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Examination for Structural Design of Concrete Lined Flood Control Channels

CHAPTER 1 - INTRODUCTION

1. What type of channel is usually the most economical when right-of-way is available?
 - a) Rip-rap channel
 - b) Rectangle channel
 - c) Natural earth channel
 - d) Trapezoidal channel

2. Who is typically responsible for the safe operation of a channel?
 - a) Design personnel
 - b) Construction supervisors
 - c) Local sponsors
 - d) Engineers

CHAPTER 2 – GENERAL DESIGN CONSIDERATIONS

3. Which of the following is not a typical trapezoidal channel type?
 - a) Trapezoidal channel with pilot channel
 - b) Trapezoidal channel with arched bottom
 - c) Trapezoidal channel with V-bottom
 - d) Trapezoidal channel with flat bottom

4. Which of the following is not a typical rectangular channel type?
 - a) Rectangular channel with I-walls
 - b) Rectangular channel with U-frame
 - c) Rectangular channel with inverted L-walls
 - d) Rectangular channel with L-walls

5. What usually dictates whether a channel lining is required?
 - a) Strength and erodability of in situ materials
 - b) Peak annual ground water levels
 - c) Faulting and earthquake potential
 - d) Hydraulic capacity

6. What causes sediment deposits to occur in a pilot channel?
 - a) Low flows
 - b) Increased trash deposits
 - c) Insufficient depth
 - d) Insufficient channel slope
7. When should air-entrained concrete be used?
 - a) When higher strengths are required
 - b) For retaining walls, I-walls, or U-frame structures
 - c) When freeze-thaw conditions are anticipated
 - d) When sulfates are present
8. Why is joint sealant installed in joints?
 - a) To provide watertight connections
 - b) To prevent weathering of joint filler
 - c) To counteract tension and compression
 - d) To counteract temperature changes
9. Reinforcement should be continuous through what type of joint?
 - a) Compression joints
 - b) Expansion joints
 - c) Contraction joints
 - d) Construction joints
10. What type of drainage system should be used in a non-critical 8' wide side channel?
 - a) Weep-hole drainage system
 - b) Open drainage system
 - c) Closed drainage system
 - d) Backflow drainage system
11. Vehicle access ramps should enter into a channel how?
 - a) Through a cut in the channel wall
 - b) From downstream to upstream
 - c) From upstream to downstream
 - d) From a protrusion into the channel

CHAPTER 3 – SPECIAL DESIGN CONSIDERATIONS FOR PAVED TRAPEZOIDAL CHANNELS

12. What is CRCP?
 - a) Continuously reinforced channel pavement
 - b) Concrete reinforced continuous pavement
 - c) Concrete reinforced channel pavement
 - d) Continuously reinforced concrete pavement
13. What is the common weep hole spacing for trapezoidal channel open drainage systems?
 - a) Not more than 3 m (10 ft.)
 - b) 3 m (10 ft.) to 3.5 m (12 ft.)
 - c) 3.5 m (12 ft.) to 4 m (13.5 ft.)
 - d) Not less than 4 m (13.5 ft.)

14. In closed drainage systems, each layer of a drainage blanket should be a minimum thickness of what?
- a) 50 mm (2 in.)
 - b) 100 mm (4 in.)
 - c) 150 mm (6 in.)
 - d) 200 mm (8 in.)
15. What should the thickness be for a pilot channel when flows carry scouring materials?
- a) 150 to 200 mm (6 to 8 in.)
 - b) 200 to 250 mm (8 to 10 in.)
 - c) 250 mm (10 in.) or greater
 - d) Less than 150 mm (6 in.)
16. What should the minimum stagger distance be for reinforcement splices?
- a) 0.5 m (1.5 ft.)
 - b) 1.0 m (3.0 ft.)
 - c) 1.5 m (4.5 ft.)
 - d) 2.0 m (6.0 ft.)
17. The amount of longitudinal reinforcement through transverse joints should be increased by how much?
- a) 10 percent
 - b) 25 percent
 - c) 35 percent
 - d) 50 percent
18. How many layers of reinforcement should be provided in the pavement in the area of concrete anchorage lugs?
- a) 1 layer
 - b) 2 layers
 - c) 3 layers
 - d) 4 layers
19. How far from an intersection should an expansion joint be placed in the intersecting side channel paving?
- a) 15 m (50 ft.) maximum
 - b) 18 m (60 ft.) minimum
 - c) 21 m (70 ft.) maximum
 - d) 24 m (80 ft.) minimum
20. Which of the following is not listed as providing guidance for the construction of drainage layers?
- a) EM 110-2-1901
 - b) EM 110-2-1911
 - c) EM 110-2-1921
 - d) EM 110-2-2300

CHAPTER 4 - SPECIAL DESIGN CONSIDERATIONS FOR RECTANGULAR CHANNELS LINED WITH RETAINING WALL STRUCTURES

21. Horizontal construction joints should be provided at the base of wall stems and vertical lifts of?
- a) Up to 2.5 m (8 ft.)
 - b) 2.5 to 3 m (8 to 10 ft.)
 - c) 3 to 5 m (10 to 16 ft.)
 - d) 5 to 10 m (16 to 30 ft.)
22. Which of the following wall types do not have drainage systems installed behind them?
- a) L-type walls
 - b) Cantilever walls
 - c) Inverted T-type walls
 - d) I-type walls
23. To prevent surface runoff from entering the backfill, pervious backfill material should be covered with a layer of what?
- a) Granular material
 - b) Impervious material
 - c) Compacted backfill
 - d) Top soil
24. Which of the following is considered to be an unusual loading condition?
- a) Drawdown loading
 - b) Design flood loading
 - c) Construction loading
 - d) None of the above
25. The criteria for performing stability analyses of T-type and L-type retaining walls can be found where?
- a) EM 1110-2-2502
 - b) ETL 1110-2-307
 - c) ETL 1110-2-322
 - d) EM 1110-2-2104
26. True/False: Paving slabs used in conjunction with retaining walls may not be designed as a strut slab to provide horizontal support to the wall.
- a) True
 - b) False
 - c) Not enough information for specific answer
 - d) Too many variables for specific answer

CHAPTER 5 - SPECIAL DESIGN CONSIDERATIONS FOR RECTANGULAR CHANNELS LINED WITH U-FRAME STRUCTURES

27. Flotation stability criteria for concrete hydraulic structures can be found where?

- a) EM 1110-2-2502
- b) ETL 1110-2-307
- c) ETL 1110-2-322
- d) EM 1110-2-2104

28. Excessive differential settlements are avoided by maintaining bearing pressures that are what?

- a) Equal to the allowable bearing pressure value furnished by the geotechnical engineer
- b) Greater than the allowable bearing pressure value furnished by the geotechnical engineer
- c) Less than the allowable bearing pressure value furnished by the geotechnical engineer

APPENDIX C – DRAINAGE SYSTEMS FOR U-FRAME AND TRAPEZOIDAL CHANNELS

29. Along with TM 5-818-5, what other document provides recommendations and procedures for determining soil permeability?

- a) EM 1110-1-1804
- b) EM 1110-2-1908
- c) EM 1110-2-1907
- d) EM 1110-2-1901

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