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Continuing Education Course #452
Heavy Civil Earthwork Construction
Part 1. An Introduction

1. What makes heavy civil earthwork construction on a largescale basis a specialized operation?
 - a. It requires a vast inventory of expensive high-tech equipment and the knowledge and expertise to utilize them properly and efficiently
 - b. There are very few operations that require earthwork
 - c. Because engineers prefer to design roads with concrete
 - d. Because the goal is to Balance a projects earthwork on a large scale
2. When is an earthwork project considered a “waste” project?
 - a. When the project excavated materials equal the projects embankment materials
 - b. When there are more project cuts than there are project fills
 - c. When there is hazardous or contaminated material excavation
 - d. When the project fills are more than the project cuts
3. If a project’s excavation generates a large amount of unsuitable materials, what can be done by the owner to help balance the earthwork for construction:
 - a. Unsuitable material can be mixed with other materials to become suitable
 - b. Unsuitable material should not be excavated and should be left in place.
 - c. A waste embankment or a non-structural portion of the required embankment may be set aside by the owner to utilize the unsuitable material
 - d. The owner will never want to utilize unsuitable material
4. By definition which items are not considered rock?
 - a. Conglomerates, Boulders, & Ledge
 - b. Topsoil, & Organic Materials
 - c. Unconsolidated Clay, Silt, Sand, & Gravel
 - d. Both B & C
5. Authorized removal of additional soil or rock material below subgrade elevation or planned elevation and moved to a new location is the definition for?
 - a. Structure Excavation
 - b. Stockpile Excavation
 - c. Undercut Excavation
6. What does AASHTO Stand for?
 - a. American Association of Specialized Highly Trained Officials
 - b. Association of American Soils Highway and Transportation Operators
 - c. American Association of State Highway and Transportation Officials
 - d. none of the above

7. Rock with a seismic velocity over 9000 fps is generally:
- a. Not suitable for use in embankments
 - b. Easily excavated with conventional equipment
 - c. Seismic velocities over 9000 fps are reserved for sandy soils and are not rock
 - d. No longer rippable, and must be drilled and blasted or hoe-rammed
8. What can be done with cohesive materials if high moisture content is a problem?
- a. Disc harrows and ripper arms can be used for drying the materials
 - b. Constructed areas can be kept well-draining and sealed
 - c. High moisture content is not a problem with cohesive materials
 - d. Both A & B
9. What is an advantage of tracked equipment over wheeled equipment?
- a. Tracked equipment are faster
 - b. Tracked equipment are more powerful and more stable
 - c. Tracked equipment are easier to maintain
 - d. There are no advantages to using tracked equipment
10. Where is the bucket located on a Loader?
- a. Loader buckets are mounted on the front of the machine
 - b. Loader buckets are mounted on an articulating boom attached to the housing
 - c. Loader buckets are located between the front and rear axels of the machine
 - d. Loaders don't have a bucket, they have a large blade used for pushing materials
11. What does the term Zero-Turn mean regarding an excavator?
- a. The housing is fixed in one direction for stability
 - b. The excavator is mounted on a tracked undercarriage that only moves forward and backward
 - c. The excavator housing is no wider than the track footprint
 - d. the housing has a large counterweight causing a blindspot or zero-turn zone
12. When would a contractor select an on-road truck over an off-road truck?
- a. Haul routes utilize private roadways and are mostly onsite.
 - b. Haul routes utilize public permitted roadways
 - c. Haul routes are mostly over soft materials and rough terrain
 - d. Hauls require extremely large and heavy loads
13. What are four types of compactor styles used in most earthwork compaction?
- a. sheepsfoot, smooth drum, vibratory, and static
 - b. Tracked, wheeled, self-loading, and pneumatic
 - c. long-reach, zero-turn, mini, and landfill
 - d. off-road, on-road, pneumatic, and walk-behind
14. In developing a work plan what is not an important consideration?
- a. What time of year and the expected weather conditions for the construction
 - b. The load count interim quantity reported to the owner for the monthly payment estimate
 - c. Lift thickness for placement of embankment materials
 - d. Compaction requirements for embankment materials
15. A Mass-Diagram:
- a. Is a graphical representation of cumulative earthwork cut and fill volumes along a project alignment
 - b. Is used to calculate optimized hauling routes in order to balance the material usage within the alignment

- c. Will detail if the project is earthwork balanced, or whether it requires "borrow" or "waste"
- d. All of the above
16. What are three laboratory tests for embankment materials:
- a. Atterberg Limits, Layer Depth Tolerance, Relative Compaction
- b. Atterberg Limits, Soil Gradation, Standard or Modified Proctors
- c. Soil Gradations, Standard or Modified Proctors, Relative Compaction
- d. Atterberg Limits, Soil Gradations, Subgrade Drop Hammer
17. What is a way to calculate earthwork quantities?
- a. Cross-section average end area volume calculations
- b. Surface comparisons from 3-D Model volumes
- c. Hauling unit load count volume calculations
- d. All of the above
18. What information is not part of a cut-sheet?
- a. PGL elevation at 50 ft stations along an alignment
- b. Optimum Moisture Content and Compaction requirements
- c. Date, location, sheet number, and revision numbers
- d. A key sheet giving a visual representation of each point given on the cut-sheet
19. OSHA requires a Professional Engineer stamped design for:
- a. All trenches where workers are exposed to the excavation
- b. Trenches over 20 feet in depth
- c. Trenches in stable rock
- d. Professional Engineers are not needed for trenching excavation
20. What is a benefit of soldier pile and lagging SOE?
- a. Tighter tolerances and control of installation than other SOE types
- b. Cheaper and easier to install than other SOE types
- c. Better control of ground water seepage than other SOE types
- d. Is preferred by veterans and other military groups
21. What equipment is not used to make sure sub-grade trimming is within tolerances?
- a. Nuclear Density Testing Gauge
- b. Grade Stakes and Stringlines
- c. GPS Rover-Packs
- d. GPS Automation on equipment
22. Erosion & Sediment Control BMP's stands for
- a. Best Management Practices
- b. Biggest Material Percentage
- c. Best Management Professionals
- d. Better Material Pond
23. 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.

24. With Heavy Civil Earthwork 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!

25. Where is the largest man-made excavation in the world is located?

- a. Nurek River Tajikistan
- b. Kimberley Diamond Mines South Africa
- c. Bingham Canyon Utah, USA
- d. Orville, CA USA

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