Continuing Education Course #264
Precast Segmental Bridge Construction
Part 5 - Precast Segment Manufacturing

1. Precast Concrete Segmental Bridges are gaining popularity with owners because they offer benefits like:
- ○ a. Reduced costs, reduced construction time, reduced environmental impacts, and reduced steel requirements
- ○ b. Reduced costs, reduced rideability, reduced environmental impacts, and reduced maintenance of traffic
- ○ c. Reduced costs, reduced construction time, reduced concrete strengths, and reduced maintenance of traffic
- ○ d. Reduced construction time, reduced costs, reduced environmental impacts, and reduced maintenance of traffic

2. Which factor is not a benefit of a designer's choice for choosing Precast Bridge Structures?
- ○ a. Adaptability for different modes of transportation
- ○ b. Easily modified deck geometry for future widening
- ○ c. Higher durability with less maintenance
- ○ d. Factory like construction allows better quality control measures

3. When outlining a fundamental manufacturing plan for a precast yard what factors may influence precasting decisions?
- ○ a. Site Selection and Preparation, Casting Cell Construction, Concrete Placing and Curing, Storage and Finishing, and Concrete Strength Requirements
- ○ b. Site Selection and Preparation, Union and Non-Union Labor Force, Concrete Placing and Curing, Storage and Finishing, and Loading and Transporting
- ○ c. Casting Cell Construction, Concrete Placing and Curing, Site Selection and Preparation, Storage and Finishing, and Loading and Transporting
- ○ d. Casting Cell Construction, Concrete Placing and Curing, Erection Site Geotechnical Data, Storage and Finishing, and Loading and Transporting

4. When selecting a precasting site a factor that would influence the decision would be:
- ○ a. Adequate storage area
- ○ b. Distance to bridge erection site
- ○ c. Proximity to a skilled workforce
- ○ d. All of the above

5. When designing casting cells what major factors should the engineer consider?
- ○ a. Tensile strength for post-tensioning strands
- ○ b. Types of axle loading anticipated on the deck riding surface
- ○ c. Geotechnical and environmental restrictions at the bridge site
- ○ d. None of the above

6. The Soffit form performs what function for the casting cell?
- ○ a. Shape for the bottom slab of the segment
- ○ b. Support for the heaviest segment of the cell

○ c. Serves as a means to move the segments after casting
○ d. All of the above

7. The Core form performs what function for the casting cell?
○ a. Controls the thickness of the concrete in the segment webs
○ b. Provides shape for the underside of the wings
○ c. Contains the shear and alignment keys for match casting
○ d. Provides support for the heaviest segment of the cell

8. A rebar jig is:
○ a. A tool used to quickly connect individual pieces of rebar together with tie-wire
○ b. A tool used to bend and shear rebar to the designed configuration
○ c. A tool used at the casting cell for pre-tying the rebar cage
○ d. A tool used to unload rebar delivered from the fabricator

9. At the placement location, what concrete test must be performed on the wet concrete?
○ a. Large aggregate gradation tests
○ b. Alkali-silica reactivity tests
○ c. Cylinder compression strength tests
○ d. Percent entrained air content tests

10. What can a designer specify that will help precasters with the deck finishing of the segment?
○ a. A self-consolidating concrete mix which will flow better for rideability
○ b. A post-erection deck treatment to help rideability
○ c. A GPS robotic deck screed automated to grade for rideability
○ d. Since segments are match-cast rideability is not a concern

11. When placing a cast segment in storage, it should be placed on:
○ a. Stabilized grade using dunnage placed in a three point pattern to ensure the segment won't rack and lose shape
○ b. Stabilized grade using Hillman Rollers placed in a three point pattern to ensure the segment won't rack and lose shape
○ c. Stabilized grade using Hillman Rollers placed in a three point pattern to allow easy movement through the storage facility
○ d. Stabilized grade using hydraulic jacks placed at the segment corners to ensure the segment stays plumb and level

12. Segments cast in a horizontal curve will have what shape?
○ a. Variable in depth
○ b. Sloped longitudinally to match the bridge profile
○ c. Pie shaped
○ d. Squared to the formwork

13. If the asbuilt survey of the cast segment shows significant deviation from the planned layout what correction is needed?
○ a. The segment may be rejected making a re-cast necessary
○ b. It can be corrected in the next segment alignment
○ c. Asbuilt surveys are for record information only
○ d. Both B & C and not A

14. Minor deviations in asbuilt alignment during the erection process can require:
○ a. Adjustment on the riding surface from concrete grinding
○ b. Re-casting of segments of the span

○ c. Control through a cast-in-place closure pour
○ d. Movement on the expansion bearing assemblies

15. Stressing and Grouting for post tensioning is usually associated with the erection process but which tendons are normally stressed and grouted in the storage yard?
○ a. Internal continuity tendons of the balanced cantilever segments
○ b. Transverse segment strands
○ c. Temporary alignment rods for span by span construction
○ d. External cantilevered tendons of the segment base

16. Embeded duct materials for post-tensioning tendons can be
○ a. Plastic
○ b. Steel
○ c. Both A & B
○ d. Neither A nor B

17. Quality Control testing done at the post-tensioning grouting operations include:
○ a. Casting compressive strength cylinders
○ b. Flow cone tests
○ c. Grout cube tests
○ d. Both B & C but not A

18. An engineer should review the tractor and trailer used for hauling the precast segments to determine:
○ a. The quickest route for delivering the segments to the erection operations
○ b. Wheel and axle loads, heights, widths, and other restrictions for permit loads on public roadways.
○ c. The drivers experience in transporting specialized construction material
○ d. The cost effectiveness for on road trucking

19. A loading sequence for barging segments is needed to?
○ a. Ensure the barge is uniformly loaded to avoid unsafe conditions
○ b. Match the erection sequence needed at point of delivery
○ c. Make sure tugboats can push the barges from the loading are
○ d. Both A and B

20. With span by span construction, when is it acceptable to sacrifice the safety of an operation for added production?
○ a. If the schedule critical path shows negative float
○ b. If the budgeted costs show losses for a particular item
○ c. If the project inspectors aren't available during a planned activity
○ d. It is never acceptable to sacrifice safety for production!