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Continuing Education Course #380
Accelerated Bridge Program
Intro to GRS-IBS Abutment Construction

1. GRS-IBS stands for?
- ○ a. Geotechnical Reinforced Soil – Informational Bridge System
- ○ b. Geosynthetic Reinforced Soil – Integrated Bridge Systems
- ○ c. Geosynthetic Reinforced System – Integrated Bridge Soil
- ○ d. Geotechnical Reinforced Soil – Integrated Bridge System

2. GRS-IBS Bridge Systems 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

3. Which factor is not a benefit of a designer's choice for choosing a GRS-IBS System?
- ○ 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. Versatility, especially for bridge reconstruction projects

4. For this course, what is the definition of CMU Thickness?
- ○ a. The vertical dimension of the CMU measured from the bottom of the block to the top of the block
- ○ b. Units as defined in contract specification and as shown on the contract plans.
- ○ c. The front to back perpendicular horizontal dimension of the CMU block, approximated for architectural irregular faced units
- ○ d. The horizontal dimension of the CMU measured along the face of the wall or abutment. For CMU with irregular side surfaces or interlocking surfaces, the width is the center to center horizontal spacing measured parallel to the face of the wall.

5. What is the Bearing Bed Reinforcement Zone?
- ○ a. The portion of the system that is below the reinforced soil mass of the GRS Abutment.
- ○ b. The portion of the system that makes up the reinforced soil mass of the system, including the crushed stone and the geotextile reinforcement.
- ○ c. The portion of the system that comprises the CMU wall face elements.
- ○ d. The portion of the system that is directly below the superstructure or concrete distribution slab.

6. Geosynthetic reinforcing material is:
- ○ a. Processed Crushed stone aggregate base
- ○ b. a combination of cast-in-place concrete and reinforcing steel
- ○ c. Grade 60 epoxy coated rebar
- ○ d. a biaxial, polypropylene geotextile

7. Backfill material for the reinforced integrated approach is:
- ○ a. Open Graded AASHTO #8 Stone
- ○ b. Open Graded AASHTO #67 Stone
- ○ c. Processed Crushed stone aggregate base
- ○ d. Lean Concrete flowable fill

8. Properties of typical CMU's are?
- ○ a. Uniform size and shape
- ○ b. Minimum concrete 28-day compressive strength 4000 psi
- ○ c. Air entrainment of 4% to 7%
- ○ d. All of the above

9. For shop drawing submittals what is included in the plan view?
- ○ a. Reinforcing details for cast-in-place distribution slab
- ○ b. Stations and offsets, and survey coordinates
- ○ c. Support of excavation for global stability
- ○ d. Typical cross-sections of the reinforced soil foundation

10. For architectural considerations, the owner may require:
- ○ a. A mock-up of the wall face
- ○ b. A licensed architect must be onsite when receiving GRS-IBS materials
- ○ c. An anti-graffiti treatment to CMU's during manufacturing
- ○ d. A reduction in the size of the reinforced soil foundation

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 final encapsulation of the reinforced soil foundation (RSF) what should be done?
- ○ a. Test the existing soil bearing capacity to ensure no differential settlement will occur
- ○ b. Compact first lift of aggregate backfill material with a minimum of 4 passes
- ○ c. Ensure intermediate layers are lapped 3 feet minimum to prevent water infiltration
- ○ d. Grade and level the top of the RSF aggregate

13. The geotextile fabric shall cover what minimum percentage of the top surface of the CMU?
- ○ a. The Geotextile shall cover a minimum of 100% of the top surface of the CMU
- ○ b. The Geotextile shall cover a minimum of 65% of the top surface of the CMU
- ○ c. The Geotextile shall cover a minimum of 85% of the top surface of the CMU
- ○ d. The Geotextile shall cover a minimum of 25% of the top surface of the CMU

14. When starting the placement of the first row of CMU blocks, they should:
- ○ a. Be placed tightly against the adjoining CMU without any gaps
- ○ b. Begin placement at the lowest portion of the wall
- ○ c. Be placed horizontally with each layer
- ○ d. All of the above

15. In order to avoid displacing or damaging the facing elements when compacting the aggregate backfill of the abutment and wingwall wall face, and the bearing bed, what is the minimum distance from the units where hand operated equipment should be used?

- a. 12 inches
- b. 36 inches
- c. 48 inches
- d. 24 inches

16. The geotextile of the reinforced integrated approach shall be at least how many inches below the pavement structure?

- a. 2
- b. 3
- c. 1
- d. 6

17. Why should a monitoring program be developed for bridge reconstruction projects?

- a. To help maintain plumbness of the CMU blocks.
- b. To monitor traffic volume on the existing bridge.
- c. To measure horizontal and vertical movements of the existing abutments.
- d. None of the above

18. Equipment used on the aggregate backfill should have rubber tracks because?

- a. Rubber Tracks allow for better load distribution and movement on loose graded No. 8 & 67 aggregate.
- b. Rubber Tracks provide quicker braking for sudden stops.
- c. Rubber Tracks can make sharp turns and spin for maneuverability.
- d. Rubber tires are better and track machines should not be used.

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!