450 PRECAST PRESTRESSED CONCRETE CONSTRUCTION (REV 11-19-21) (FA 1-12-22) (7-22)

SUBARTICLE 450-2.3 is deleted and the following substituted:

450-2.3 Tolerances:

Inspect all prestressed concrete products within five working days of detensioning to ensure their dimensions (other than sweep and camber) conform to the specified tolerances and to determine if there are any deficiencies.

Inspect the product for conformance with the product dimension tolerances shown in Appendix B of PCI Manual MNL-116, except as modified herein.

Apply the tolerances with respect to the theoretical positions and dimensions shown in the Plans. Apply the same tolerances for U-Beams as those specified for I-Beams, when inspecting the product for conformance with dimension tolerances.

For Florida U-Beam diaphragms, the tolerances are:

1. Plus 1 inch and minus 1/2 inch for the thickness of intermediate diaphragms.

2. Plus or minus 3 inches for the location of intermediate diaphragms, relative to design plan positions.

3. Plus 3 inches and minus 1/2 inch for the thickness of the end diaphragms.

The tolerance for beam strand sheathing is plus or minus 2 inches.

Ensure the tolerance on all miscellaneous shaping including, but not limited to, chamfers, miters, bevels, keys, tapers, radii, holes, inserts, and block outs is within plus or minus 1/8 inch of the control dimension of the shape.

The tolerances represent the total allowable tolerance that will be accepted in the finished product. Do not apply tolerances shown for the overall dimensions of a member to violate the tolerances shown for positions of reinforcing and prestressing steel or FRP. Apply the tolerances during and after the fabrication of prestressed products. Do not reduce the concrete cover for reinforcing steel, FRP reinforcing, prestressing steel, FRP prestressing strands, or any other metallic or polymeric objects specified in the Plans more than 1/4 inch. Do not reduce the concrete cover for reinforcing steel, FRP reinforcing, prestressing steel, FRP prestressing strands, or any other metallic or polymeric objects when the cover specified in the Plans is minimum cover.

Limit sweep to 1/2 inch for U-Beams and Inverted T-Beams.

The maximum allowable sweep for I-Beams and piles is 1/8 inch for every 10 feet, and will be determined by the following equation:

Sweep (in) = (0.0125 in/ft) x Length (ft) of beam or pile

Measure and record the sweep and camber of the beams immediately after detensioning and monthly. Beyond 120 days after casting, monthly sweep and camber measurements may be reduced to quarterly if there are no identified issues with the beam, and if the sweep and camber measurements are in tolerance. Once the reduced frequency

is applied, camber and sweep shall be measured no more than 7 calendar days prior to shipping. Keep the measurement records on file for review upon request by the Engineer.

Notify the Engineer immediately when the sweep or camber exceeds the specified tolerances.

If the actual camber is less than 50% of the predicted camber at release provided by the Plans, move the dunnage towards the center of the beam to a maximum of 5% of the total length at each end to induce camber.

If the camber is outside of the design camber shown in the Plans by plus or minus 1 inch, take appropriate actions to accommodate the product in the structure.

If the sweep exceeds the tolerance specified, immediately propose measures to the Engineer to bring the sweep of the product back to within tolerance. Special storage conditions for the purpose of removing excessive sweep will not be restricted by requirements of this Section.

ARTICLE 450-5 is deleted and the following substituted:

450-5 Shop Drawings.

Submit shop drawings for all pretensioned prestressed concrete products containing FRP bars, FRP strands, or stainless steel strands. Submit shop drawings for all other pretensioned prestressed concrete products when the Contract Documents do not contain all the detailed information necessary to fabricate and erect the pretensioned prestressed concrete product. Ensure the submitted shop drawings meet the requirements of the Contract Documents.

Obtain prior approval of any adjustments to the shop drawings which will result in a net change of prestressing force within the product. Shop drawings are not required to depict negligible, supplemental reinforcement used to facilitate fabrication of products if the additions do not affect the performance of the product.

In lieu of shop drawings, submit the following to the Engineer:

1. The Framing Plan with product designations for all superstructure components.
2. Strand detensioning schedule.
3. Tensioning and elongation calculations.
4. Details of supplemental reinforcement that remains as part of the finished product.
5. Drawings, details and spacing for embedded items associated with fall protection systems used on beams.
6. When proposing to use materials and/or methods that differ from the requirements of the Contract Documents, submit full plan details and Specifications for the alternate materials and methods. Ensure the alternate materials and methods meet the following requirements:

    a. The provisions of the Contract Documents.

    b. The AASHTO LRFD Bridge Design Specifications, edition with interims as referenced in Plans.

    c. The recommendations of the material manufacturer.

d. Any materials change proposed by the Contractor and approved by the Engineer.

e. Net compressive stress in the concrete due to prestressing acting alone, after all losses, is not less than or 5% greater than that provided by the stranding shown in the Plans.

f. Ultimate strength of the structure with the proposed changes is not less than the ultimate strength of the original design.

g. The provisions of the Departments Structures Design Guidelines.

SUBARTICLE 450-10.7.1 is deleted and the following substituted:

450-10.7 Accelerated Curing:

450-10.7.1 General: Use low-pressure steam curing, radiant heat curing or continuous moisture and heat curing. Submit steam and/or radiant heat curing procedures for CFRP strand products for approval. If accelerated curing is completed before the curing period has elapsed, continue curing for the remaining part of the curing period in accordance with one of the curing methods above.

If accelerated curing is used, furnish and use temperature recording devices that will provide accurate, continuous, and permanent records of the time and temperature relationship of the enclosure and concrete throughout the entire curing period. Place the temperature recording sensors at a minimum of two locations, spaced approximately at or near the third point of bed length, to measure the temperatures of the enclosure and concrete. Initially calibrate recording thermometers and recalibrate them at least annually in accordance with manufacturer's recommendations. Place the sensors at the center of gravity of the bottom flanges for beams. Place the sensors at the center of gravity of the cross sections perpendicular to the length for solid piles or poles, and at the midpoint of the wall thickness for voided piles or poles.

When the ambient air temperature is equal to or higher than 50ºF, start the accelerated curing by supplying or retaining moisture and the application of the heat, following the initial set period of concrete. Determine the initial set time in accordance with ASTM C403. During the application of heat, do not allow the temperature rise in the concrete product to exceed 36ºF per hour. The maximum curing temperature of the enclosure or concrete must not exceed 150ºF. Maintain the maximum curing temperature uniform throughout the enclosure, with variation of not more than 20ºF from the maximum peak temperature until concrete reaches the required release strength. Allow the concrete element to cool gradually at the maximum cooling rate of 50ºF per hour and continue the cooling at this rate until the concrete temperature is 40ºF or less above the ambient temperature outside the curing enclosure.

When the ambient air temperature is below 50ºF cure the concrete in two stages. Start the accelerated curing of the first stage during the preset period by applying heat to increase the temperature of concrete at the maximum rate of 10ºF per hour. The total temperature gain of concrete during the initial set period cannot exceed 40ºF higher than the placement temperature, or 104ºF, whichever is less. Upon obtaining

the initial set, continue curing as stated above for ambient temperature of 50ºF or higher. To prevent moisture loss on exposed surfaces during the preheating period, cover products as soon as possible after casting or keep the exposed surfaces wet by misting or wet blankets. Use enclosures for heat curing that allow free circulation of heat about the product and that are constructed to contain the heat with minimum moisture loss. The use of tarpaulins or similar flexible covers may be used provided they are kept in good repair and secured in such a manner to prevent the loss of heat and moisture. Use enclosures that cover the entire bed from stressing abutment to stressing abutment, including all exposed stranding, except when using CFRP strands. When using CFRP strands, follow the manufacturer's instructions.

SUBARTICLE 450-12.2 is deleted and the following substituted:

450-12.2 Identification of Defects: The QC Manager, or QC inspectors under direction of the QC Manager, will examine all deficiencies within the time limit specified in 450-2.3 and 450-2.4, to determine the applicable provisions and requirements of this Article and which course of action is appropriate.

1. If the QC Manager or designee determines that a deficiency is a cosmetic or minor defect, as stated 450-12.3, appropriate repairs may be executed in accordance with 450-13.

2. If the deficiency is major as defined in this Section, and is repairable for acceptance, submit a completed Noncomplying Prestressed/Precast Concrete Component Data Sheet (Form No. 700-030-10) to the Engineer within 30 days of the defect identification.

Submit an Engineering Analysis Scope in accordance with 6-4 for approval, to address the deficiency. A previously approved Engineering Analysis Report (EAR) may not be applied to a current major repair without the approval from the original engineer who signed and sealed the previously approved EAR.

Make major repairs under the observation of and to the satisfaction of the QC Manager. The Engineer reserves the right to witness the repairs.

The disposition of deficiencies and repair methods provided herein must at no time, and under no circumstances, be used as an excuse for or applied in such a manner so as to relieve the Contractor of his responsibility for QC. The number and type of deficiencies evaluated under this Specification will, however, be used in evaluating the Contractor's QC.

The Engineer may require a credit on any products with deficiencies that require an EAR and are accepted for use in the structure. Bear the costs of repairs and any actions taken to rectify deficiencies at no expense to the Department.