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Continuing Education Course #341  
Accelerated Bridge Program  
An Introduction to Prefabricated Bridge Unit (PBU) Construction

1. Prefabricated Bridge Units 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 Prefabricated Bridge Unit Structures?
  - a. Adaptability for different modes of transportation
  - b. Easily modified deck geometry for future widening
  - c. Shortened construction time compared to traditional cast-in-place
  - d. Factory like construction allows better means of quality control
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 reinforcing steel
  - 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. After structural steel is delivered and set on temporary pedestals the girders are surveyed longitudinally at 10th points to:
  - a. check if the finish paint limits were followed
  - b. check if all diaphragms were placed in the right location

- c. check asbuilt camber and determine form heights
  - d. check bolts are torqued correctly
7. 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
8. 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
9. When placing a cast segment in storage, it should be placed on:
- a. Stabilized grade using dunnage placed under the structural steel in close approximation to the final bearing seat configuration to ensure the unit won't rack and lose shape
  - b. Anywhere in the yard because if the unit was made correctly it will not matter
  - c. Stabilized grade using Hillman Rollers placed under the structural steel in close approximation to the final bearing seat configuration to allow easy movement through the storage facility
  - d. Stabilized grade using hydraulic jacks placed at the unit corners to ensure the segment stays plumb and level
10. When scheduling deliveries of segments to the point of erection, deliver the segments:
- a. Reversed to match casting because the forms produce a mirror image to the proposed bridge geometry
  - b. Any order is acceptable because the factory setting of the precast yard produces interchangeable pieces
  - c. In the same relation as they were cast
  - d. None of the above
11. How quickly did the MASSDOT Fast 14 accelerated bridge project complete?
- a. 14 bridges in 14 weeks
  - b. 14 bridges in 10 weekends
  - c. 10 bridges in 14 weekends
  - d. 10 bridges in 14 weeks
12. Prior to delivery and erection of the PBUS a final check of the substructure is performed:
- a. So Low concrete seats can be raised by shimming
  - b. So High concrete seats can be fixed by grinding
  - c. So difficult last minute adjustments can be avoided
  - d. All of the above.
13. A crane erection plan should include?
- a. Structural steel grade and properties
  - b. Formwork requirements for closure pours
  - c. Architectural features for the precast concrete parapets
  - d. Crane and rigging information
14. SPMT stands for:
- a. Self-controlled modular transporters
  - b. Self-propelled modular transporters

- c. Self-propelled multi transports
- d. Self-partitioned moving transporters

15. After Erecting foundations and scaffold towers, the correct sequence for the SPMT erection method is - (A) raise, position, and set PBUs on bearing assemblies of substructure, (B) form, rebar, place, and cure concrete superstructure elements, (C) deliver and set structural steel on towers, (D) mobilize and load SPMTs, and transport to bridge?

- a. C, B, A, D
- b. C, B, D, A
- c. A, B, C, D
- d. D, B, C, A

16. In a bridge slide, strand jacks are used for:

- a. pulling the PBUs from the temporary supports using high strength strands
- b. pushing the PBUs from the temporary supports using hydraulic strands
- c. pulling the SPMT along the haul route using high strength strands
- d. pushing the SPMT along the haul route using hydraulic strands

17. The trial placement shall simulate the actual job conditions in all respects including i) SPMT configuration, ii) transit equipment, iii) travel conditions, iv) admixtures, v) strand jack capacity, vi) the use of bonding compounds, vii) restraint of adjacent concrete, viii) shoring tower layout, and ix) personnel.

- a. ii, iv, & vi
- b. iii, vii, & ix
- c. All of the above
- d. None of the above

18. If the PBU surface is to be the final riding surface of the bridge what recommended practice can improve rideability?

- a. An asphalt overlay can be added to smooth the surface.
- b. None is needed, geometry control is sufficient to meet surface requirements
- c. None is needed, PBU bridges rarely have rideability requirements
- d. Longitudinal grinding can eliminate imperfections.

19. The project construction staff should consider the use of outside specialty consultants and an experienced construction engineering firm to:

- a. Help spread liability for losses due to the often-adverse conditions associated with these bridges
- b. Help train the project personnel, troubleshoot problems, and give confidence to the owner
- c. To inflate overhead budgets for anticipated T&M work
- d. Segmental bridges are so specialized there are too few opportunities to enlist outside help to make it worthwhile.

20. With accelerated bridge 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!

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