



Florida Department of Transportation

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ANANTH PRASAD, P.E.
SECRETARY

February 15, 2012

Monica Gourdine
Program Operations Engineer
Federal Highway Administration
545 John Knox Road, Suite 200
Tallahassee, Florida 32303

Re: Office of Design, Specifications
Section 344LAP
Proposed Specification: 344LAP Concrete for LAP (Off-System)

Dear Ms. Gourdine:

We are submitting, for your approval, two copies of the above referenced Local Agency Program specifications ("Big 4").

These changes were proposed by Susan Blazo in the State Materials Office to define acceptance testing as performed by the Local Agency.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via Email to SP965RP or rudy.powell@dot.state.fl.us.

If you have any questions relating to this specification change, please call Rudy Powell, State Specifications Engineer at 414-4280.

Sincerely,

Signature on File

Rudy Powell, Jr., P.E.
State Specifications Engineer

RP/ft

Attachment

cc: Calvin Johnson, Chief Civil Litigation
Florida Transportation Builders' Assoc.
State Construction Engineer

CONCRETE FOR LAP (OFF-SYSTEM).
(REV ~~45-527-1112-20-11~~) (~~FA 4-15-11~~)

SECTION 344
CONCRETE FOR LAP (OFF-SYSTEM)

344-1 Description.

344-1 General: Construct ~~C~~concrete based on the type of work as described in the Contract and the ~~Concrete-concrete Work-work Categories-categories~~ as defined below.

344-1.2 Work Categories: Construction will fall into one of the following ~~Concrete-concrete Work-work Categories-categories~~:

344-1.2.1 Concrete Work Category 1: Includes the construction of sidewalks, curb and gutter, ditch and slope pavement, or other non-reinforced cast-in-place ~~or precast~~ elements.

344-1.2.2 Concrete Work Category 2: Includes the construction of precast concrete including concrete barriers, traffic railing barriers, parapets, sound barriers, inlets, manholes, junction boxes, pipe culverts, storm sewers, box culverts, prestressed concrete poles, concrete bases for light poles, highway sign foundations, retaining wall systems, traffic separators or other structural precast elements.

344-1.2.3 Concrete Work Category 3: Includes the work associated with the placement and/or construction of structural cast-in-place concrete ~~meeting the requirements of this section. requiring a class of concrete specified in FDOT Section 346.~~

344-2 Materials.

344-2.1 General: Use concrete composed of a mixture of Portland cement, aggregates, and water, with or without chemical or mineral admixtures that meet the following requirements:

344-2.1.1 Portland Cement: ~~Portland cements meeting the requirements of AASHTO M-85 or ASTM C-150 is required. Cement shall conform to the requirements of the AASHTO or ASTM designations.~~ Different brands of cement, cement of the same brand from different facilities or different types of cement shall be stored separately and shall not be mixed. ~~Portland cements meeting the requirements of AASHTO M-85 or ASTM C-150 are allowed.~~

344-2.1.2 Coarse and Fine Aggregates: Aggregates shall meet ~~ASTM C 33. current FDOT requirements except that source~~ *Source* approval by the FDOT is not required. ~~ASTM C 33?~~

344-2.1.3 Water: Water shall meet ~~the current FDOT~~ requirements of *ASTM C 1602*.

344-2.1.4 Chemical Admixtures: Chemical admixtures shall ~~meet current FDOT requirements~~ *be listed on the FDOT Qualified Products List*. Admixtures may be added at the dosage rates recommended by the manufacturer.

344-2.1.5 Pozzolans and Slag: Pozzolans and Slag shall meet the ~~current FDOT~~ requirements of *Table 344-1. Fly ash shall not include the residue resulting from the burning of municipal garbage or any other refuse with coal, or the burning of industrial or municipal garbage in incinerators.*

<i>Table 344-1</i>		
<i>Type or Class</i>	<i>Test Method</i>	<i>Exceptions</i>
<i>Class C Fly Ash</i>	<i>ASTM C 618</i>	<i>Not to be used with Types IP or IS cements.</i>
<i>Class F Fly Ash</i>	<i>ASTM C 618</i>	<i>Not to be used with Types IP or IS cements.</i>
<i>Petroleum Coke Class F</i>	<i>ASTM C 618</i>	<i>Not to be used with Types IP or IS cements.</i>
<i>Bark Ash Class F</i>	<i>ASTM C 618</i>	<i>Not to be used with Types IP or IS cements.</i>
<i>Silica Fume</i>	<i>ASTM C 1240</i>	
<i>Metakaolin</i>	<i>ASTM C 618</i>	
<i>Slag</i>	<i>ASTM C 989</i>	<i>Use only ground granulated blast-furnace slag grade 100 or 120.</i>
<i>Ultra Fine Fly Ash</i>	<i>ASTM C 618</i>	<i>Not to be used with Types IP or IS cements.</i>

344-2.2 Material Storage: Use a concrete production facility that meets the following requirements.

~~344-2.2.1 Cementitious Materials Storage:~~ Provide a separate and clearly labeled weatherproof facility to store each brand or type of cementitious material without mixing or contamination. Provide a suitable, safe and convenient means of collecting cementitious material samples at each storage facility.

~~344-2.2.2 Aggregate Storage:~~ Provide suitable bins, stockpiles or silos to store and identify aggregates without mixing, segregating or contaminating different grades or types of materials. Identify aggregate type/gradation. Handle the aggregates in a manner to minimize segregation and meet the specification requirements when recovered from storage. Continuously and uniformly sprinkle coarse aggregate with water, for 24 hours preceding introduction into the concrete mix. Timers may be used to facilitate the sprinkling of aggregate stockpiles using an alternating on/off method. However, in no event shall the top surface of the stockpile be permitted to become dry prior to batching of concrete. Moisture probes may be used to determine the moisture content of the aggregate. Ensure that the accuracy of the probe is certified annually and verified weekly. Maintain stored aggregates in a well-drained condition to minimize free water content. Provide access for the Engineer to sample the aggregates from the recovery side of the storage facility.

344-3 Production, Mixing and Delivery of Concrete.

~~344-3.1 Concrete Production Requirements:~~ *The Engineer may disqualify any production facility for non-compliance with specification requirements.* Use concrete production facilities certified by the National Ready Mixed Concrete Association (NRMCA), approved by the FDOT.

~~Produce concrete utilizing equipment that is in good operating condition and operated in a manner to ensure a consistent product. When moisture probes are not used, ensure that the concrete production facility determines the free moisture for the coarse and fine aggregates within two hours prior to each day's batching. On concrete placements expected to exceed three hours, perform an additional moisture test approximately half way through the batching operations and adjust batch proportions accordingly.~~

Ensure that the calibration of the measuring devices of the concrete production facilities meets the requirements of Chapter 531 of the Florida Statutes, and are in accordance with Chapter 9.2 of the FDOT Materials Manual. At least quarterly, ensure that all scales, meters and other weighing or measuring devices are checked for accuracy by a qualified representative of a scale company registered with the Bureau of Weights and Measures of the Florida Department of Agriculture. As an alternative, the producer may have this frequency identified in an FDOT approved QC plan. The accuracy of admixture measuring dispensers will be certified annually by the admixture supplier.

When Volumetric Mixers are used for Category I applications, deliver concrete in accordance with the requirements of Volumetric Mixer Manufacturers Bureau (VMMB) and ensure that the vehicle has a VMMB registered rating plate.

344-3.1.1 Category 1: Use a concrete production facility that is certified by the National Ready Mixed Concrete Association (NRMCA) or listed on the FDOT list of approved by the Florida Department of Transportation non-structural concrete producerse.- Concrete production facilities listed on the FDOT Producers with Accepted QC Programs list for structural concrete may also be used for Category 1.

344-3.1.2 Category 2: Use a prestressed and or precast facility listed on the FDOT Producers with Accepted QC Programs for precast or prestressed concrete.

344-3.1.3 Category 3:- Use a structural concrete facility listed on the FDOT Producers with Accepted QC Programs for structural concrete-.

344-3.2 Classes of Concrete: Meet the requirements of Table 344-2. Classes of concrete to be used on the project will be defined in the Contract Documents.

Table 344-2						
Class	Minimum Strength (28 day) (psi)	Target Slump (inches)	Target Range (inches)	Air Content Range (%)	Minimum Total Cementitious Materials Content (lb/yd ³)	Maximum Water to Cementitious Material Ratio (lb/lb)
<i>Category 1</i>						
<i>Class NS</i>	<i>2,500</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>
<i>Category 3</i>						
<i>I</i>	<i>3,000</i>	<i>3</i>	<i>± 1.5</i>	<i>1.0 to 6.0</i>	<i>470</i>	<i>0.53</i>
<i>I (Pavement)</i>	<i>3,000</i>	<i>2</i>	<i>± 1.5</i>	<i>1.0 to 6.0</i>	<i>470</i>	<i>0.50</i>
<i>II</i>	<i>3,400</i>	<i>3</i>	<i>± 1.5</i>	<i>1.0 to 6.0</i>	<i>470</i>	<i>0.53</i>
<i>II (Bridge Deck)</i>	<i>4,500</i>	<i>3</i>	<i>± 1.5</i>	<i>1.0 to 6.0</i>	<i>611</i>	<i>0.44</i>
<i>III</i>	<i>5,000</i>	<i>3</i>	<i>± 1.5</i>	<i>1.0 to 6.0</i>	<i>611</i>	<i>0.44</i>
<i>III (Seal)</i>	<i>3,000</i>	<i>8</i>	<i>± 1.5</i>	<i>1.0 to 6.0</i>	<i>611</i>	<i>0.53</i>
<i>IV</i>	<i>5,500</i>	<i>3</i>	<i>± 1.5</i>	<i>1.0 to 6.0</i>	<i>658</i>	<i>0.41</i>
<i>IV (Drilled Shaft)</i>	<i>4,000</i>	<i>8.5</i>	<i>± 1.5</i>	<i>0.0 to 6.0</i>	<i>658</i>	<i>0.41</i>
<i>V (Special)</i>	<i>6,000</i>	<i>3</i>	<i>± 1.5</i>	<i>1.0 to 6.0</i>	<i>752</i>	<i>0.37</i>
<i>V</i>	<i>6,500</i>	<i>3</i>	<i>± 1.5</i>	<i>1.0 to 6.0</i>	<i>752</i>	<i>0.37</i>
<i>VI</i>	<i>8,500</i>	<i>3</i>	<i>± 1.5</i>	<i>1.0 to 6.0</i>	<i>752</i>	<i>0.37</i>

344-3.3 Contractors Quality Control: *For Categories 1 and 2, assume full responsibility for controlling all operations and processes such that the requirements of these Specifications are met at all times. For category 1, inspect the element after placement. For category 2, inspect the precast element before placement.*

For eCategory 3, The Contractor will supply furnish a Quality Control (QC) plan to identify-identify to the Agency-Engineer how quality will be ensured at the project site. During random inspections, the Agency-Engineer will use this document to verify that the construction of the project is in agreement with his-the QC plan.

344-3.4 Concrete Mix Design: Before producing any eCategory 1 or eCategory 2-concrete, submit the proposed mix designs to the Engineer on a form provided by the Agency-Engineer. *Otherwise For eCategory 3, the agency will accept-submit to the Engineer for approval, mix designs previously described in an-FDOT approved QC plan-mix designs. In any event, Do not use only concrete mix designs having-without prior approval of the Engineer.*

Materials may be adjusted provided that the theoretical yield requirement of the approved mix design is met. Show all required original approved design mix data and batch adjustments ~~and substituted material~~ on an Agency-Engineer approved concrete delivery ticket. ~~The Engineer may disqualify any concrete production facility for non-compliance with specification requirements.~~

344-3.5 Delivery: For ~~cast in-place applications~~ Category 3, the maximum allowable ~~mixing and agitation~~transit time of concrete is ~~90-90~~ minutes.

Furnish a delivery ticket on a form approved by the Agency-Engineer with each batch of concrete before unloading at the placement site. ~~The delivery ticket shall be printed.~~ Record material quantities incorporated into the mix on the delivery ticket. Ensure that the Batcher responsible for producing the concrete *signs the delivery ticket certifies-certifying* that the batch was produced *and delivered* in accordance with these ~~Specifications-requirements~~ and ~~signs the delivery ticket~~. ~~The Contractor shall s~~Sign the delivery ticket certifying that the concrete was ~~batched, delivered and~~ placed in accordance with these ~~Specifications~~requirements.

~~———— The Contractor shall be responsible for rejecting loads of concrete that do not meet the plastic properties of the approve mix design or the minimum compressive strength requirements.~~

~~———— At the sole option of the Agency, the Engineer may accept concrete at a reduced pay when it is determined that the concrete will serve its intended function.~~

~~————~~ **344-3.6 Placing Concrete:**

344-3.6.1 Concreting in Cold Weather: Do not *mix or* place concrete when the *air* temperature ~~of the concrete~~ at placement is below 45°F.

~~Meet the air temperature requirements for mixing and placing concrete in cold weather as specified in Section 346.~~ During the curing period, if NOAA predicts the ambient temperature to fall below 35°F for 12 hours or more or to fall below 30°F for more than 4 hours, enclose the structure in such a way that the ~~concrete and~~air *temperature* within the enclosure can be kept above ~~60~~50°F for a period of 3 days after placing the concrete or until the concrete reaches a minimum compressive strength of 1,500 psi.

Assume all risks connected with the placing and curing of concrete. Although the Engineer may give permission to place concrete, the Contractor is

responsible for satisfactory results. If the placed concrete is determined to be unsatisfactory, remove, dispose of, and replace the concrete at no expense to the Agency.

344-3.6.2 Concreting in Hot Weather: *For eCategory 3, hot weather concreting is defined as the production, placing and curing of concrete when the concrete temperature at placing exceeds 86°F but is less than 100°F.*

Unless the specified hot weather concreting measures are in effect, reject concrete exceeding 86°F at the time of placement. Regardless of special measures taken, reject concrete exceeding 100°F. Predict the concrete temperatures at placement time and implement hot weather measures to avoid production shutdown. Meet the temperature requirements and special measures for mixing and placing concrete in hot weather as specified in Section 346.

~~When the temperature of the concrete as placed exceeds 75°F, incorporate in the concrete mix a water reducing retarder or water reducer if allowed by Section 346.~~

~~Spray reinforcing steel and metal forms with cool fresh water just prior to placing the concrete in a method approved by the Engineer.~~

~~Assume all risks connected with the placing and curing of concrete. Although the Engineer may give permission to place concrete, the Contractor is responsible for satisfactory results. If the placed concrete is determined to be unsatisfactory, remove, dispose of, and replace the concrete at no expense to the Agency.~~

344-3.7 Mixers: ~~Ensure that mixers are capable of combining the components of concrete into thoroughly mixed and uniform mass, free from balls or lumps of cementitious materials, and capable of discharging the concrete uniformly. Operate concrete mixers at speeds per the manufacturer's design. Do not exceed the manufacturer's rated capacity for the volume of mixed concrete in the mixer, mixing drum, or container.~~ *For eCategory 3 concrete, do not place concrete from a truck mixer that does not have a current FDOT mixer identification card.*

344-3.8 Small Quantities of Concrete: With approval of the Engineer, small quantities of concrete, less than 3 *cubic yards* yd^3 -placed in one day and less than 0.5 *cubic yards* yd^3 -placed in a single placement may be accepted using a pre-bagged mixture. The *Agency-Engineer* may verify that the pre-bagged mixture is prepared in accordance with the manufacturer's recommendations and will meet the requirements of this Specification.

344-3.9 Sampling and Testing:

344-3.9.1 Category 1: The Engineer may sample and test the concrete ~~at his discretion~~ to verify its quality. The minimum ~~28-28~~ day compressive strength requirement for this concrete is 2,500 psi.

344-3.9.2: Category 2: ~~Provide a statement of certification from the manufacturer of the precast element that the element meets the quality control and inspection testing requirements of the Contract Documents.~~ *No sampling and testing is required for category 2.*

344-3.9.3 Category 3: The *Agency-Engineer* will randomly select a sample from each ~~200-200~~ *yd³-cubic yards* or one day's production to determine plastic properties and to make three 4 x 8 inch cylinders for testing by the *Agency-Engineer* at ~~28-28~~ days to ensure that the design compressive strength has been met *for the class of concrete as*

~~specified in Table 344-2. The Agency Engineer may, at its discretion, test additional concrete samples to ensure compliance with the specifications.~~

344-3.10 Records: ~~Maintain~~ *Ensure* the following records *are available* for review for at least 3 years after final acceptance of the project:

1. Approved concrete mix designs.
2. Materials source (delivery tickets, certifications, certified mill test reports).
3. A copy of the scale company or testing agency report showing the observed deviations from quantities checked during calibration of the scales and meters.
4. A copy of the documentation certifying the admixture weighing/measuring devices.

~~5. For non structural concrete, the Agency will accept recent NRMCA, VMMB or FDOT inspection records certifying the plant or truck can produce concrete. In addition, documentation will be available at the plant or in the truck showing that action has been taken to correct deficiencies noted during the inspections.~~

344-4 Acceptance of the Work.

344-4.1 Category 1 Work: Category 1 work will be accepted based ~~upon compliance with Production, Mixing and Delivery Requirements specified in 334-3~~ *Certification by the Batcher and Contractor on the Delivery Ticket.*

344-4.2 Category 2 Work: *Certify that the* ~~_____ Precast elements will be accepted based upon certification from the Contractor that the elements~~ were produced by a production facility on the FDOT's ~~current approved plant~~ *list of Producers with Accepted QC Programs for precast or prestressed concrete.* In addition, the ~~producers producer's QC logo stamp will shall be displayed stamped~~ on the element. *The producer shall not use the Florida Department of Transportation QC stamp on elements used on off-system this projects. Provide a statement of certification from the manufacturer of the precast element that the element meets the requirements of this Specification.*

344-4.3 Category 3 Work: Category 3 ~~work~~ *concrete will be accepted based on the Engineer's test results for plastic properties and compressive strength requirements for the class of concrete as defined in shall be in full compliance with this Specification, and with current FDOT Specifications, Section 346 Table 344-2 and associated Contractor Quality Control (QC) specifications governing cast-in-place concrete.* In addition, a Delivery Ticket as described in 344-3.5 will be required for acceptance of the material at the project site.

344-4.4 Small Quantities of Concrete:- *Category 3 concrete meeting the definition of 344-3.8 will be accepted in accordance with 344-4.3 based on test results for plastic properties and compressive strength.*

344-5 Method of Measurement.

The quantities to be paid for will be the items shown in the plans, completed and accepted.

344-6 Basis of Payment.

Prices and payments will be full compensation for all work and materials specified in this Section.

CONCRETE FOR LAP (OFF-SYSTEM).
(REV 12-20-11)

SECTION 344
CONCRETE FOR LAP (OFF-SYSTEM)

344-1 Description.

344-1 General: Construct concrete based on the type of work as described in the Contract and the concrete work categories as defined below.

344-1.2 Work Categories: Construction will fall into one of the following concrete work categories:

344-1.2.1 Concrete Work Category 1: Includes the construction of sidewalks, curb and gutter, ditch and slope pavement, or other non-reinforced cast-in-place elements.

344-1.2.2 Concrete Work Category 2: Includes the construction of precast concrete including concrete barriers, traffic railing barriers, parapets, sound barriers, inlets, manholes, junction boxes, pipe culverts, storm sewers, box culverts, prestressed concrete poles, concrete bases for light poles, highway sign foundations, retaining wall systems, traffic separators or other structural precast elements.

344-1.2.3 Concrete Work Category 3: Includes the work associated with the placement and/or construction of structural cast-in-place concrete meeting the requirements of this section.

344-2 Materials.

344-2.1 General: Use concrete composed of a mixture of Portland cement, aggregates, and water, with or without chemical or mineral admixtures that meet the following requirements:

344-2.1.1 Portland Cement: Portland cements meeting the requirements of AASHTO M-85 or ASTM C-150 is required. Different brands of cement, cement of the same brand from different facilities or different types of cement shall be stored separately and shall not be mixed.

344-2.1.2 Coarse and Fine Aggregates: Aggregates shall meet ASTM C 33. Source approval by the FDOT is not required.

344-2.1.3 Water: Water shall meet the requirements of ASTM C 1602.

344-2.1.4 Chemical Admixtures: Chemical admixtures shall be listed on the FDOT Qualified Products List. Admixtures may be added at the dosage rates recommended by the manufacturer.

344-2.1.5 Pozzolans and Slag: Pozzolans and Slag shall meet the requirements of Table 344-1. Fly ash shall not include the residue resulting from the burning of municipal garbage or any other refuse with coal, or the burning of industrial or municipal garbage in incinerators.

Type or Class	Test Method	Exceptions
Class C Fly Ash	ASTM C 618	Not to be used with Types IP or IS cements.
Class F Fly Ash	ASTM C 618	Not to be used with Types IP or IS cements.

Petroleum Coke Class F	ASTM C 618	Not to be used with Types IP or IS cements.
Bark Ash Class F	ASTM C 618	Not to be used with Types IP or IS cements.
Silica Fume	ASTM C 1240	
Metakaolin	ASTM C 618	
Slag	ASTM C 989	Use only ground granulated blast-furnace slag grade 100 or 120.
Ultra Fine Fly Ash	ASTM C 618	Not to be used with Types IP or IS cements.

344-3 Production, Mixing and Delivery of Concrete.

344-3.1 Concrete Production Requirements:

344-3.1.1 Category 1: Use a concrete production facility that is certified by the National Ready Mixed Concrete Association (NRMCA) or listed on the FDOT list of non-structural concrete producers. Concrete production facilities listed on the FDOT Producers with Accepted QC Programs list for structural concrete may also be used for Category 1.

344-3.1.2 Category 2: Use a prestressed and or precast facility listed on the FDOT Producers with Accepted QC Programs for precast or prestressed concrete.

344-3.1.3 Category 3: Use a structural concrete facility listed on the FDOT Producers with Accepted QC Programs for structural concrete.

344-3.2 Classes of Concrete: Meet the requirements of Table 344-2.

Class	Minimum Strength (28 day) (psi)	Target Slump (inches)	Target Range (inches)	Air Content Range (%)	Minimum Total Cementitious Materials Content (lb/yd ³)	Maximum Water to Cementitious Material Ratio (lb/lb)
Category 1						
Class NS	2,500	N/A	N/A	N/A	N/A	N/A
Category 3						
I	3,000	3	± 1.5	1.0 to 6.0	470	0.53
I (Pavement)	3,000	2	± 1.5	1.0 to 6.0	470	0.50
II	3,400	3	± 1.5	1.0 to 6.0	470	0.53
II (Bridge Deck)	4,500	3	± 1.5	1.0 to 6.0	611	0.44
III	5,000	3	± 1.5	1.0 to 6.0	611	0.44
III (Seal)	3,000	8	± 1.5	1.0 to 6.0	611	0.53
IV	5,500	3	± 1.5	1.0 to 6.0	658	0.41
IV (Drilled Shaft)	4,000	8.5	± 1.5	0.0 to 6.0	658	0.41
V (Special)	6,000	3	± 1.5	1.0 to 6.0	752	0.37
V	6,500	3	± 1.5	1.0 to 6.0	752	0.37
VI	8,500	3	± 1.5	1.0 to 6.0	752	0.37

344-3.3 Contractors Quality Control: For Categories 1 and 2, assume full responsibility for controlling all operations and processes such that the requirements of these Specifications are met at all times.

For Category 3, furnish a Quality Control (QC) plan to identify to the Engineer how quality will be ensured at the project site. During random inspections, the Engineer will use this document to verify that the construction of the project is in agreement with the QC plan.

344-3.4 Concrete Mix Design: Before producing any Category 1 or Category 2, submit the proposed mix designs to the Engineer on a form provided by the Engineer. For Category 3, submit to the Engineer for approval, FDOT approved mix designs. Do not use concrete mix designs without prior approval of the Engineer.

Materials may be adjusted provided that the theoretical yield requirement of the approved mix design is met. Show all required original approved design mix data and batch adjustments on an Engineer approved concrete delivery ticket.

344-3.5 Delivery: For Category 3, the maximum allowable transit time of concrete is 90 minutes.

Furnish a delivery ticket on a form approved by the Engineer with each batch of concrete before unloading at the placement site. Record material quantities incorporated into the mix on the delivery ticket. Ensure that the Batchers responsible for producing the concrete signs the delivery ticket certifying that the batch was produced and delivered in accordance with these requirements. Sign the delivery ticket certifying that the concrete was placed in accordance with these requirements.

344-3.6 Placing Concrete:

344-3.6.1 Concreting in Cold Weather: Do not mix or place concrete when the air temperature at placement is below 45°F.

During the curing period, if NOAA predicts the ambient temperature to fall below 35°F for 12 hours or more or to fall below 30°F for more than 4 hours, enclose the structure in such a way that the air temperature within the enclosure can be kept above 50°F for a period of 3 days after placing the concrete or until the concrete reaches a minimum compressive strength of 1,500 psi.

Assume all risks connected with the placing and curing of concrete. Although the Engineer may give permission to place concrete, the Contractor is responsible for satisfactory results. If the placed concrete is determined to be unsatisfactory, remove, dispose of, and replace the concrete at no expense to the Agency.

344-3.6.2 Concreting in Hot Weather: For Category 3, hot weather concreting is defined as the production, placing and curing of concrete when the concrete temperature at placing exceeds 86°F but is less than 100°F.

Unless the specified hot weather concreting measures are in effect, reject concrete exceeding 86°F at the time of placement. Regardless of special measures taken, reject concrete exceeding 100°F. Predict the concrete temperatures at placement time and implement hot weather measures to avoid production shutdown.

344-3.7 Mixers: For Category 3 concrete, do not place concrete from a truck mixer that does not have a current FDOT mixer identification card.

344-3.8 Small Quantities of Concrete: With approval of the Engineer, small quantities of concrete, less than 3 cubic yards placed in one day and less than 0.5 cubic yards placed in a single placement may be accepted using a pre-bagged mixture. The

Engineer may verify that the pre-bagged mixture is prepared in accordance with the manufacturer's recommendations and will meet the requirements of this Specification.

344-3.9 Sampling and Testing:

344-3.9.1 Category 1: The Engineer may sample and test the concrete to verify its quality. The minimum 28 day compressive strength requirement for this concrete is 2,500 psi.

344-3.9.2: Category 2: No sampling and testing is required for Category 2.

344-3.9.3 Category 3: The Engineer will randomly select a sample from each 200 cubic yards or one day's production to determine plastic properties and to make three 4 x 8 inch cylinders for testing by the Engineer at 28 days to ensure that the design compressive strength has been met for the class of concrete as specified in Table 344-2.

344-3.10 Records: Ensure the following records are available for review for at least 3 years after final acceptance of the project:

1. Approved concrete mix designs.
2. Materials source (delivery tickets, certifications, certified mill test reports).
3. A copy of the scale company or testing agency report showing the observed deviations from quantities checked during calibration of the scales and meters.
4. A copy of the documentation certifying the admixture weighing/measuring devices.

344-4 Acceptance of the Work.

344-4.1 Category 1 Work: Category 1 work will be accepted based on certification by the batcher and contractor on the delivery ticket.

344-4.2 Category 2 Work: Certify that the precast elements were produced by a production facility on the FDOT's list of Producers with Accepted QC Programs for precast or prestressed concrete. In addition, the producer's logo shall be stamped on the element. The producer shall not use the Florida Department of Transportation QC stamp on elements used on this project. Provide a statement of certification from the manufacturer of the precast element that the element meets the requirements of this Specification.

344-4.3 Category 3 Work: Category 3 concrete will be accepted based on the Engineer's test results for plastic properties and compressive strength requirements for the class of concrete as defined in Table 344-2. In addition, a Delivery Ticket as described in 344-3.5 will be required for acceptance of the material at the project site.

344-4.4 Small Quantities of Concrete: Category 3 concrete meeting the definition of 344-3.8 will be accepted in accordance with 344-4.3 based on test results for plastic properties and compressive strength.

344-5 Method of Measurement.

The quantities to be paid for will be the items shown in the plans, completed and accepted.

344-6 Basis of Payment.

Prices and payments will be full compensation for all work and materials specified in this Section.

