February 22, 1999

11. HPC SPECIFICATIONS **METRIC**
SPECIAL PROVISION
NH-IM-75-2(194) HENRY
P.I. NO. 311840

SECTION 500 – CONCRETE STRUCTURES

Delete Subsection 500.02 and substitute the following:

500.02 MATERIALS: All materials shall meet the requirements of the following Specifications:

*Coarse Aggregate	800.01
Fine Aggregate	801.02
Dampproofing or Waterproofing Material (Bituminous)	826.01
**Portland Cement	830.01
**Portland-Pozzolan Cement	830.03
Admixtures:	
Air-Entraining Admixtures	831.01
Retarding Admixtures	831.02
Water Reducing Admixtures	831.02
Fly Ash	831.03
Microsilica (Silica Fume)	831.03
Curing Agents	832
Joint Fillers and Sealers	833
Special Surface Coating	836
Linseed Oil	870.07.B
Mineral Spirits	870.07.D
Water	880.01
***Graded Aggregate	815.01
Graffiti Proof Coating	838.01

*Coarse aggregate may be either Class A or B of the designated size except when Limestone or Dolomite is used in bridge structures. When Limestone or Dolomite is used in bridge length structures, Class A coarse aggregate is required.

**For High Performance Concrete only Types I and III Portland Cement will be allowed. Types I or II Portland Cement or Type IP Portland Pozzolan Cement shall be used unless otherwise specified. Air-entraining cement shall not be used.

***The gradation requirements of graded aggregate are modified to require 30 to 45 percent by weight passing the 2.00 mm sieve.

Delete Subsection 500.03 and substitute the following:

500.03 CLASSES AND USES OF CONCRETE:

A. General: Classes and specific requirements for each class of concrete are tabulated in the Concrete Mix Tables 500.03.T.1 and 500.03.T.2. The specific class of concrete to be used in a particular component of a structure will be shown on the Plan or called

for in the Specifications. Various classes of concrete for specified uses shall be as follows:

Class AAA HPC -	Prestressed Concrete
Class AA HPC -	Bridge Superstructure Concrete
Class AA1 -	Precast Concrete as called for on Plans

Note No. 1: This class may be used as high-early strength concrete if approved by the Engineer. The Engineer may approve the use of Type III cement in concrete used for this purpose. The Engineer may also specify the rate of compressive strength development when this concrete is used to expedite the contract.

Additional compensation will not be given for this concrete when it is used at the request of the Contractor.

Class AA -	Precast Concrete as called for on plans
Class A -	General Purposes
Class B -	Massive sections or lightly reinforced sections or miscellaneous non-structural concrete.
Class CS -	(Portland Cement Concrete Subbase).

Note No. 2: Class CS (Portland Cement Concrete Subbase)- this class to be used as a subbase where required by the Plans. Concrete subbase may be composed of a mixture of Portland Cement and graded aggregate or Portland Cement, aggregate and sand.

B. ADMIXTURES: Additives are required when specified herein or as directed by the Engineer.

1. AIR-ENTRAINING ADMIXTURES: Air entraining additives are required for all bridge structure concrete except Seal Concrete and non-exposed footings. The agent may be used in other concrete to improve workability when job or material conditions dictate. When used as an option to improve workability or when required, the amount of entrained air shall not exceed the upper limit of entrained air content requirement in Tables 500.03.T.1 and 500.03.T.2.

2. RETARDING ADMIXTURES: Concrete retarding additives shall be used in bridge concrete when the average temperature is above 18°C (average of expected high and the predicted low). Normally, the additives will not be required for bridge curbs, handrails, crosswalks or other appurtenances constructed separately from the decks. The use of retarders may be waived by the Engineer in substructure concrete when concrete can be placed within one (1) hour after batching.

3. WATER REDUCING ADMIXTURES: Water reducing agents may be used in Class AA HPC concrete for bridge decks when conditions do not require the use of a retarder. The agent may be used in other concrete when job or materials conditions dictate a reduction in water requirements or when minimal retardation of set is desired. Type “F” water reducing admixtures may be allowed by the Laboratory when requested by the Contractor.

4. FLY ASH: Fly Ash may be used as an additive in all classes of concrete listed in Concrete Mix Table 500.03.T.1 to promote workability and plasticity. Fly ash may be used as a partial replacement for Portland Cement in all concrete provided the following limits are met:

   a. The quantity of cement replaced shall be no more than 15% by weight.

b. Cement shall be replaced by fly ash at rate of 1.0 kg to 1.5 kg of fly ash to 1.0 kg of cement.

c. The fly ash mix shall conform to the provisions of Subsections 500.03 and 500.04.

d. Type IP cement shall not be used in mixes containing fly ash.

Water-cement ratio shall be calculated based on the total cementious material in the mix including fly ash.

e. For concrete classes listed in Concrete Mix Table 500.03.T.2, fly ash may be used as an additive in Class AAA HPC and Class AA HPC. For these classes only Class "F" fly ash shall be allowed and the following limits shall be met:

1. The quantity of fly ash shall be no more than 15% by weight.
2. The fly ash mix shall conform to the provisions of Subsections 500.03 and 500.04.

5. GRANULATED IRON BLAST-FURNACE SLAG: When high-early strengths are not desired, Granulated Iron Blast-Furnace Slag may be used as a partial replacement for Portland Cement in all classes of concrete listed in Concrete Mix Table 500.03.T.1, provided the following limits are met:

a. The quantity of cement replaced shall be no more than 50% by weight.

b. Cement shall be replaced by slag at the rate of 1.0 kg of slag to 1.0 kg of cement.

c. The slag mix shall conform to the provisions of Subsection 500.03 and 500.04.

d. Water-cement ratio shall be calculated based on the total cementious material in the mix including Granulated Iron Blast-Furnace Slag.

e. Type IP cement or fly ash will not be permitted in slag mixes.

f. Granulated Iron Blast-Furnace Slag shall not be used in High Performance Concrete mixtures listed in Table 500.03.T.2.

6. MICROSILICA (SILICA FUME): Silica fume may be used as an additive in Class AAA HPC and Class AA HPC at addition rates not to exceed 10% and 5% of the cement content respectively.

CONCRETE MIX TABLE
500.03.T.1

CLASS OF CONCRETE	COARSE AGGREGATE[2] SIZE NO.	MINIMUM CEMENT FACTOR[6] (kg/m^3)	MAXIMUM WATER/CEMENT RATIO (kg/kg)	SLUMP ACCEPTANCE[5] LIMITS (mm) LOWER – UPPER		ENTRAINED AIR ACCEPTANCE[3 & 7] LIMITS (%) LOWER – UPPER		MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS (MPa)
"AAA"	67,68	400	0.440	50	100	2.5	6.0	35
"AA1"	67,68	400	0.440	50	100	2.5	6.0	30
"AA"	56,57,67	375	0.445	50	100	3.5	7.0	25
"A"	56,57,67	360	0.490	50	100	2.5	6.0	20
"B"	56,57,67	280	0.660	50	100	0.0	6.0	15
"CS"[4]	56,57,67	165	1.400		90	3.0	7.0	7

GRADED AGG.*

HIGH PERFORMANCE CONCRETE MIX TABLE
500.03.T.2

CLASS OF CONCRETE	COARSE AGGREGATE SIZE NO.	MINIMUM CEMENT FACTOR (kg/m^3)	MAXIMUM WATER/CEMENT RATIO[7] (kg/kg)	SLUMP ACCEPTANCE[8] LIMITS (mm) LOWER	SLUMP ACCEPTANCE[8] LIMITS (mm) UPPER	ENTRAINED AIR ACCEPTANCE LIMITS (%) LOWER	ENTRAINED AIR ACCEPTANCE LIMITS (%) UPPER	MINIMUM COMPRESSIVE STRENGTH[9] AT 56 DAYS (MPa)	MAX. CHLORIDE PERMEABILITY[10] AT 56 DAYS (COULOMBS)
"AAA HPC"	67	386	0.33	50	180	3.5	6.5	70	3000
"AA HPC"	67	386	0.35	50	125	3.5	6.5	50	2000

NOTE:

1. Portland Cement may be partially replaced with fly ash as provided in Subsection 500.03.B.4 or Granulated Iron Blast-Furnace Slag as provided in Subsection 500.03.B.5.
2. Specific gravity of coarse aggregate may be specified.
3. Lower limit is waived when air entrained concrete is not required.
4. The mixture will be capable of demonstrating a laboratory compressive strength at 28 days of 7 MPa + 0.18R*. Compressive strength will be determined based upon result of six cylinders prepared and tested in accordance with AASHTO T 126 and T 22.

   *Where R = difference between the largest observed value and the smallest observed value for all compressive strength specimens at 28 days for a given combination of materials and mix portions prepared together.
5. Designed slump may be altered by the Laboratory when Type "F" water reducers are used.
6. Minimum cement factor shall be increased by 30 kg/m^3 when Size No. 7 Coarse Aggregate is used.
7. For High Performance Concrete the maximum water-cement ratio shall not include the addition of fly ash and/or silica fume.
8. For High Performance Concrete slump acceptance shall be determined after the addition of high-range water reducer.
9. For High Performance Concrete the minimum compressive strength at 56 days shall be determined using 100 mm diameter x 200 mm high cylinders.
10. For High Performance Concrete chloride permeability tests on mixtures shall be conducted as outlined in AASHTO T-277 on specimens cured for 56 days.

Delete Subsection 500.04 and substitute the following:

500.04 QUALITY OF CONCRETE:

A. GENERAL: The Contractor shall be responsible for concrete mix designs, batching, mixing, delivering and placing concrete in accordance with the Specifications. Concrete mixes shall meet requirements of the Concrete Mix Tables 500.03.T.1 and 500.03.T.2. Properties of concrete will be determined by the applicable method in the Sampling, Testing and Inspection Manual.

B. CONCRETE MIX DESIGNS: Concrete mix designs shall be submitted to the Office of Materials and Research at least 90 days prior to using the proposed mix. Any change in the mix design or in the source of components or admixtures shall be

submitted to the Office of Materials and Research for approval at least 90 days prior to the date of use. Mix proportions that contain materials from approved sources and produce concrete that meets these Specifications will be approved. Concrete mix design proportions may be approved by a method listed below.

1. SPECIFIC PROPORTIONS: The Contractor may request approval of specific concrete mix design proportions for designated classes of concrete. Request shall contain at least the following information:

    a. The source of each material.

    b. The apparent specific gravity of cement and fly ash if used, bulk specific gravity (saturated surface dry) of each aggregate and the percent absorption of each aggregate.

    c. The amount of each material required per cubic meter of concrete.

    d. Proportions of admixtures per cubic meter of concrete and limitations as accompany the use thereof.

    e. The proposed slump and air content of the design.

    f. Evidence that the proposed mixture will conform to provisions of Subsections 500.03 and 500.04.

2. READY TO MIX DESIGN PROPORTIONS: Ready mix concrete plants that are approved in accordance with Laboratory SOP, Quality Assurance for Ready Mix Concrete Plants in Georgia, are authorized to submit concrete mix designs for approval. The Contractor may secure approved concrete mix designs from authorized ready mix concrete plants.

3. LABORATORY DESIGN PROPORTIONS: Laboratory design proportions are available for commonly used materials combinations. The Contractor may obtain these mixes by directing a written request to the State Highway Materials and Research Engineer. Request shall be for specific classes of concrete and shall specify the source of all ingredients.

    The Contractor may select a combination of materials from approved sources and request the Laboratory to determine a mix that meets requirements in Table 500.03.T.1. The proportions will be established for strength and workability under laboratory conditions.

4. CEMENT FACTOR: The minimum cement factor for each class of concrete is established in Tables 500.03.T.1 and 500.03.T.2. Concrete mixes shall contain sufficient cement to produce adequate workability within the specified water-cement ratio.

5. COMPRESSIVE STRENGTH: Concrete mix designs (Table 500.03.T.1), which do not have a performance record of use by the Department, shall be required to meet minimum laboratory strength requirements. Laboratory acceptance strength shall be determined by at least eight compressive test specimens prepared and cured in accordance with AASHTO T 126. The specimens shall be made from two or more separate trial batches. An equal number of specimens shall be made from each batch. The minimum acceptance strength shall be:

$$X = f'c + 2.0s$$

where: X is the minimum average strength or acceptance strength, f'c is the required minimum compressive strength for each class of concrete from the Concrete Mix Table 500.03.T.1 and s is the average standard deviation of all 28 day specimens made in the field representing concrete of a given class from all ready mix plants. The standard deviation has been determined as follows:

Class of Concrete	s
B	2.5
A	4.5
AA	4.3
AA-1	3.7
AAA	3.4

High Performance Concrete mix designs (Table 500.03.T.2), which do not have a performance record of use by the Department, shall be required to meet minimum laboratory strength requirements. Laboratory acceptance strength shall be determined by at least eight (8) 100 mm diameter x 200 mm high compressive test cylinders prepared and cured in accordance with AASHTO: T-126. The cylinders shall be made from two or more separate trial batches. An equal number of cylinders shall be made from each batch. The minimum acceptance strength shall be:

$$X = f'c + 6.9$$

Where: X is the minimum average strength or acceptance strength, f'c is the required minimum compressive strength at 56 days for each class of High Performance Concrete as shown in Concrete Mix Table 500.03.T.2

When job site test specimens fail to meet the compressive strength requirements shown in Tables 500.03.T.1 and 500.03.T.2, final acceptance or rejection of concrete in place shall be determined by coring or non-destructive testing.

6. BATCHING CONTROLS: Concrete shall be batched in accordance with proportions of an approved mix design. The Contractor will take the action necessary to ensure that concrete materials are from the designated sources and that batch weights are corrected to account for surface moisture in aggregates. Batching control tests shall be conducted in accordance with procedures in the Sampling, Testing and Inspection Manual.

7. ACCEPTANCE TOLERANCES: Measurements for acceptance tolerances will be made immediately before concrete is placed in the forms. The applicable tests shall be conducted in accordance with procedures established in the Sampling, Testing and Inspection Manual. Acceptance tolerances for each class of concrete are listed in the Concrete Mix Tables.

Delete Subsection 500.05.B.3 and substitute the following:

500.05.B.3 MEASURING MATERIALS:

3. MEASURING MATERIALS:

a. CEMENT: Bulk cement shall be measured by weight on scales to an accuracy of plus or minus one percent of the designated weight. If the Engineer

permits the use of bag cement, the batch shall be so proportioned that only whole bags will be used.

b. AGGREGATES: All aggregates shall be measured by weight on scales to an accuracy of plus or minus two percent of the designated weight and the Contractor shall be responsible for ensuring that proper aggregate surface moisture corrections are applied.

c. WATER: Water may be measured by volume or weight. The measuring system shall be constructed to be independent of fluctuation in water pressure and it shall measure the designated amount within an accuracy of plus or minus one percent. Measuring systems shall have outside taps and valves to facilitate plant calibrations. Wash water shall not be used as mixing water.

(1) ADDING WATER TO HIGH PERFORMANCE CONCRETE: For High Performance Concrete all water shall be added at the concrete plant and additions at the jobsite shall not be permitted. A portion of the high-range water reducer shall be added at the concrete plant and as jobsite conditions dictate redosing will be allowed subject to the approval of the Engineer, but not to exceed manufacturer's dosage rate.

(2) ADDING WATER AT THE JOBSITE: Preferably all water will be added at the concrete plant and indiscriminate additions at the jobsite will not be permitted. However, with the Engineer's approval, small additions of water may be added at the jobsite when placement conditions require concrete of a more workable consistency than is delivered. The Contractor will determine the quantity of water required to provide the necessary consistency. The Engineer will not approve additions of water that will cause the total amount of water to exceed the maximum water/cement ratio established in the Concrete Mix Table 500.03.T.1. Neither will water be added to concrete that has begun to set, due to excessive mixing, or to concrete that has exceeded mixing or haul time limitations.

When water is added at the jobsite, it shall be done under carefully controlled conditions. The delivery vehicle shall be positioned in a manner that will not affect the measuring operation. Water shall be carefully measured and injected into the mixer with sufficient force to facilitate uniform mixing. Additions of water shall be made before an appreciable amount of concrete has been discharged. Repeated additions of water will not be permitted after discharge of concrete begins.

After water is added at the jobsite, the concrete shall be mixed 30 additional mixing revolutions. All mixing shall be completed before the total revolutions at mixing speed exceed 150.

The addition of any quantity of water sufficient to produce a slump in excess of that specified in the Concrete Mix Table 500.03.T.1 shall be cause for rejection of concrete. The Contractor shall bear all cost related to the rejection and removal of rejected concrete.

d. VOLUMETRIC PROPOTIONING: Concrete ingredients may be proportioned volumetrically when non-air entrained concrete is used in miscellaneous concrete, non-exposed footings, or culverts smaller than bridge culvert size.

Volumetric proportioning will require the equipment, calibration and operation of the equipment to be approved by the Engineer and the operator to

be certified by the Office of Materials and Research. Equipment specifications established in ASTM C 685 shall be required. The concrete producer shall conduct calibration tests at intervals not exceeding six months. Also the equipment shall be calibrated for each new concrete mix prior to production.

e. ADMIXTURES: Admixtures shall be measured by weight or volume. As measured, admixtures shall be within plus or minus three percent of the required amount.

Delete Subsection 500.05.B.6.b and substitute the following:

500.05.B.6 MIXING AND DELIVERY:

b. HAUL TIME LIMITATIONS: High Performance Concrete shall reach its final position in the forms within one (1) hour after cement has been added to the aggregates. All other concrete shall reach its final position in the forms within one (1) hour after the cement has been added to the aggregates, unless retarders or water reducers are used, in which case a time limit of up to one and one half (1.5) hours will be allowed.

Subsection 500.06 Add the following at the end of this Subsection:

500.06: PRODUCTION AND PLACEMENT CAPACITY REQUIREMENTS:

D. DEMONSTRATION SLAB: Prior to beginning deck placement operations, the Contractor shall construct a demonstration slab using the proposed HPC mix design for the concrete deck at a location adjacent to the new bridge to be approved by the Engineer. This demonstration slab shall be a mock-up of the bridge deck. The Contractor shall submit plans and procedures for the demonstration slab to the Engineer for approval 14 days prior to construction of the slab. The demonstration slab shall be constructed 30 days prior to the first deck pour of the new structure. The minimum dimension of the demonstration slab shall be 6.0 meters transverse by 5.0 meters longitudinal. The demonstration slab shall have the same bar reinforcement, same slab thickness and forming as Spans 2 and 3 of the proposed bridge. The Contractor shall use the same equipment and operations proposed for the bridge deck to successfully demonstrate forming, delivery, placement, screeding, finishing and curing of the demonstration slab. Failure to properly construct an acceptable demonstration slab shall result in the rejection of this portion of work with the requirement that a new demonstration slab shall be constructed. The demonstration slab shall be removed and disposed of by the Contractor after acceptance by the Engineer.

Delete Subsection 500.08.F

500.08.F PRESTRESSED CONCRETE DECK PANELS FOR HIGHWAY BRIDGES: Delete this Subsection

Subsection 500.11.B Add the following at the end of this Subsection:

500.11.B EQUIPMENT:

10. INSTRUMENTATION: High Performance Concrete instrumentation shall be installed by the Department on this bridge. The instrumentation shall consist of strain gauges, thermocouples, wiring, etc. to be cast into the concrete deck and beams. The Contractor shall allow the Department full access to the work area for installation and monitoring of the instrumentation. The Contractor shall take care so as not to damage the instrumentation. Instrumentation damaged by the Contractor shall be replaced at no cost to the Department.

Delete Subsection 500.12.C and substitute the following:

500.12.C CURING BRIDGE DECK CONCRETE:

C. CURING BRIDGE DECK CONCRETE: Bridge deck concrete shall be cured by of the following methods:

1. Immediately after the water sheen disappears and the surface finish is applied, a film of water shall be kept on the surface by fogging. The application of moisture shall be delayed if surface damage occurs. The surface shall be kept wet up to the time sheet curing covers are applied. Curing covers shall be thoroughly soaked on the fabric side and applied with the white-poly side up as soon as the concrete has set sufficiently to prevent damage. Sheet material for curing concrete shall meet requirements of AASHTO M 171, and shall be two layers. The bottom layer shall be polyethylene film and the top layer shall be white burlap polyethylene sheet or a white copolymer material coated over a layer of absorbent non-woven, synthetic fabric. It shall meet Specification requirements for reflection and moisture retention. The curing sheets shall contain no holes or tears and shall cover the entire surface of the deck. The curing covers shall be placed so that adjoining sheets overlap at least 450 mm. All laps and/or side edges shall be weighted to prevent displacement of covers before curing is completed. Weighting and overlapping shall be performed so as to ensure contact between the curing sheets and concrete surface. Soaker hoses shall be placed under the covers and used to keep the concrete surface continually moist for the entire seven (7) day curing period.

    a. The equipment used for supplying additional moisture by fogging shall consist of a heavy duty pump capable of delivering 7.6 liters of water per minute to a 1.6 mm diameter tip at an air pressure of 700 kPa and consuming approximately 0.6 mm^3/min of compressed air. An example of a suitable assembly is the Alemite Pump 7878-A. A 10 mm I.D. hose of sufficient length to reach all areas of the deck shall also be furnished.

    b. The spray gun and tip to provide the atomized spray or fog shall be adjustable so as to provide various patterns to conform to changing finishing conditions. An example of this type of equipment is the Gun Jet No. 43 with a 120-2 Multee Jet Nozzle.

c. As an alternate to the equipment described above, the Contractor may substitute other equipment, which has been demonstrated as being capable of equal performance.

2. The surface of parapets, sidewalk, end post and horizontal and vertical faces of curbs are not considered to be part of the bridge deck and may be cured by either method specified in Subsection 500.12.B. Curing Method, unless the surfaces are to receive a special surface coating as permitted in Subsection 500.13.B.3.b. Surfaces to receive a special surface coating shall not be cured with membrane-forming curing compounds. Surface to receive Protection Surface Treatment (75% boiled linseed oil and 25% mineral spirits solution) shall not be cured with membrane-forming curing compounds that contain acrylics.

3. The Department will allow the use of a surface moisture evaporation retarder as a supplement to other bridge deck curing procedures subject to an acceptable performance of the product during the construction of the demonstration slab. If used, the evaporation retarder shall require the approval of the Engineer and shall be applied per the manufacturer's recommendations.

Add to Subsection 500.18:

500.18. MEASUREMENT AND PAYMENT:

I. DEMONSTRATION SLAB: Payment for the demonstration Slab shall be per lump sum basis including site preparations, placement, removal and disposal. Payment will be made upon completion of an acceptable demonstration slab.

J. INCIDENTAL ITEMS: The provision for coordination of the Work to accommodate installation of the Department supplied instrumentation is considered to be an incidental item. No separate payment will be made for these items.

Payment will be made under:

Item No. 500. Demonstration Slab.....per Lump Sum
Item No. 500. Superstructure Concrete Class _____,
Bridge No. ____.....per Lump Sum
Item No. 500. Concrete Handrailing
(designation) .....per Linear Meter
Item No. 500. Class ___ Concrete .....per Cubic Meter
Item No. 500. Class ___ Concrete,
High Early Strength .....per Cubic Meter
Item No. 500. Class "B" Concrete Base
Or Pavement Widening.....per Cubic Meter
Item No. 500. Class ___ Concrete including
Reinforcement Steel.....per Cubic Meter
Item No. 500. Class A Concrete – Filler.....per Cubic Meter
Item No. 500. Class ___ Concrete Retaining Wall .....per Cubic Meter
Item No. 500. Grooved Concrete ..... per Square Meter
Item No. 500. Concrete Barrier.....per Cubic Meter

SPECIAL PROVISION
NH-IM-75-2(194) HENRY
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SECTION 507 – PRESTRESSED CONCRETE BRIDGE MEMBERS

Delete Subsection 507.04.F and substitute the following:

507.04.F HANDLING, STORAGE AND FABRICATION:

1. In handling, beams must be maintained in an upright position at all times and must be picked up at points within 900 mm from their ends. Disregarding this requirement could lead to collapse of the member.
2. Tops of beams are to be rough floated at approximately the initial set. Entire top of beams shall be scrubbed transversely with a coarse brush to remove all laitance and to produce a roughened surface for bonding to slab. Concrete fins or projections shall be removed to produce a vertical face at the edge of the beam.
3. The Contractor shall submit shop drawings on standard plan size 550 mm x 900 mm sheets showing complete details of beam including the following:
    a. Non-prestressed reinforcement.
    b. The method of retaining depressed strands in place.
    c. Calculations for determination of the strand elongation required to produce the specified pretensioning force.
    d. Detensioning schedule.
    e. Increased length of beam due to vertical alignment.
4. Entire end of beams, including strand ends, shall be covered with 3 mm epoxy mortar after detensioning is completed.
5. The strands shall meet all the requirements of ASTM A 416, Grade 270.
6. PRE-POUR CONFERENCE FOR BEAM FABRICATION – Two (2) weeks prior to the beginning of beam fabrication, the Engineer in conjunction with the Laboratory will schedule a pre-pour conference with the Contractor and the Contractor's beam supplier. Topics of discussion shall include concrete batching, mixing, placement procedures, curing quality control procedures, instrumentation and any other details pertinent to the Work.
7. High Performance Concrete instrumentation shall be installed by the Department on this bridge. The instrumentation shall consist of strain gauges, thermocouples, wiring, etc. to be cast into the beams. The Contractor shall allow the Department full access to the work area for installation and monitoring of the instrumentation. The Contractor shall take care so as not to damage the instrumentation. Instrumentation damaged by the Contractor shall be replaced at no cost to the Department.

Delete Subsection 507.06 and substitute the following:

507.06 PAYMENT

A. BEAMS: The quantity of beams, determined as provided in Subsection 507.05.A, will be paid for at the Contract Price per linear meter of each different type designation, complete in place.

B. DECK UNITS: The quantity of deck units, determined as provided in Subsection 507.05.B, will be paid for at the Contract Price per span of each different nominal span length, complete in place.

C. CAPS: The quantity of caps, determined as provided in Subsection 507.05.C, will be paid for at Contract Price per each, complete in place.

D. Prestressed Concrete Box Beams, measured as specified above, will be paid for at the Contract Unit Price bid per linear meter. Such payment shall be full compensation for furnishing and erecting the beam.

E. PARTIAL PAYMENTS: Material allowance payments for bridge beams will be determined and paid for in accordance with the requirements of Subsection 109.07.

Upon completion of the erection in its final manner and position, 95% of the Contract Price will be included for payment on the next statement.

If there is no field rubbing or painting required, the 95% may be increased to 100%. If such work is required, the remaining 5% of the Contract Price will be included on the next statement following the satisfactory completion of such work.

F. INCIDENTAL ITEMS: The provision for coordination of the Work to accommodate installation of the Department supplied instrumentation is considered to be an incidental item. No separate payment will be made for this item.

Payment will be made under:

Item No. 507. PSC Beam (Type ___), ... per Linear Meter
Item No. 507. Box Beam (Depth/Strands) ..... per Linear Meter
Item No. 507. PSC Deck Units ____ meter Span ..... per Span
Item No. 507. PSC Caps ..... per Each

OFFICE OF MATERIALS AND RESEARCH

February 22, 1999

METRIC

SPECIAL PROVISION
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SECTION 865 – MANUFACTURE OF PRESTRESSED CONCRETE BRIDGE MEMBERS

Delete Subsection 865.02 and substitute the following:

865.02 MATERIALS:

Concrete, Class AAA HPC	Section 500
Steel Bars for Reinforcement	853.01
Pretensioning Steel Wire Strand	853.02
Post-Tensioning Steel Wire	853.03
Post-Tensioning Steel Bars	853.04
Plain Steel Bars – Threaded Ends	853.05
Portland Cement	830.01
Fine Aggregate for Mortar	801.02
Aluminum Powder	835.01
Self-Lubricating Bronze Bearing and Expansion Plates and Bushings	857.03
Primer Coats	870
Elastomeric Pads	885.01
Epoxy Resin Adhesive	886
Microsilica (Silica Fume)	831.03

A. PORTLAND CEMENT

Portland cement shall be Type I, Type II or Type III and shall meet requirements of AASHTO M 85 for low alkali cement. Type II cement shall be used in the concrete to cast pile for specific locations and it shall be so noted on the Plans.

B. COARSE AGGREGATE

Specific sizes of coarse aggregate may be specified and approved for precast/prestressed concrete products.

Unconsolidated limerock coarse aggregate shall be excluded from use in precast/prestressed concrete piling and from use in any portion of a structure which comes in direct contact with water.

C. MICROSILICA (SILICA FUME)

Silica fume may be used as an additive at addition rate not to exceed 10% of the cement content.

D. SLUMP LIMITATION

Slump shall be in accordance with Subsection 500.03. The maximum slump shall be 180 mm provided there is no segregation of the concrete mixture.

E. MIXING

Mixing of concrete shall be in accordance with Subsection 500.05.B.6 except that with the addition of HRWR the following shall apply. The HRWR shall be dosed at the casting yard under the direct supervision of the producer's Quality Control. HRWR manufacturer's recommended dosage may not be exceeded. After dosing, the concrete shall be additionally mixed at mixing speed for a minimum of 70 revolutions. Maximum revolutions at mixing speed and agitation speed shall not exceed 360 revolutions. After Plasticizer has been added, no additional mixing water will be permitted.

F. EPOXY COATED REINFORCEMENT STEEL AND WIRE

When the top mat of steel in a bridge deck is to be epoxy-coated, the shear steel in the prestressed concrete beams shall also be epoxy-coated in accordance with Section 514.

Delete Subsection 865.03.A and substitute the following:

865.03 MANUFACTURE

A. GENERAL REQUIREMENTS:

1. ERECTION DRAWINGS: The Contractor shall furnish the Engineer erection drawings covering the placement of superstructure units when the units are not interchangeable with respect to transverse placement within a span or with respect to the reversal of ends within a span.

2. PLANT INSPECTION:

   a. NOTICE TO BE GIVEN TO ENGINEER: The Engineer shall be given ample notice before the beginning of work so that all of the plant facilities that are involved in the production can be inspected. No member shall be manufactured until all facilities are approved.

   b. FACILITIES FOR INSPECTION: The Inspector shall be allowed free access to all parts of the premises that are a part of the production process.

   c. INSPECTOR'S AUTHORITY: The Inspector will have the authority to reject materials or quality of work which do not meet the Specifications, but in cases of dispute, the Contractor may appeal to the Engineer, whose decision will be final.

3. REJECTIONS: The acceptance of any materials or finished members by the Inspector shall not prevent them from being rejected later if they are found to be defective. Rejected material and quality of work shall be replaced promptly or made good at the expense of the Contractor.

4. PROVISIONS FOR TESTING: The Contractor shall furnish and maintain sufficient testing equipment so that the Inspector can conduct the following tests at the casting yard:

MATERIAL	METHOD OF TEST
Fine Aggregate	AASHTO T 27
Coarse Aggregate	AASHTO T 27

Hardened Concrete* GDT-35

*Cylindrical molds shall be available for use on each casting bed. The Contractor shall also provide and maintain a machine and other accessories such as capping molds, heating pots and capping compound sufficient to test compression specimens in accordance with AASHTO T 22. All materials to be furnished for testing shall be furnished free of cost to the Department and shall be furnished well in advance of the anticipated time of use. No additional compensation will be made to the Contractor if the work is delayed awaiting approval of the materials furnished for testing.

5. FACILITIES FOR THE INSPECTOR: The Contractor shall furnish for the sole use of the Inspector, a suitable field laboratory in accordance with Subsection 106.04, 106.11 and Section 152.

6. INSTRUMENTATION: High Performance Concrete instrumentation shall be installed by the Department on this bridge. The instrumentation shall consist of strain gauges, thermocouples, wiring, etc. to be cast into the beams. The Contractor shall allow the Department full access to the work area for installation and monitoring of the instrumentation. Instrumentation damaged by the Contractor shall be replaced at no cost to the Department.

Delete Subsection 865.03.H.3.c and substitute the following:

865.03.H.3.c DETENSIONING OPERATION:

c. DETENSIONING OPERATION:

(1) GENERAL: Before any detensioning operations are started, the pattern and schedule for releasing the strands shall be submitted for advance approval. Forms which tend to restrict the horizontal or vertical movement of the member shall be stripped or loosened prior to stress release. When steam curing is used, strand release shall be done with special care because of dimensional changes due to temperature and shrinkage. Where possible, the pretensioned strand shall be released while units are moist and warm. In deflected strand construction, the hold down devices within the member or members shall be released immediately upon the discontinuation of the steam curing.

(2) STRESS RELEASE STRENGTH: Unless otherwise specified on the Plans or in the Special Provisions, stress may be transferred to the concrete based upon the following minimum strength, as determined by cylinders cast of the same concrete and age requirements: Concrete I-Beams, Box Beams, Flat Slab Deck Sections or Tee Slab Deck Sections, 30 MPa and 18 hours.

Piling: 28 MPa

Other Members: As specified on the Plans.

METHOD OF CURING FOR RELEASE STRENGTHS: Temperature match curing (“Sure Cure” or equivalent methods) shall be required for specimens used to determine when stress may be transferred to the concrete for High Performance Concrete units.

(3) MULTIPLE STRAND RELEASE: When this method of release is used, either a symmetrical group of strands or all of the strands shall be released simultaneously. The load on the strands shall be removed from the anchorage and placed on the jacking system. The jack or jacks shall be gradually released until the strands are released.

(4) SINGLE STRAND RELEASE: When this method of release is used, each strand shall be heated and allowed to pull itself apart in the sequence of the approved pattern and schedule of release. No cutting will be allowed.

(5) DRAPED STRAND RELEASE: Draped strand shall be released in accordance with the method in which the weight of the beam is compared with twice the total amount of the vertical components of the hold down forces. One of the following two methods shall be used:

Method I. When the beam weight is less than twice the above amount and vertical restraints are not sufficient to counteract the vertical components of the hold down forces, the release shall be as follows:

(a) Each draped strand at the end of each member shall be heated to failure in the sequence of the approved pattern and schedule of release.

(b) Hold downs shall be released and hold down bolts removed.

(c) Straight strands shall be released as noted in Subsection 865.03.H.3.c.(3) and (4).

Method II. When the beam weight is more than twice the above amount, the release shall be as follows:

(a) Hold down devices within the beam shall be released.

(b) Strands shall be released from the top to the bottom by either heating or jacking in the sequence of the approved pattern and schedule of release.

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