

GUIDELINES FOR AN IN-DEPTH INSPECTION OF THE FABRICATION OF PRECAST PRESTRESSED CONCRETE STRUCTURAL MEMBERS

PURPOSE

The purpose of this inspection is to evaluate the adequacy of all the materials, fabrication practices and procedures, and State inspection associated with the construction of precast, prestressed concrete structural members, and to determine whether or not the resultant product is satisfactory.

INSPECTION DATA

Project No.

Contract No.

Project Title

Contract Amount

Prime Contractor

Date of Inspection ___/___/___

District

Inspection Made By

In Company With

% Time Elapsed
(Total WD =)

% Work Complete

Name of Fabrication Plant

Location

Narrative of Work Done:

PLANT ORGANIZATION

Individual In Charge of Plant

Individual In Charge of Production

Individual In Charge of Quality Control

1. Is QC performed by other than production personnel?
2. does QC report to? (Please attach a functional organizational chart)

MATERIALS

A. Concrete Aggregates

1. Stockpiles handled to prevent intermingling and segregation?

B. Cement

1. Kept dry and lump free?

C. Concrete Mix Design

	Source	Quantity
Coarse Aggregate		
Fine Aggregate		
Cement		
Water		
Admixture(s)		
Design Strength:		

D. Reinforcing Steel

1. Stored to ensure cleanliness?

E. Prestressing Steel

1. Stored under cover to minimize corrosion?
2. Bands on strand packs should not be torched to avoid damaging strands.
3. Are reels identified with (STA) DOT & manuf. numbers?

FABRICATION

A. Forming

1. Have shop drawings been approved?
2. Are forms clean?
3. Are side forms steel as specified?
4. Do joints prevent significant leakage of paste?
5. Does inspector check alignment, end dams, bond breaker treatment, & actual length of forms (each beam) before pour?

B. Steel Placement

1. Is steel clean and free from rust?
2. Is steel tied securely and in the proper locations?
3. Are clearances satisfactory?
4. Are the post-tensioning ducts, if any, secured in the correct positions?
5. Is the inspection provided timely and complete?
6. Does the inspector check the placement using the approved shop drawings & check the positions of the strands?

C. Tensioning Prestressed Strands

1. What is the setup of the stressing bed?
2. Are the strands horizontal or draped?
3. Are the strands clean and free from significant rust & form oil?
4. Have the jack gauges been calibrated within the last 180 days or since repaired or adjusted?
5. What are the calculated losses for:
 - a. grip slippage
 - b. movement of anchoring abutment
 - c. friction of hold-downs
 - d. temperature adjustment
6. Does the inspector:
 - a. determine the distance from bulkhead to bulkhead?
 - b. have a work chart showing the calculated elongation, the pressure the gauge should indicate, the time of tensioning, the ambient temperature and the reel number of the strand used?
 - c. fill out a pretensioning report?
7. Is the elongation calculated from the actual modulus of elasticity of the strand used?
8. Describe the tensioning procedure. (Example: Tension to gauge reading, meas. elong, jack to 1.05 of gauge reading to achieve calc. elong.)
9. What tensioning method- single or multiple strand?
10. Is the member cast within 3 days after stressing, or if not, are the strands retensioned to compensate for relaxation?

D. Concrete Placement

1. Are concrete batching & mixing procedures & controls adequate?
2. Does inspector:
 - a. observe batching & mixing?
 - b. record time required for placement of each load and each girder?
 - c. record slump, entrained air (when required) & temp of concrete? (What are the requirements?)
 - d. record ambient temp and temp of forms and steel?
3. Are placement, consolidation and finishing of the tops of the girders satisfactory? (2 layers for beams not more than 3'-4" deep, 3 layers for deeper beams)
4. Are an adequate number of cylinders made and protected next to the girder?

E. Curing

1. What type of cure is being used?

2. Is a temperature sensor being used and is a continuous log of the temperatures available?
3. What are the minimum & maximum temperatures experienced? (60 F min, 175 F max)
4. Are heating & cooling rates less than 25 degrees F/hr?
5. If steam cured, concrete should attain initial set before steam is applied (2 hrs required by the spec's). Is it?
6. Is top of girder kept continuously wet per Std Spec's?
7. Are cylinders being properly cured? (Girder cure for release strength & standard moist cure for 28-day strength)

F. Detensioning

1. What is the required concrete strength for release of the prestressing force?
2. the forms that restrain deflection removed prior to detensioning?
3. It is recommended that detensioning be done immediately following the curing period. Is this being done? Is the temperature of the member held reasonably constant for the latter part of the curing period to prevent undue stresses or cracking?
4. What is the sequence of cutting strands? Does this procedure minimize eccentricity and shock loading? Does the inspector record the releasing procedure in his field book? Has it been approved by (STA) DOT? (If burned, the first wire in a strand should not be cut until at least 5 seconds after the torch has been applied.)
5. Does the inspector record the camber while the girder is still on the bed?

G. Finishing

1. Is the surface of the concrete adequately finished?
2. Are extensive honeycombed areas evident?
3. Does the inspector measure the length of each member?

H. Handling & Storage

1. Are members handled only by approved pickup points?
2. Are they properly stored to prevent damage & supported at bearing points?

TESTING & REPORTING

A. Testing

1. Concrete cylinders:
 - a. Is concrete sampled from 1/3 & 2/3 parts of pour and bucket?
 - b. Are they made within 15 minutes of sampling & consolidated properly?
 - c. If heat cured, allowed to cool 1/2 hour before capping for testing?
 - d. Are sulphur caps allowed to cure 1/2 hour before testing?
 - e. Are the actual dimensions of the cylinder measured (within 1/16" diameter, 1/4" length)?

- f. Is the loading rate satisfactory (20 to 50 psi/sec for hydraulic system, 0.05"/min for screw system)?
(For 6000 psi conc., time from midpoint of load to failure should be from 60 to 150 seconds.)
 - g. Is the strength test an average of 2 breaks & does any one break fall below 95% of the required 28-day strength?
2. Is the concrete aggregate being tested at a sufficient frequency (at least 2 times weekly)?
 3. Horizontal alignment:
 - a. Is it checked upon removal from casting bed & within the tolerance of 1/8" per 10' of length?
 - b. Is it checked during storage & just prior to shipping to conform to 1/4" per 10' of length?

B. Reporting

1. Does the inspector's diary contain instructions to the fabricator, an account of work accomplished, description of inspector's actions & an discussion of problems encountered?
2. Are the appropriate forms filled out & complete?

COMMENTS

FINDINGS/RECOMMENDATIONS/RESOLUTIONS

CONCLUSION

Applicable Specifications

6-02.3(25)E Prestressed Concrete Girders (Construction Requirements)
9-19 Prestressed Concrete Girders (Materials)
9-03.1 Aggregates for Portland Cement Concrete
9-25.1 Water for Concrete
9-01 Portland Cement
9-23.7 Air-Entraining and Chemical Admixtures for Precast
Prestressed Concrete
9-07 Reinforcing Steel

References

1. Manual For Quality Control For Plants and Production of Precast and Prestressed Concrete Products; Prestressed Concrete Institute; 3rd Edition, 1985.

2. Tentative Standards For Prestressed Concrete Piles, Slabs, I-Beams and Box Beams For Bridges and an Interim Manual For Inspection of Such Construction; AASHTO/Prestressed Concrete Institute; 1963.
3. Prestressed Concrete Inspectors' Manual; Prestressed Concrete Manufacturers' Association of California; 1975.
4. Inspector Guide For Prestress Plant Inspection and Quality Control; (STA) DOT; 1982.
5. Construction Manual; (STA) DOT; 1984.