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Continuing Education Course #229  
Precast Segmental Bridge Construction  
Part 2 - Span by Span Erection Method

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. The term Span by Span erection method comes from:
  - a. The decks are designed as a factor of length by width (span by span)
  - b. Segments are cast and delivered identical so all spans are interchangeable
  - c. The completion of one bridge span at a time is the defining character
  - d. The riding surface of the bridge decks are cast-in-place to provide a smoother driving surface across the span.
4. Items that can affect span by span productivity include all but:
  - a. Variations in span length and height
  - b. The terrain being spanned
  - c. Changes in alignment
  - d. Ultimate compressive strength of the precast segments
5. Temporary Support Equipment types include:
  - a. Underslung Trusses
  - b. Overhead Gantries
  - c. Individual Shoring Towers and Carrier Beams
  - d. All of the above
6. What factors should not affect the selection of cranes for segment erection?
  - a. Span length and number of segments per span
  - b. Weight and height of segment placement
  - c. Crane manufacturer and load chart
  - d. Soil bearing capacity, terrain, and congestion
7. 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
8. If a support truss is to be self-launching, the length should be:
- a. Equal to the bridge span length or shorter
  - b. Equal to the span length but no longer
  - c. Twice the span length or longer
  - d. None of the above
9. Survey measurements and geometry control is especially critical for erection trusses and the supports when:
- a. Long straight repetitive spans are encountered to maximize efficiency
  - b. Spans are in Horizontal or vertical curves, or when abrupt changes in superelevations occur
  - c. No adjustments can be made at the truss once the geometry is cast into the segments.
  - d. Higher elevations require greater geometry control due to access issues
10. If Hillman rollers are used to launch segments on the support truss from the downstation end what order should the segments be delivered to the erection operations?
- a. It doesn't matter because the crane can swing the segments into place in any order
  - b. Segments should be delivered West to East
  - c. Segments should be delivered in reverse order
  - d. Segments should be delivered in sequential order
11. Prior to permanent post tensioning, precast segments are erected with an epoxy placed on the match-cast faces because:
- a. The epoxy acts as a lubricant and sealer to facilitate a tight fit between segments.
  - b. The epoxy glues the segments together so they act as a single unit.
  - c. The epoxy is required by state DOT's
  - d. The epoxy provides an architectural finish to hide imperfections in the match-cast process
12. Why are elongations measured on the post tensioning strands after stressing?
- a. Because if the steel stretches it is considered a failure and must be replaced
  - b. It is measured to make sure the wedges don't slip and they retain the loaded energy
  - c. It is a way to make sure the correct size and number of strand were placed in the anchorage
  - d. It is a way to ensure the stresses occurred over the entire length of the strand because a shortened elongation will mean the strand is pinched somewhere along its length.
13. The span-by-span method of superstructure erection is economical for spans ranging:
- a. Up to 100 feet
  - b. Spans from 80 to 180 feet
  - c. Spans from 150 to 500 feet
  - d. Spans over 400 feet
14. If excessive span heights or local crane height restrictions prevent the use of ground based or barged cranes to lift segments to the temporary supports of a span-by-span erection, what might be an option?
- a. Cranes are always used for this procedure
  - b. Specialized gantry transports can be utilized
  - c. Segmental bridges are not designed for limited access sites
  - d. None of the above
15. In the context of the span-by-span section, a closure pour is:

- a. A concrete placement between the piers and mid segments to correct for field conditions
- b. A concrete placement to close temporary access points in the superstructure
- c. An epoxy poured on the match-cast faces to seal the joints “closed”
- d. A concrete pour at the end of the pre-stressing tendons to close the ducts

16. If the segment 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, segmental bridges rarely have rideability requirements
- d. Longitudinal grinding can eliminate imperfections.

17. To align and lock the span segment together in order to make the closure pours, what must be done prior to applying a tension load to the span?

- a. Small concrete blocks are poured to maintain the closure pour gap.
- b. Pressure injected epoxy is used to seal leaks in the gap of the closure pour.
- c. Nothing is needed once the epoxy lubricant/sealant has hardened.
- d. Reinforcing steel is placed in the 8” closure pour gaps

18. What is done to account for design alignment and construction tolerances at the pier segment bearing assemblies?

- a. Nothing is needed any variations will be corrected if the surface is ground
- b. Cast in place pedestals are poured under the pier segments.
- c. The span closure pours are adjusted for bearing differences.
- d. Nothing is needed, proper geometry control in the segment casting will compensate for deviations.

19. Why is it important to optimize the amount of epoxy at the segment joints?

- a. Too little epoxy may cause the joints to leak and compromise the corrosion protection
- b. Too much epoxy will be wasted during the epoxy squeeze process and cause waste.
- c. Both A & B
- d. Neither A nor 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!

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