

SECTION 900 - SPECIAL PROVISION ITEMS

CONTRACTOR-FABRICATED PRECAST CONCRETE STRUCTURES

45. DESCRIPTION. This work shall consist of manufacturing, transporting, handling, and erecting precast concrete structure components fabricated by the Contractor at a location other than a Precast Concrete Institute (PCI) or National Precast Concrete Association (NPCA) certified precast concrete facility.
46. MATERIALS. Materials shall be in accordance with Sections 501.02, 507.02, and 540.02 of the Standard Specifications.

CONCRETE

Concrete shall meet the Standard Specification of 540.05, excluding 540.05 (a). In lieu of a mix meeting the requirements of 540.05, the Contractor may provide a mix meeting the Specifications of 501 for Class HPC A or Class HPC B provided that the design strength as shown in the plans as well as what is required for lifting and handling is met.

47. GENERAL FABRICATION REQUIREMENTS. Unless noted otherwise herein, Contractor-fabricated precast concrete (CFPC) produced shall meet the requirements of Standard Specifications 501, "HPC Structural Concrete" and 507, "Reinforcing Steel."
48. SUBMITTALS. As soon as practical after award of the Contract, all required information shall be prepared and submitted.

Fabrication Drawings for the precast concrete shall be submitted in accordance with Section 105. In addition to the requirements for Fabrication Drawings in Section 105, the following shall be included:

- (a) Dimensions and tolerances of the precast concrete to be fabricated.
- (b) The concrete mix design, including but not limited to the following:
- (1) Batch weights specifying dry or saturated surface dry.
 - (2) Material names and sources.
 - (3) Aggregate properties and date tested.
 - (4) Chemical and physical properties of cementitious material.
 - (5) Admixture names and sources.
- (6) Lab data that shall include, but not be limited to:
- a. Slump.
 - b. Air Content.
 - c. Temperature.

- d. Ratio of Water/Cementitious Material.
 - e. Cylinder breaks for 3, 7, and 28 days cured in the same manner as the piece to be fabricated.
 - f. 56 day Rapid Chloride Ion Permeability - AASHTO T 277 test data. The results shall be the average from testing 3 specimens, but the individual specimen results shall also be included. Testing shall be performed by an independent laboratory accredited by AMRL in this test method.
 - g. Alkali-Silica Reactivity (ASR) - AASHTO T 303 data from testing of both the fine and coarse aggregates. Testing shall be performed by an independent laboratory accredited by AMRL in this test method.
- (c) Alkali-Silica Reactivity (ASR) - If potentially reactive aggregates are to be used in a mix design, then proposed mitigation method(s) and test results must be provided. The AASHTO T 303 test must be run again with the proposed mitigation method(s) and using the proposed job cementitious material proportioning. The proposed mitigation method(s) shall reduce expansion to below 0.10%.

If a mix design, including the testing results, has been submitted and approved within a 12 month period, it may be used in lieu of submitting an additional mix design. However, if any change in the material sources, properties or proportions has occurred, then a new mix design with lab test data will be required regardless of previous approval.

The requirements for testing in Subsections 540.04(b)(6)f, 540.04(b)(6)g, and 540.04(b)(7) above shall be waived if the submitted mix design has a minimum proportion of the cementitious material content of that allowed for use in High Performance Concrete in section 501.

The mix design shall be approved by the Composite Materials Engineer prior to fabrication.

- (d) The sources and properties of the materials proposed for use.
- (e) The placement of reinforcing steel, welded wire fabric, mechanical bar connectors, and inserts.
- (f) The type of surface finish and how the finish will be obtained. Include details of potential repair procedures.
- (g) The curing method, detailing sequence and duration.
- (h) The minimum required concrete strength for design strength and form removal.
- (i) The design of the lifting attachments.
- (j) Transportation, handling, and storage details.
- (k) The installation procedure including a detailed grouting procedure.

(1) A Quality Control Plan that identifies a Quality Control Manager and provides previous experience for work of this nature. A Description of Quality Control Processes addressing but not limited to: Concrete Production including batching, delivery, and placement, Formwork, Rebar, Concrete finishing, Concrete Cure, Shipping /Installation procedures.

49. INSPECTION. Materials furnished and the work performed herein shall be inspected by the Agency. The Agency will test all concrete incorporated into the work per section 501 of the standard specifications. The inspector shall have the authority to reject any material or work that does not meet the requirements of the Specifications. Advance notification of at least two weeks must be provided by the Contractor to the Agency's Engineer and the Composite Materials Engineer concerning the proposed intention to commence work. A minimum of five working days notification must be provided to the Agency's Engineer and the Composite Materials Engineer by the Contractor to confirm the fabrication start date.

Prior to placing any precast concrete elements produced under these Specifications, the Materials and Research Engineer shall have approved all applicable material certifications required in accordance with Subsection 700.02.

50. FABRICATION.

(a) Pre-Production Meeting. Unless the Engineer deems, in writing, that a pre-production meeting is unnecessary, then a pre-production meeting shall be held a minimum of seven (7) calendar days prior to beginning concrete placement. The pre-production meeting shall be attended by, and including but not limited to, the Crew Supervisor, Contractor Project Manager, Concrete Producer, Resident Engineer, Project Manager, and Composite Materials Engineer.

(b) Placing Concrete. Concrete placement shall be in accordance with Standard Specification 501.10 and as noted herein. Concrete shall not be deposited in the forms until the Agency representative has approved placement of the reinforcement, conduits, and anchorages.

(c) Repairs/Patching. Contractor-fabricated precast concrete structure components that contain minor defects caused by manufacture or handling may be repaired at the manufacturing site. Minor defects are defined as holes, honeycombing, or spalls, which are 150 mm (6 inches) or less in diameter, that do not penetrate deeper than 25 mm (1 inch) into the concrete. Surface voids or "bugholes" that are less than 16 mm (5/8 inch) in diameter and less than 6 mm (1/4 inch) deep need not be repaired. Repairs shall be made using a material from the Approved Products List for overhead and vertical concrete repair. The repair material shall be cured as specified by the manufacturer. Repairs shall be approved by the Engineer.

(d) Cracking. Cracks less than 0.25 mm (0.01 inch) in width shall be sealed by a method approved by the Engineer. Cracks in excess of 0.25 mm (0.01 inch) may be cause for rejection. At the Engineer's discretion, cracked Contractor-fabricated precast

concrete structure components shall be repaired or replaced at the Contractor's expense.

(e) Dimensional Tolerances for Contractor-Fabricated Precast Concrete Structure Components. All tolerances shall be in accordance with the latest editions of both PCI MNL 116 Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products and PCI MNL 135 Tolerance Manual for Precast and Prestressed Concrete Construction, or with the National Precast Concrete Association (NPCA) Quality Control Manual for Precast Concrete, unless otherwise noted in the Contract Documents or as approved by the Engineer.

(f) Marking. The date of manufacture, the production lot number and the piece mark shall be clearly marked on each individual piece of precast concrete. The mark shall be in a location that will not be visible in the finished product.

51. HANDLING, STORAGE, AND SHIPPING. All CFPC Structures shall be handled, stored, and shipped in such a manner as to minimize chipping, cracks, fractures, discoloration, and excessive bending stresses. Units damaged by handling, storage, or shipping shall be replaced at the Contractor's expense.

CFPC Structures shall not be installed until the respective unit has been inspected. This inspection shall verify that the pieces are free from defects and all specification requirements including the compressive strength and tolerance requirements have been achieved. In addition, CFPC structures will not be considered for shipment until the completion of the cure period and the required strength has been attained as demonstrated by field cured cylinder breaks.

52. INSTALLATION METHODS, EQUIPMENT AND ERECTION. Cranes, lifting devices, and other equipment for Contractor-fabricated precast concrete structure erection shall be of adequate design and capacity to safely erect, align, and secure all members and components in their final positions without damage. The Contractor is solely responsible for the methods and equipment employed for the erection of the precast concrete structure components.

Construction Drawings for precast concrete structure component erection shall be submitted in accordance with Section 105. The erection plan shall include the necessary computations to indicate the magnitude of stress in the units during erection and to demonstrate that all of the erection equipment has adequate capacity for the work to be performed, and provisions for all stages of construction, including temporary stoppages.

Submittal of the erection plan is for the Agency's documentation only and shall in no way be construed as approval of the proposed method of erection. The Contractor shall follow the erection plan as submitted.

53. GROUT.

(a) Unless otherwise noted Grout shall be used to fill shear keys, leveling screw voids, transverse tie anchor recesses, dowel holes, and for fairing joints as detailed in the Contract or as ordered by the Engineer.

Grout shall be Mortar, Type IV. Acceptable grout materials shall be those included on the Approved Products List on file with the Agency's Materials and Research Section. Additional aggregates shall not be added to the material during field mixing.

The Contractor, with written permission from the Engineer, has the option to use ready mixed mortar for the grouting process. The Contractor shall prepare and submit for approval the mix design for the grout. The maximum quantity that can be delivered in a single load is one cubic meter (1.25 cubic yards), which must be delivered and placed within the time limits specified by the manufacturer.

For testing, 6 neat 50 mm (2 inch) cubes shall be molded and cured in accordance with AASHTO T 106 (ASTM C 109). The average compressive strength of 3 cubes shall be a minimum of 7 MPa (1000 psi) at 3 days and a minimum of 35 MPa (5000 psi) at 28 days.

- (b) The surface to be grouted shall be thoroughly cleaned, wetted, and free of all standing water. The grout shall be mixed using a mechanical mixer according to the manufacturer's recommendations and shall be readily pourable so that it completely fills the shape of the shear keys or holes, depending on the product being installed. The placement of grout shall be continuous to produce a monolithic key absent of any voids or cold joints.
- (c) All exposed grout shall be cured for a period of not less than three days by the wetted burlap method in accordance with Section 501. Curing shall commence as soon as practical after grout placement.

54. METHOD OF MEASUREMENT. The quantity of Contractor-Fabricated Precast Concrete Structures of the types and sizes specified to be measured for payment shall be on a lump sum basis. The lump sum shall include all of the elements indicated to be Contractor-Fabricated Precast Concrete Structures in the complete and accepted work for the locations specified in the Contract.

55. BASIS OF PAYMENT. The accepted quantity of Contractor-Fabricated Precast Concrete Structures will be paid for at the Contract lump sum price. Payment shall be full compensation for designing, detailing, fabricating, repairing, transporting, handling, and erecting the elements specified, for furnishing and implementing the erection plan, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Any grouting work, such as fairing out unevenness between adjacent precast concrete structure components and filling leveling screw holes, shear keys, transverse anchor recesses, and dowel holes, is considered incidental to the work for Contractor-Fabricated Precast Concrete Structure.

Payment will be made under:

| <u>Pay Item</u> | <u>Pay Unit</u> |
|---|-----------------|
| 900.645 Contractor-Fabricated Precast Concrete Structures | Lump Sum |

HIGH PERFORMANCE CONCRETE, RAPID SET

43. DESCRIPTION. This work shall consist of designing, furnishing, and placing a high-early strength, high performance, portland cement concrete at the locations indicated in the Plans and as directed by the Engineer.

The work under this section shall be performed in accordance with these provisions, the Plans, and Section 501 of the Standard Specifications.

44. MATERIALS. Materials shall meet the requirements of Subsection 501.02 and the following:

High Early Strength Portland Cement.....701.04

45. MIX DESIGN SUBMISSION CRITERIA. Concrete shall meet the following requirements:

The mix shall be classified as conventional or self-consolidating concrete (SCC) mix. If the intended slump is greater than 9" then it shall be classified as an SCC mix.

- (a) Compressive Strength.
28 Day Compressive Strength - 5000 psi

In addition to this requirement, the Contractor shall be aware that a minimum compressive strength of 4000 psi, as determined by field cured test cylinders, shall be achieved prior to allowing traffic on the structure.

- (b) Permeability. 56 Day Permeability - 2500 Coulombs (The permeability may be tested prior to 56 days but results must still be 2500 Coulombs or less). Test shall be performed in accordance with Subsection 510.04 b(6)(f).

- (c) Air Content. 7 ± 1.5%

- (d) Slump/Spread. The mix shall not exhibit segregation at the slump/spread being used.

(1) For SCC mix the visual stability index (VSI) shall be equal to or less than 1.

- (e) Alkali-Silica Reactivity (ASR). Test shall be performed in accordance with Subsections 510.04 b(6)(g) and 510.04 b(7).

- (f) The mix shall contain shrinkage-compensating admixtures such that there will be no separation of concrete from adjacent precast units. The Contractor shall include results for the unrestrained shrinkage test method, ASTM C 157. The maximum shrinkage allowed shall be 0.04%.

- (g) A proprietary concrete mix design meeting the same performance requirements may also be considered for use.

46. SUBMITTALS. A minimum of fourteen (14) calendar days prior to placement (or prior to the pre-placement meeting, if one is required), the Contractor shall submit the mix design for approval. The mix design shall be submitted to the Agency's Materials and Research Laboratory, attention Structural Concrete Engineer. Concrete under

this provision shall not be placed until the mix design has been approved.

- (a) Trial Batch. A maximum of seven (7) days prior to the first placement, the Contractor shall produce and place a 2 cubic yard trial batch at a location agreed upon by the Contractor and the Engineer. The purpose of this trial batch is to show that the mix is capable of producing the wet test results within the specified ranges. The Engineer shall be given a minimum of seven (7) days notice prior to the trial batch pour. The trial batch shall be poured in the presence of the Engineer and the Structural Concrete Engineer. The trial batch shall be produced, and poured, in the same manner and time frames that will occur during construction. The Contractor shall provide qualified personnel to test slump, air content, and unit weight of the trial batch.

The placed concrete will be tested for all mix design criteria as listed above with the exception of permeability, shrinkage and ASR. If the mix falls outside of any of the above listed ranges for the tested criteria, it shall be subject to rejection.

47. CURING CONCRETE. The method of wet curing used shall meet the requirements of Subsection 501.17. Concrete shall be wet cured as follows:

Flange Connection - 3 days
Approach Slab Connection - 24 hours
Abutment closure pour - 24 hours
Pile cavities - 24 hours

48. LOADING OF CONCRETE. After the concrete has been placed and the finishing operations concluded, it shall not be walked on or disturbed in any manner, including the removal of forms, for a minimum period of 12 hours.

The concrete shall obtain a strength of 4000 psi prior to any vehicular loading.

A portable compression testing machine shall be provided by the Contractor and available on-site for cylinder testing. All testing and equipment shall conform to ASTM C 39 and performed by a qualified individual. This compression machine must be calibrated in accordance with the provisions of Section 5, ASTM C 39.

49. METHOD OF MEASUREMENT. The quantity of Special Provision (High Performance Concrete, Rapid Set) to be measured for payment will be the number of cubic meters (cubic yards) of concrete placed in the complete and accepted work, as determined by the prismatic method using dimensions shown on the Plans or as directed by the Engineer, including the volume of precast concrete stay-in-place forms, but excluding the volume of steel or other stay-in-place forms and form filling materials. No deductions will be made for the volume of concrete displaced by steel reinforcement, structural steel, expansion joint material, scuppers, weep holes, conduits, tops of piles, scoring, chamfers or corners, inset panels of 38 mm (1 ½ inches) or less in depth, or any pipe less than 200 mm (8 inches) in diameter.

50. BASIS OF PAYMENT. The accepted quantity of Special Provision (High Performance Concrete, Rapid Set) will be paid for at the Contract unit

price per cubic meter (cubic yard). Payment will be full compensation for performing the work specified, including designing the mix, satisfactory finishing and curing, and for furnishing all forms, materials, including joint filler and bond breaker, labor, tools, admixtures, equipment, including automatic temperature recording units, trial batches, and incidentals necessary to complete the work.

The cost of heating materials and protecting the concrete against cold weather, and any additional cost for cement, will not be paid for separately but will be considered incidental to Special Provision (High Performance Concrete, Rapid Set).

The cost of furnishing testing facilities and supplies at the batch plant and the setting of inserts, bench marks, and bridge plaques furnished by the Agency will not be paid for separately but will be considered incidental to Special Provision (High Performance Concrete, Rapid Set).

Costs for all materials, labor, and incidentals for steel or other stay-in-place forms and form filling materials will not be paid for separately, but will be considered incidental to Special Provision (High Performance Concrete, Rapid Set).

Payment will be made under:

| <u>Pay Item</u> | <u>Pay Unit</u> |
|---|-----------------------------|
| 900.608 Special Provision (High Performance Concrete, Rapid Set)(FPQ) | Cubic Meter (Cubic Yard) |

CRITICAL PATH METHOD (CPM) SCHEDULE

- xx. DESCRIPTION. This work shall consist of developing and furnishing a CPM Schedule, including narratives, updates, and revisions for the duration of the Contract.

These provisions shall supersede Subsection 108.03(a) of the Standard Specifications.

- xx. SUBMISSIONS.

(a) The Contractor is responsible for the scheduling of all Contract work, which shall include, but is not limited to subcontracted work, complete and acceptable submissions, work component fabrications, and delivery of materials. The schedule shall include allowance for time for all aspects of the work including sufficient time for VTrans to perform its functions as indicated in the Contract, including but not limited to acceptance inspection and/or testing, and review and acceptance/approval of any required Working Drawings as defined in Section 105 or otherwise in the Contract Documents.

(b) Provide the following items with each schedule submission. The schedule shall be prepared with MS Project.

- (1) An electronic copy in MS Project format with run date and version of the schedule;

- (2) A PDF illustrated in color, depicting no more than 50 activities on each 280 by 430 mm (11 by 17 in.) sheet, and with each sheet including title, project name and number, match data for diagram correlation, and a key;
 - (3) A four-week look-ahead narrative to provide a more detailed plan of upcoming work highlighting the near term priorities. Indicate the anticipated workdays per week, number of shifts per day, number of hours per shift, crew sizes, and assumed resources. If the project requires a road closure, identify any changes in anticipated resources, or work schedule during the closure period.
- (c) The CPM schedule shall include the following:
- (1) Activities that describe the essential features of the work, activities that might delay Contract completion, and which activities are on the critical path;
 - (2) The planned start and completion dates for each activity and the duration of each activity stated in work days (field activities of more than 15 work days in duration shall be broken into two or more activities distinguished by location or some other logical feature); this estimated figure shall include considerations for permit limitations, seasonal limitations, and any other anticipated delays.
 - (3) When the project contains a defined Road or Bridge Closure Period of a minimum of 24 hours and up to a maximum of 28 days, the duration for work within the closure period shall be shown in hours instead of days. The maximum duration of each activity within the closure period shall be limited to twelve (12) hours;
 - (4) Finish-to-Start relationships among activities, without leads or lags unless justified in the narrative, and approved by the Engineer;
 - (5) Distinct columns showing Predecessors, Successors, Duration, Actual Start, and Actual Finish for each Activity;
 - (6) Project suspension or work inactivity that is three (3) days or longer;
 - (7) Dates related to the procurement of materials, equipment, and articles of special manufacture;
 - (8) Dates related to the submission of Working Drawings, plans, and other data specified for review or approval by the Agency;

- (9) Key milestone dates specified in the Contract including but not limited to; Notice to Proceed, Interim Completion, Permit Restriction Dates, and Contract Completion Date. These shall be the only constraints in the schedule logic;
- (10) Activities related to Agency or Third Party reviews and inspections.
- (d) For contracts with an original Contract amount in excess of \$8,000,000.00 the following additional information shall be shown on the CPM schedule:
- (1) Each Contract bid item identified with at least one activity, except:
- Lump Sum items, Lump Unit items, Contract items paid by the "Hour", Contract items paid by the "Dollar", Section 641 pay items, and Section 653 pay items.
- (2) Each compensable activity shall identify the applicable Contract item(s), along with the total quantity intended to be placed during that activity.
- xx. BASELINE SCHEDULE. The CPM Schedule submittal shall be received by the Engineer a minimum of seven (7) calendar days prior to the preconstruction meeting. The Engineer and Contractor may review the schedule at the preconstruction meeting. Any requested information and a revised schedule shall be submitted within seven (7) calendar days after receiving the Engineer's request. The Engineer shall be allowed twenty-one (21) calendar days to review the schedule and provide a response. The Engineer will review the schedule by assessing the schedule's compliance with these provisions and conformance with the Contract requirements. By accepting the schedule, the Engineer does not modify the Contract in any way. The Baseline Schedule shall be accepted before any field work begins. The accepted schedule will be used as the Baseline Schedule for the remainder of the project.
- The schedule shall define and sequence activities so as to accurately describe the project and to meet Contract requirements for scope of work, phasing, accommodations for traffic, and interim, and project completion dates. Create the schedule, beginning with the date of the Notice to Proceed.
- xx. SCHEDULE UPDATES. The schedule shall be updated during active construction at the end of every other bi-weekly estimate period (update period) and when directed by the Engineer. Projects with short duration road closures are of particular importance as the project float will be limited. The Contractor shall promptly inform the Engineer of any schedule delays or changes that occur during these periods. The Engineer shall be allowed ten (10) calendar days to review the update for compliance with these provisions and provide a response. Include the following with each update:

- (1) Actual start dates of each activity started;
 - (2) Actual finish dates of each activity finished, or remaining durations of activities started but not yet completed;
 - (3) Narrative report describing progress during the update period, shifts in the critical activities from the previous update, sources of delay, potential problem areas, work planned for the next update period, and changes made to the schedule. Changes include additions, deletions, or revisions to activities due to the issuance of a Contract revision, changes to an activity duration, changes to relationships between activities, or changes to the planned sequence of work or the method and manner of its performance.
 - (4) The Original schedule shall be shown as a Baseline
- xx. REVISIONS. Schedule revisions shall be submitted within ten (10) calendar days after any of the following:
- (1) A written request to revise the schedule from the Engineer;
 - (2) A delay (actual or projected) to scheduled milestones or project completion dates;
 - (3) When actual progress falls behind the most recent schedule accepted by the Engineer, either by falling more than two (2) weeks behind schedule or by 5% of the total Contract time, the Contractor shall immediately inform the Engineer in writing. The Engineer may require the Contractor to submit a revised schedule. Neither the Engineer's acceptance of such revised schedule nor any Agency feedback regarding the revised schedule shall be construed as an approval of the revised schedule, nor should it be construed as the Agency's dictation of the Contractor's means and methods;
 - (4) Issuance of a Change Order/Supplemental Agreement(s) that by adding, deleting, or revising activities, changes the planned sequence of work or the method and manner of its performance;
 - (5) Issuance of a Change Order/Supplemental Agreement(s) that adds time to the Contract;
 - (6) The Contractor shall participate in progress meetings at the request of the Engineer to review and discuss the updated schedule information including any activity delay, coordination requirements, change orders, potential delays, and other relevant issues.

The Engineer shall review the revised schedule for compliance with these provisions, and provide a response within ten (10) calendar days.

- xx. FLOAT. Any float in the schedule is to be credited to the project only.

- xx. FAILURE TO SUBMIT SCHEDULE. Failure to submit a schedule (i.e. original baseline schedule, required updates, revisions, and when requested by the Engineer) in accordance with these provisions may be grounds for suspension of partial payments, as identified in Subsection 109.08, until a satisfactory schedule meeting the requirements of these provisions is received by the Engineer.
- xx. METHOD OF MEASUREMENT. The quantity of Special Provision (CPM Schedule) to be measured for payment will be the number of each CPM Schedule (i.e. original baseline schedule, required updates, revisions, and when requested by the Engineer), accepted by the Engineer through the duration of the Contract.
- xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (CPM Schedule) will be paid for at the Contract unit price for each. Payment will be full compensation for preparing and submitting a schedule as specified, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

| <u>Pay Item</u> | <u>Pay Unit</u> |
|--|-----------------|
| 900.620 Special Provision (CPM Schedule) | Each |

INCENTIVE/DISINCENTIVE (I/D)

67. INCENTIVE/DISINCENTIVE (I/D), is hereby made a new Section of the Specifications as follows:

The payment of monies for performance under the Incentive/Disincentive (I/D) specifications contained in these Special Provisions shall be as follows:

1. For the incentive payment as described in part (c) of Special Provision No. 10, the Contractor will be paid in the next bi-weekly estimate in which the Contractor has satisfactorily met the requirements of I/D.
2. For the disincentive penalties as described in part (c) of Special Provision No. 10, the Engineer will deduct the amount due the Agency from the monies due the Contractor on the next bi-weekly estimate.

Payment will be made under:

| <u>Pay Item</u> | <u>Pay Unit</u> |
|--|-----------------|
| 900.650 Special Provision (N.A.B.I.) (Incentive/Disincentive) | Lump Unit |

BITUMINOUS CONCRETE PAVEMENT, SMALL QUANTITY

68. DESCRIPTION. This work shall consist of constructing one or more courses of bituminous mixture on a prepared foundation in accordance with these specifications and the specific requirements of the type of surface being placed, and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the Plans or established by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and the appropriate provisions of Section 406 or Section 490 of the Standard Specifications.

69. APPLICABILITY. This specification applies to Contracts where the total quantity of bituminous concrete pavement to be paid for under this item is less than or equal to 2000 metric tons (tons) or the total roadway length, including approaches, is 0.80 kilometers (0.50 miles) or less.

70. MATERIALS. Materials shall meet the requirements of the following Subsections:

- Performance-Graded Asphalt Binder.....702.02
- Emulsified Asphalt, RS-1.....702.04
- Aggregate for Marshall Bituminous Concrete Pavement...704.10(a)
- Aggregate for Superpave Bituminous Concrete Pavement..704.10(b)

Aggregate shall meet requirements relating to Section 490 or 406, where so specified.

The grade of PG asphalt binder used to produce bituminous concrete pavement shall be 58-28. Substitutions will be accepted based on availability where the upper end temperature value is greater than 58°C (136°F) and/or the lower end is less than -28°C (-18°F).

71. DESIGN MIX TYPES. Design mix types may be substituted based on mix availability. Allowable mix type substitutions will be accepted on a one to one thickness relationship, except as listed in Tables A and B below.

TABLE A - ALLOWABLE 40 MM (1½") MIX TYPE IVS SUBSTITUTIONS⁽¹⁾

| Design ESALs (millions) | Design | Allowable Substitution | |
|-------------------------|---|--------------------------------------|--|
| | 490.30 Superpave Bituminous Concrete Pavement | 406.25 Bituminous Concrete Pavement* | 406.27 Med. Duty Bituminous Concrete Pavement* |
| < 0.3 | TYPE IVS | TYPE III | TYPE III |
| 0.3 to < 10 | TYPE IVS | TYPE III | - |
| > 10 | TYPE IVS | - | - |

⁽¹⁾These table substitutions do not apply to bridge deck paving.

*Per Section 406.

TABLE B - ALLOWABLE 90 MM (3½") MIX TYPE IIS SUBSTITUTIONS

| Design ESALs (millions) | Design | Allowable Substitution | |
|-------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| | 490.30 Superpave Bituminous Concrete | 406.25 Bituminous Concrete Pavement* | 406.27 Med. Duty Bituminous Concrete |
| | | | |

| | | | |
|-------------|----------|--------|-----------|
| | Pavement | | Pavement* |
| < 0.3 | TYPE IIS | TYPE I | TYPE I |
| 0.3 to < 10 | TYPE IIS | TYPE I | - |
| > 10 | TYPE IIS | - | - |

*Per Section 406

72. COMPOSITION OF MIXTURE.

- (a) Gradation. Gradation shall meet the requirements of Section 406 or 490, as appropriate.
- (b) Design Criteria. Design Criteria shall meet the requirements of Section 406 or 490, as appropriate.
- (c) Mix Design. Standard mix design will be in accordance with Subsection 490.03 with an n value of 65 gyrations. Allowable substitutions based on pre-existing approved mix designs and/or n values for intended Contract suppliers are listed in Table C below. A request for substitutions must be submitted in writing to the Engineer a minimum of 10 working days prior to production. Any substitutions from the standard mix design or mix types as detailed in the Plans shall not result in any increase in cost to the Agency.

TABLE C - ALLOWABLE SPECIFICATION SUBSTITUTIONS

| Design ESALs (millions) | Acceptable Specification Substitution | | |
|----------------------------|--|--|---|
| | Superpave Bituminous Concrete Pavement (Gyrations) | Bituminous Concrete Pavement* (75 Blow) | Med. Duty Bituminous Concrete Pavement* (50 Blow) |
| < 0.3 | 50 | ✓ | ✓ |
| 0.3 to < 10 | 65 ⁽¹⁾ | ✓ | - |
| 10 to < 30 | 80 | - | - |
| > 30 | 125 | - | - |

⁽¹⁾Standard mix design specification.

*Per Section 406

- (d) Control of Mixtures.

The plant shall be operated so that no intentional deviations are made from the job-mix formula. The gradation of the actual mixture shall not vary from the job-mix formula by more than the following tolerances:

TABLE D - PRODUCTION TESTING TOLERANCES AND SPECIFICATION LIMITS

| PRODUCTION TESTING TOLERANCES | | | SPECIFICATION LIMITS |
|---|---|--|--|
| Aggregate larger than 2.36 mm (No. 8) sieve | ± | 6.0 % | 9.0 % |
| Aggregate passing the 2.36 mm (No. 8) sieve and larger than the 75 µm (No. 200) sieve | ± | 4.0 % | 6.0 % |
| Aggregate passing 75 µm (No. 200) sieve | ± | 1.0 % | 1.5 % |
| Temperature of Mixture ⁽³⁾ | ± | 11°C (20°F) | 15°C (30°F) |
| Air Voids | = | 4.0 ± 1.0% | 4.0 ± 1.5% |
| VMA | = | JMF ⁽¹⁾ ± 1.0% | JMF ⁽¹⁾ ± 1.5% |
| VFA ⁽⁴⁾ | = | JMF ⁽¹⁾ ± 5.0% ⁽²⁾ | JMF ⁽¹⁾ ± 7.0% ⁽²⁾ |

- (1) JMF stands for the most current Job-Mix Formula value as approved by the Engineer or the Engineer's designee.
- (2) The VFA value shall not be allowed to exceed 80.0% at any time.
- (3) Mix temperatures shall not exceed 180°C (355°F).
- (4) The VFA requirements only apply to Superpave Bituminous Concrete Pavement.

(e) Quality Acceptance.

- (1) General. Acceptance sampling and testing will be conducted in accordance with the Agency's Quality Assurance Program as approved by FHWA. Bituminous concrete mixtures designated under these specifications will be sampled a minimum of once per day of production or 500 metric tons (tons) and evaluated by the Agency for each mix type (each mix design) in accordance with the following acceptance guidelines.
- (2) Acceptance Guidelines. Temperature of the bituminous mixture shall be tested using the Verified Thermometer test method and PG Asphalt Binder content determined from the batch slip. Gradation shall be tested in accordance with AASHTO T 30. Mixture volumetric properties (air voids, VMA, and VFA) shall be calculated in accordance with Subsections 406.03(b) or 490.03(b), as appropriate.
- (3) Non-Compliant Material.
- a. Rejection by Contractor. The Contractor may, prior to sampling, elect to remove any defective material and replace it with new material at no expense to the Agency. Any such new material will be sampled, tested, and evaluated for acceptance.

- b. For any non-compliant material outside the production testing tolerances but within the specification limits as identified in Table D, payment shall be assessed a mixture pay factor, PF(mix), of (-0.10).
 - c. For any non-compliant material outside the specification limits as identified in Table D, payment shall be assessed a mixture pay factor, PF(mix), of (-0.50), or can be removed and replaced at no cost to the Agency.
- (f) Boxed Samples. If Agency plant inspectors are not available for daily testing and inspection functions, then box samples will be taken by the Engineer at the project site to afford verification of mixture volumetrics/properties. Boxed samples will be processed and results reported to the Engineer within ten working days of being received at the Agency Central Laboratory in Berlin, Vermont. Gradation shall be tested in accordance with AASHTO T 30. Maximum Specific Gravity shall be tested in accordance with AASHTO T 209.
81. COMPACTION. Special Provision (Bituminous Concrete Pavement, Small Quantity) will be analyzed for density according to the procedure specified below.

The density of the compacted pavement shall be at least 92.0%, but not more than 97.0%, of the corresponding daily average maximum specific gravity for each mix type (each mix design) of bituminous mix placed during each day. For material that falls outside of this range, payment will be made by adjusting the daily production totals in accordance with Table E:

TABLE E - DENSITY PAY FACTORS

| AVERAGE DENSITY | DENSITY PAY FACTOR, PF(d) |
|-----------------|---------------------------|
| 90.5% - 91.9% | - 0.100 |
| 92.0% - 97.0% | 0.000 |
| 97.1% - 98.5% | - 0.100 |

When the Contract allows for a pay adjustment for mat density and the Agency elects to not take cores of any pavement course, the Density Pay Factor (PF(d)) will be considered equal to 0.000.

Bridges with a length equal to or greater than 6 meters (20 feet) will be cored for analyzing density of the bridge deck pavement. The minimum number of cores taken shall be 2, or as directed by the Engineer. Bridges with a length less than 6 meters (20 feet) will not be cored.

Bridge deck core areas shall be repaired to the satisfaction of the Engineer at no additional cost to the Agency.

The cores taken for acceptance testing will be the final cores taken for determination of densities.

When the Contract does not allow for a pay adjustment for mat density the Contractor shall, prior to performing any construction operations,

submit to the Engineer for approval the proposed rolling pattern and compaction equipment to be used on the project. Random investigative cores will be taken by Agency personnel on the first day's production of any pavement course, with the exception of leveling course, to verify effectiveness of the proposed rolling pattern and equipment.

Pending results of the investigative cores, necessary adjustments to the proposed rolling pattern and/or equipment shall be made by the Contractor to achieve densities as directed by the Engineer.

82. METHOD OF MEASUREMENT. The quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) to be measured for payment will be the number of metric tons (tons) for a lot of mixture (each type) complete in place in the accepted work (Q) as determined from the weigh tickets.

The quantities of all applicable Pay Adjustments calculated for the project will be determined as specified below.

When applicable, and when the mixture pay factor, PF(mix), for a lot of Special Provision (Bituminous Concrete Pavement, Small Quantity) is less than 0.000, the measured quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) placed will be multiplied by such pay factor to determine a Mixture Pay Adjustment, (PA(mix)), to the accepted tonnage placed (Q) for that lot based on the Contract bid price (B), as follows:

$$PA(mix) = PF(mix) \times Q \times B$$

When boxed samples are taken to determine mix properties, test results will determine PF(mix) as outlined in COMPOSITION OF MIXTURE, Quality Acceptance, Non-Compliant Material of this Section.

When applicable, and when the density pay factor, PF(d), for a lot of Special Provision (Bituminous Concrete Pavement, Small Quantity) is less than 0.000, the measured quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) placed that day will be multiplied by such pay factor to determine a Mat Density Pay Adjustment, (PA(d)), to the accepted tonnage placed (Q) for that lot based on the Contract bid price (B), as follows:

$$PA(d) = PF(d) \times Q \times B$$

83. BASIS OF PAYMENT. The measured quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) will be paid for at the Contract unit price per metric ton (ton). Payment shall be full compensation for furnishing, mixing, hauling, and placing the material specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment for Pay Adjustments shall be debited against the Contract prices (Lump Units) bid for the Pay Adjustment items.

The cost of repairing bridge deck core areas will not be paid for separately, but will be considered incidental to Special Provision (Bituminous Concrete Pavement, Small Quantity).

The costs of furnishing testing facilities and supplies at the plant will be considered included in the Contract unit price of Special Provision (Bituminous Concrete Pavement, Small Quantity).

The costs of obtaining, furnishing, transporting, and providing the straightedges required by Subsection 406.16 or Subsection 490.16, as appropriate, will be paid for under the appropriate Section 631 pay item included in the Contract.

The costs associated with obtaining samples for acceptance testing will be incidental to the cost of Special Provision (Bituminous Concrete Pavement, Small Quantity).

When not specified as items in the Contract, the costs of cleaning and filling joints and cracks, sweeping and cleaning existing paved surfaces, the emulsified asphalt applied to tack these surfaces, and tacking of manholes, curbing, gutters, and other contact surfaces will not be paid for directly, but will be incidental to Special Provision (Bituminous Concrete Pavement, Small Quantity).

Special Provision (Bituminous Concrete Pavement, Small Quantity) mixture approved by the Engineer for use in correcting deficiencies in the base course constructed as part of the Contract will not be paid for as Special Provision (Bituminous Concrete Pavement, Small Quantity), but will be incidental to the Contract item for the specified type of base course.

Special Provision (Bituminous Concrete Pavement, Small Quantity) mixture used to correct deficiencies in an existing pavement or to adjust the grade of a bituminous concrete surface completed under the Contract will be paid for at the Contract unit price for Special Provision (Bituminous Concrete Pavement, Small Quantity).

Payment will be made under:

| <u>Pay Item</u> | <u>Pay Unit</u> |
|--|------------------|
| 900.650 Special Provision (Mat Density Pay Adjustment, Small Quantity)(N.A.B.I.) | Lump Unit |
| 900.650 Special Provision (Mixture Pay Adjustment) (N.A.B.I.) | Lump Unit |
| 900.680 Special Provision (Bituminous Concrete Pavement, Small Quantity) | Metric Ton (Ton) |

PRE-EXCAVATION OF INTEGRAL ABUTMENT PILES

84. DESCRIPTION. This work shall consist of loosening or removing the foundation materials that may be encountered in designated areas to permit the placing of piles.
85. MATERIALS. Materials shall meet the requirements of the following Subsections:
- (a) Sand. Sand shall meet the requirements of Subsection 703.03.
86. CONSTRUCTION REQUIREMENTS. The pre-excavation of integral abutment piles shall consist of augering, pre-boring, or some other means of excavation to produce an excavation to the depth and diameter specified in the Contract Documents. The excavation shall be maintained to allow for backfilling with sand in accordance with the Contract Documents. Temporary casing is considered an acceptable option.

Following installation of the piles, and in accordance with the Plans, the entire pre-excavation shall be filled with sand. Casing used to

facilitate installation of the pile and backfill material shall not be left in place.

87. METHOD OF MEASUREMENT. The quantities of Special Provision (Pre-excavation of Integral Abutment Piles, Earth) and Special Provision (Pre-excavation of Integral Abutment Piles, Rock) to be measured for payment will be the total number of meters (linear feet) of excavation to the depth specified in the Contract Documents or as ordered by the Engineer, measured to the nearest meter (linear foot) as shown on the plans.

88. BASIS OF PAYMENT. The accepted quantities of Special Provision (Pre-excavation of Integral Abutment Piles, Earth) and Special Provision (Pre-excavation of Integral Abutment Piles, Rock) will be paid for at the Contract unit price per meter (linear foot). Payment will be full compensation for all excavation including any required rock removal as well as furnishing, transporting, storing, and installing the materials specified, including the sand.

Payment will be made under:

| <u>Pay Item</u> | <u>Pay Unit</u> |
|--|-----------------|
| 900.640 Special Provision (Pre-excavation of Integral Abutment Piles, Earth) | Linear Foot |
| 900.640 Special Provision (Pre-excavation of Integral Abutment Piles, Rock) | Linear Foot |

TRAFFIC CONTROL, ALL INCLUSIVE

89. DESCRIPTION. This work shall consist of establishing and maintaining traffic control measures to protect the traveling public and construction operations as indicated in the Plans and as directed by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 641 of the Standard Specifications.

90. SUBMITTALS. The Contractor shall submit to the Project Manager for approval a site-specific traffic control plan in accordance with Subsection 105.03. The traffic control plan shall conform to the requirements of the MUTCD and all applicable Agency Standard Drawings. Where conflicts exist, the MUTCD will govern. Each phase of construction shall be included in the submitted traffic control plan. The Contractor shall allow the Agency 14 calendar days to review and respond to the proposed traffic control plan.

91. TRAFFIC CONTROL DEVICES. Temporary traffic barrier shall meet the requirements of Section 621. Traffic control devices shall meet the requirements of Section 641. Temporary pavement markings and removal of existing pavement markings shall meet the requirements of Section 646. Temporary traffic signal systems shall meet the requirements of Section 678.

92. METHOD OF MEASUREMENT. The quantity of Special Provision (Traffic Control, All-Inclusive) to be measured for payment will be on a lump sum basis for providing traffic control in the complete and accepted work.

The quantities for Flaggers will be measured separately in accordance with Section 630.

93. BASIS OF PAYMENT. The accepted quantity of Special Provision Traffic Control, All-Inclusive) will be paid for at the Contract lump sum price.

Partial payments will be made as follows:

- (a) The first 15% of the Contract lump sum price will be paid upon approval of the Contractor's traffic control plan.
- (b) The remaining 85% of the Contract lump sum price will be paid on a prorated basis for the estimated duration of the Contract work remaining.

Payment will be full compensation for preparing, implementing, inspecting, maintaining, and removing the applicable traffic control plan and required traffic control devices, including but not limited to temporary traffic barrier, temporary pavement markings, signing and message boards, and temporary traffic signal systems; and for furnishing all labor, tools, materials, equipment, and incidentals necessary to complete the work.

Flaggers will be paid for separately under Contract item 630.15.

Payment will be made under:

| <u>Pay Item</u> | <u>Pay Unit</u> |
|---|-----------------|
| 900.645 Special Provision (Traffic Control, All-Inclusive) | Lump Sum |