8.6 m, the slip form paver shall have a minimum weight of 25 000 kg and an engine having a minimum power output of 150 kw.

For pavement widths less than 5.0 m, the slip form paver shall have a minimum gross weight of 15 000 kg and an engine having a minimum power output of 100 kw.

830. 4.3 Fine Grading Machine

The machine used for fine grading of the granular base course shall be capable of grading the base to the design specifications.

4.4 Proportioning Plant

The concrete plant shall proportion the cement and fine and coarse aggregates by mass. The plant shall have separate bins or compartments for the cement and for each type and size of aggregate. They shall be designed to prevent intermingling of different materials, contamination, segregation, breakage, and allow free movement of materials to the discharge openings.

Water and liquid admixtures shall be proportioned by volume or mass. If water is to be measured by volume, the device shall be so arranged that variable pressure in the water supply line does not affect the measurements. The device shall be fitted with the necessary valves and connections to divert the water measured for a batch so that the accuracy of measurement can be easily verified.

4.4 Proportioning Plant (Cont'd)

The dispensing equipment for adding the liquid admixtures shall be automated and shall also have visual, volumetric measuring or read-out units. Pressure systems shall have a safety check valve to prevent admixtures from re-entering the read-out units before the discharge of the admixture to the present batch.

The Contractor will be responsible for the cement delivered to the plant storage silos. He shall supply and install filters, dust collectors or other equipment to minimize any loss or damage to the cement.

Weighing devices in the plant shall be tested and their accuracy approved before the construction starts and may be tested with standard weights at any time. Scales shall be designed and maintained to within 0.5 % accuracy through the normal operating range for cement, water and aggregates. Minimum increments on the scale or digital readout shall not exceed 2 kg for the cement scale and 10 kg for the aggregate scale. The weighing beam, dial, or digital readout shall be placed in full view of the operator during the operation of the gate, which delivers the material to the hopper. Adjustments to the weighing devices shall not be made without the Department's approval.

4.5 Mixers and Agitators

Mixers may be stationary mixers or truck mixers. Agitators may be truck mixers or truck agitators. Each mixer or agitator shall have the manufacturer's rating plate(s) attached to it in a prominent place indicating:

- a) the gross volume of the drum or container
- b) the rated maximum mixing capacity (the max. volume of concrete that may be mixed)
- c) the rated maximum agitating capacity
- d) the maximum and minimum mixing and agitating speeds for the drum, blades or paddles

When stationary mixers are used for the complete mixing of concrete, the time of discharge shall be controlled by an acceptable timing device that prevents discharge of the batch until the specified mixing time has elapsed.

Mixers and agitator trucks shall be operated within the limits specified on the equipment manufacturer's rating plates.

To ensure that the mixers and agitators are producing concrete uniform in consistency throughout the batch, "within-batch" uniformity tests may be made on selected batches. Individual samples, at approximately the beginning, the mid-point, and the end of the load, will be obtained and tested for uniformity of the slump.

If the slump of the 3 individual samples varies by more than 30 mm, then the mixer or agitator shall not be used until the condition is corrected.

Accumulation of hard concrete or mortar within the mixer will not be permitted.

4.6 Side Forms

The side forms shall be constructed of steel for 200 mm and 250 mm pavements. Welded 250 mm side forms, built from 200 mm forms, may be permitted. They shall be rigid, straight and true with a smooth face and have locked joints. For every 3 m form section, a minimum of 3 pins shall be used for securing the forms to the base.

4.6 Side Forms (Cont'd)

Forms for curves shall be capable of installation to within 12 mm of the true curve. If the radius is less than 50 m, forms shall be either flexible material or custom-shaped to fit the curve. The forms shall be designed to be securely fastened together in the correct position.

The forms shall be clean and free of hardened concrete.

4.7 Screed

The Contractor shall provide a mechanical screed and a back up manual screed to accommodate a breakdown.

The manual screed will only be permitted to screed concrete already mixed and placed on grade at the time of the mechanical screed's breakdown. Further paving shall stop until the mechanical screed is again operative.

4.8 Straightedge

The Contractor shall provide one metal straightedge, 3 m long, with suitable handles. The straightedge shall have at least one machined edge and shall be checked frequently for accuracy.

4.9 Brooms

The Contractor shall provide a mechanical broom. At least 2 hand brooms will be on site to accommodate a breakdown. Each hand broom shall be approximately 600 mm wide with at least 3 rows of bassine fibres not more than 112 mm long. The brooms shall have handles long enough to permit the brooming of one lane of pavement.

830. 4.10 Spraying Device

The Contractor shall provide a mechanical sprayer for applying the liquid, curing compound to the surface and sides of the pavement. To accommodate a breakdown, the Contractor shall provide portable, pressurized, spray containers capable of completing the application as soon as the finishing is completed.

4.11 Portable Vibrator

The Contractor shall provide a portable vibrator, with its own power unit, to operate at a uniform, minimum 3 600 impulses per minute.

4.12 Asphalt Kettle

The Contractor shall provide thermostatically controlled heating equipment for the joint sealant used. The heating equipment shall meet the requirements specified by the joint sealant manufacturer.

4.13 Additional Equipment

The Contractor shall also provide foot bridges, edgers, small tools and other equipment necessary to complete the work in accordance with these specifications.

830. 5 CONSTRUCTION METHODS

5.1 Base

Main-lane pavements shall be the travel and passing lanes, excluding exit legs, acceleration and deceleration lanes, tapers, median crossover, connecting roads 30 m or less in length and pavements to be overlaid with asphalt.

For main-lane pavements, the Contractor shall use a fine grading machine to bring the base to the design elevations before placing the concrete.

Immediately after fine grading the base, it shall be compacted with at least 2 passes of a compactor.

All high areas in the base shall be levelled to the design elevation. Low areas in the base greater than 25 mm shall be filled to the design elevation and thoroughly compacted.

When necessary, base shall be dampened with water immediately before placing the concrete. There shall be no pools of water on the base.

Concrete shall not be placed on a wet, soft or frozen base.

5.2 Setting Side Forms

Side forms shall be set to exact grade and alignment ahead of placing the concrete. The side forms shall be set on a minimum 450 mm wide and a maximum 15 mm deep sand or granular base course cushion. The cushion shall be placed on a stable and well-compacted foundation.

Form sections shall be tightly joined by a locked joint, free from play or movement in any direction. They shall be staked with a minimum of 3 steel pins for each 3-metre section. A pin shall be placed at each side of every joint.

Staked forms shall be securely set to withstand deflection from the impact and vibration of the consolidating and finishing equipment. The forms shall not deflect more than 6 mm when tested with a load equal to the loads exerted by the consolidating and finishing equipment.

Before placing the concrete, the forms shall be cleaned and coated with a form release agent.

5.3 Placing Reinforcing Steel

Reinforcing steel shall be straight and free from distortion and shall be positioned as shown on the Plans. It shall be kept clean and free from rust and form release agents.

The reinforcing steel shall be supported on metal chairs so it will not be displaced while placing the concrete.

Dowels for plain-dowelled, concrete pavement shall be located at all transverse contraction joints using dowel assemblies as shown on the Plans. The dowels shall be aligned parallel to the centerline and the slab surface. The dowel assemblies shall be rigidly fabricated and fastened to the base to hold the dowels horizontally and vertically in alignment until the concrete is placed and finished.

The Department will mark the location of the dowel assemblies on the top of the forms or on the grade so the transverse joint can be accurately marked and cut.

The reinforcing steel shall be uniformly coated with a specified lubricant where indicated on the Plans or in the Special Provisions.

5.4 Batching Concrete

The concrete mixes shall be batched in accordance with the mix design.

The weight of aggregates and cement from the proportioning plant shall be within 0.5 % of the designated batch weights. The batch weights may be adjusted to allow for moisture variations in the aggregates.

5.5 Mixing and Delivering Concrete

Concrete shall be mixed and transported to the point of delivery by one of the following combinations:

- 1) Mixed completely in a stationary mixer and transported to the point of delivery in a truck mixer operating at agitator speeds.
- 2) Mixed completely in a truck mixer at the batch plant and transported to the point of delivery operating at agitator speeds.
- 3) Mixed completely in a truck mixer at the point of delivery after the addition of mixing water.

When a stationary mixer, charged to its maximum rated capacity, is used for the complete mixing of the concrete, the mixing time for mixers having capacities of 1 m³ or less shall be a minimum of 1 minute. For mixers of larger capacities, this minimum shall be increased by 20 seconds for each additional cubic metre or fraction of it. Mixing time shall be measured from the time all the cement and aggregates are in the drum.

When batching the concrete, some water shall enter the mixer before the cement and aggregate, and all water shall be in the drum by the end of the first one-quarter of the specified mixing time.

The operation of truck mixers shall not exceed the drum's rated maximum mixing capacity and the mixing or agitating speeds designated by the equipment manufacturer. A truck mixer or truck agitator transporting concrete that has been completely mixed in a stationary mixer shall operate within the limits of its capacity and agitating speed.

For determining the number of mixing revolutions required when a truck mixer is used for complete mixing, all materials, including the mixing water, shall be in the mixer drum before starting. Each batch of concrete shall then be mixed at the designated mixing speed. When complete mixing has been obtained, any additional revolutions shall be at the designated agitating speed.

Concrete delivered to the work site, shall be discharged completely within 90 minutes after the cement was added to the aggregates. This time may be reduced under conditions contributing to quick stiffening of the concrete or when the temperature of the concrete is 29°C or above.

Each load of concrete delivered to the job site shall have a delivery ticket issued at the batch plant, showing the following minimum information:

- (a) the Contract Number
- (b) the truck number
- (c) the date and time loaded or the time of the first mixing of the cement with the aggregates
- (d) the volume of the truck load (batch)

For dedicated plants, the Department will issue the delivery tickets; however, for non-dedicated plants, the Contractor will issue the delivery tickets.

5.5 Mixing and Delivering Concrete (Cont'd)

When the Special Provisions specify that a dedicated plant be used, then that plant shall not produce concrete for other projects while producing for the Department's project. The dedicated plant and concrete delivery equipment shall ensure a minimum delivery of 60 m³/hr of concrete to the placing machine.

Concrete shall be used as long as its consistency and workability meet the job requirements. Additional water may be added to the concrete after the initial mixing water has been added, if the measured slump at the start of discharge is less than that specified, and the time between batching and the start of discharge has not exceeded 60 minutes. The drum shall then be turned at mixing speed to meet the within-batch uniformity stated in Clause 4.5. Water shall not be added to the batch at any later time.

830. 5.6 Placing Concrete

Main-lane pavements, 8.6 m or less in width, shall be constructed in one complete pass using a self-propelled slip form paver.

The plastic concrete shall be uniformly discharged, full width in front of the spreader in a manner which prevents segregation of the mixed material.

The slip form paver shall spread, consolidate, screed, and float finish the freshly placed concrete, to provide a dense and homogeneous pavement. Hand finishing will be kept to a minimum.

The mixing, placing and spreading operations shall be performed in a continuous, uniform, forward movement. Vibrating and tamping shall cease immediately upon the paver's forward movement being stopped.

The slip form paver shall construct the pavement true to the specified grades and alignments.

Paving equipment riding on steel side forms will be permitted to construct non main-lane pavements.

When side forms are used the concrete adjacent to the side forms and fixed structures shall be placed to the required depth and thoroughly consolidated with a portable vibrator. The vibrator shall not contact the base while it is being operated nor shall it be used to move the concrete horizontally.

Equipment paving adjacent to a slab previously placed will be permitted to operate on that slab. Damage to the adjacent existing concrete, caused by the paving equipment, shall be repaired at the Contractor's expense.

Joints in adjacent lanes of pavement shall align with joints in previously placed concrete.

Two-lift construction or other special construction methods will not be permitted without prior written approval. Where approval is given to use two-lift construction, the first lift shall be roughly struck off with a template or screed at the correct elevation to place the reinforcing steel as shown on the plans. The concrete above the reinforcing steel shall be placed within 15 minutes after the first lift has been placed. Any dust, dirt, or other foreign matter which collects on the first lift shall be removed before the second lift is placed.

A transverse construction joint may be required to close a section when the continual placing of concrete is delayed. If the concrete pavement is not dowelled, the construction joint shall be located between the contraction joints.

5.7 Finishing Concrete

After the concrete has been placed, it shall be struck off by a finishing machine or a slip form paver designed to perform the finishing as one of its operations.

The finishing machine shall be designed and operated to strike off and consolidate the concrete, eliminate ridges and produce an even surface true to the specified grades and alignment. The operation of the machine shall be controlled to keep the coarse aggregate near the finished surface of the pavement. Repeated operation of the machine over any area shall be avoided.

There shall be no noticeable water on the surface before hand finishing.

After finishing, the Contractor shall test the smoothness of the pavement surface with a 3-metre metal straightedge. Noticeable deviations shall be corrected at this time.

As a final finishing operation, the pavement surface shall be textured to a broomed finish in the transverse direction. Brooming shall be completed before initial set has developed and when the concrete will not be torn or excessively roughened. Brooms shall be clean and free from an accumulation of hardened cement.

The stroke of the mechanical broom shall be made, without stopping, for the full width of the concrete, with the adjacent strokes overlapping. Sufficient pressure must be exerted on the broom to produce a uniformly serrated surface. The broom marks shall be approximately 2.5 mm deep.

Handheld brooms will not be permitted on pavement lanes exceeding 5.0 m widths unless a work bridge is provided that spans the full width of the fresh pavement.

5.8 Surface Smoothness

The Department will use a Cox Computerized Profilograph to determine the surface smoothness and riding quality of main-lane pavements. The riding quality and surface smoothness will be expressed in terms of a Profile Index; which is the sum of the vertical deviations of the Profilograph riding wheel outside a 5 mm blanking band, over a unit distance. The profilograph readings will be terminated 6 m from the beginning and end of each bridge, railway crossing and existing pavement which was placed under another contract.

A Profile Index will be determined by taking Profilograph readings within 1 working day of the initial saw cuts of the pavement joints. The readings will be taken in the middle of each lane in the direction of travel.

The finished concrete surface shall have a maximum Profile Index of 12 mm per 100 m and bumps or dips shall have maximum deviations of 8 mm per 7.6 m.

When the initial Profile Index is 8 mm to 12 mm per 100 m, payment will be made at the Contract Unit Price for the completed pavement.

When the initial Profile Index is less than 8 mm per 100 m, a bonus payment will be made for the completed pavement. A bonus will not be paid for pavement sections that require corrections for any reason.

For a Profile Index greater than 12 mm but 19 mm or less per 100 m, the Contractor may correct the profile or accept a pay adjustment (deduction) in lieu of the correction.

The Contractor shall correct all areas having a Profile Index greater than 19 mm per 100 m or areas with bumps or dips greater than 8 mm per 7.6 m. The pavement may be corrected either by removing and replacing or by diamond grinding. Corrections shall be made on a minimum full width of one lane and one panel length.

830. 5.8 Surface Smoothness (Cont'd)

Where bumps or dips are greater than 8 mm but less than 12 mm per 7.6 m, the Contractor may correct the bumps or accept a price adjustment (deduction) in lieu of the correction. Bumps or dips greater than 12 mm per 7.6 metres must be corrected.

Unit price bid adjustment will apply to the total area of the 100 metre segment of pavement for each full lane width represented by the profile index. A paving section less than 100 m shall be added to the next day's paving to total 100 m. The pay adjustment will be in accordance with the schedule specified in the Special Provisions.

On pavement sections where corrections have been made, a second Profilograph-run will be performed to verify that the corrections have produced a maximum Profile Index of 12 mm per 100 m, and bumps or dips have maximum deviations of 8 mm per 7.6 m. Corrected areas which fail to meet the smoothness requirements will need further correction or be subject to appropriate deduction.

The additional acceptance testing will be at the Contractor's expense.

The procedures for appealing the acceptance test results shall be as follows:

- (a) The Contractor may appeal the acceptance testing for smoothness of any 100-metre section only once. This appeal must be made within 2 calendar days of receiving the test results.
- (b) The new test results will be binding on both the Contractor and the Department.
- (c) The Engineer will make every effort to conduct the verification test and provide a copy of the test results to the Contractor within 2 calendar days of receiving the Contractor's request for the verification test.

If the Engineer fails to provide the test results within the time provided in this specification, the Contractor shall not be relieved of his obligation to repair any defect.

Should the appeal testing verify the original test result, the profilograph testing will be at the Contractor's expense.

When fixed forms are used, deviations in the finished surface between 3 mm and 9 mm, as shown by the straightedge, shall be corrected by milling or grinding. Concrete with deviations greater than 9 mm shall be removed and replaced.

All work involved in the correction or removal and replacement of the concrete shall be done at the Contractor's expense.

Pay Adjustments will be in accordance with the schedule outlined in the "Special Provisions".

5.9 Joints

The location of the transverse *and* longitudinal joints shall be marked by the Department.

All joints shall be sawn. The Contractor shall have a minimum of 2 concrete saws and sufficient auxiliary equipment on the job to insure that joint sawing is completed within the required time limits.

Transverse and longitudinal joints shall be sawn in conjunction with one another and begin as soon as the concrete surface has hardened sufficiently to resist raveling as the cut is made.

Transverse and longitudinal joints shall be sawn to the width and depth shown on the Plans.

830. 5.9 Joints (Cont'd)

All the residue within each joint and on the pavement surface shall be removed after the sawing of that joint is completed.

Sawed joints which are ravelled or do not conform to the specified size and shape shall be repaired before the sealant is installed.

Expansion joints shall be provided adjacent to fixed structures and at other locations directed by the Department. They shall be filled with a treated fibre joint filler as shown on the Plans.

The filler shall be supported rigidly in place while placing the concrete. Immediately after the finishing of the pavement is completed, the concrete over the filler shall be cleaned out and the edges of the slab on each side of the joint shall be rounded with an edging tool to a radius of 6 mm.

When the pavement is constructed one lane at a time, a keyway, shall be constructed at all longitudinal joints, as shown on the plans.

All reinforcing steel shall be placed in accordance with the details shown on the Plans.

5.10 Curing

Upon the completion of concrete finishing, all exposed surfaces shall be sprayed with the curing liquid to completely cover the surfaces in accordance with the manufacturer's recommendations. When side forms are used, the pavement's vertical sides shall be sprayed immediately after the forms are removed.

5.11 Removing Forms

Forms shall remain in place for a minimum of 12 hours after the concrete has been placed, unless permitted otherwise. Forms shall be removed without damaging the pavement.

5.12 Sealing Joints

The joint shall be clean and surface-dry at the time of sealing and the ambient temperature must be at least 4°C and rising. Generally, joints shall not be sealed before the concrete has aged a minimum of 7 days.

Transverse joints shall be sealed with a premoulded neoprene sealant. The neoprene sealant shall extend the full width of the pavement without any splices. A lubricant adhesive shall be applied to the joints before installing the premoulded sealant.

Longitudinal joints shall be sealed to within 6 mm of the surface with a hot-poured, rubberized asphalt joint-sealing compound.

Joints which fail shall be cleaned out and resealed at the Contractor's expense.

830. 5.13 Weather Limitations

During hot weather, the temperature of the mix shall be kept as low as possible and shall not exceed 32°C. Aggregates or water, or both shall be cooled to reduce the concrete's temperature.

Additional measures shall be taken to prevent rapid moisture loss from the concrete surface.

830. 5.13 Weather Limitations (Cont'd)

The Contractor shall have a protective cover available at all times to protect the surface from rain before the concrete has sufficiently hardened. Paving shall stop immediately when rain starts and the concrete shall be covered with the protective cover.

Paving will not be allowed when the ambient temperature is below 0°C.

Paving may start when the ambient temperature is between 0°C and 5°C depending on the weather forecast, type of work, and quantity of concrete to be placed.

The Contractor shall provide sufficient polyethylene and straw or other approved protective coverings to maintain a minimum temperature of 10°C on the concrete surfaces for a minimum of 48 hours after it has been placed. If the air temperature drops below 0°C during this 48-hour period, the pavement shall be covered for a further 5 days.

When polyethylene is used, it shall be stretched over and held above the straw-covered, concrete surface to provide an insulating dead air space. Sufficient weights shall hold the plastic in place. Additional payment will not be made for any of these protective measures.

When the concrete is protected by insulation no more than 25 linear metres of concrete pavement shall be exposed for saw cutting operations. In no case shall concrete pavement be exposed more than one hour.

5.14 Movable Bridges

Movable bridges, if required, will be as specified in the "Special Provisions".

5.15 Cracked Concrete

Concrete with cracking that extends greater than 1/3 of the slab thickness shall be removed and replaced, or at the Department's option accepted with zero payment. Concrete with cracking that extends less than 1/3 of the slab thickness may be repaired by methods approved by the Engineer. All work to remove and repair cracked concrete will be at the Contractor's expense.

830. 9 METHOD OF MEASUREMENT

Concrete pavement will be measured in square metres.

Dowel assemblies will be measured on a linear basis. The length to be paid will be the total number of metres of transverse joint in which the dowel assemblies are installed.

830. 11 BASIS OF PAYMENT

The unit price per square metre for "Concrete Pavement" will be payment in full for supplying materials and for constructing a concrete pavement and for performing all works necessary or incidental thereto.

The unit price per metre for "Dowel Assemblies" will be payment in full for supplying materials and installing dowel assemblies and for performing all work necessary or incidental thereto.