

# PRINCIPAL ENGINEER TECHNICIAN EXAM

1) A 6' embankment is made on level ground. The top of the embankment is 22' wide with side slopes of one vertical on one and a half horizontal - What is the bottom width of the embankment?

- A) 22
- B) 26
- C) 31
- D) 40

2) Which one of the following would be most often used to scale a distance on a map with a scale 1 inch equals 30 ft.

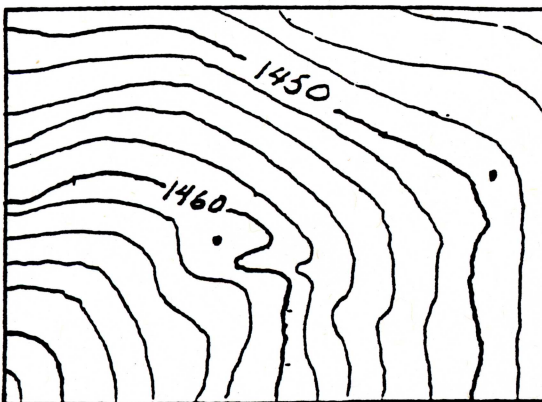
- A) Architectural scale
- B) a pantograph
- C) a steel tape
- D) an engineering scale

3) What are the steps necessary to complete a pencil drawing?

1. draw small details fillets and rounds
2. draw extension and dimensions lines
3. draw center lines and circles
4. accent views
5. draw general outline of all views
6. draw arrows dimensions marks & notes

- A) 5,4,1,2,3,6    B) 4,5,1,3,2,6    C) 5,4,3,2,6,1    D) 4,5,3,2,1,6

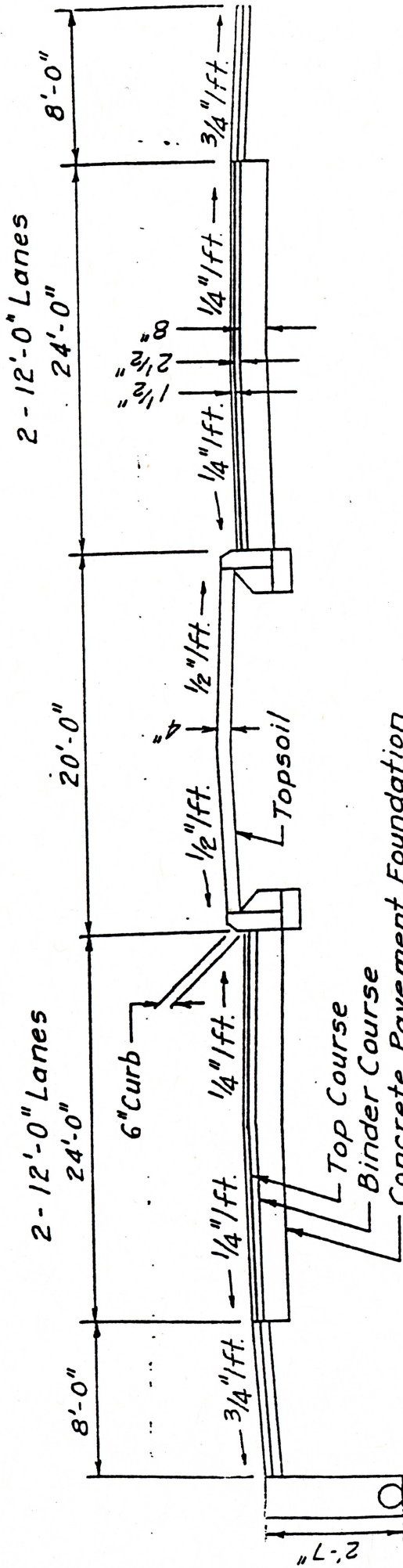
4)



The difference in elevation of the two points is:

- A) 13 ft.
- B) 12 ft.
- C) 8 ft.
- D) 10 ft.

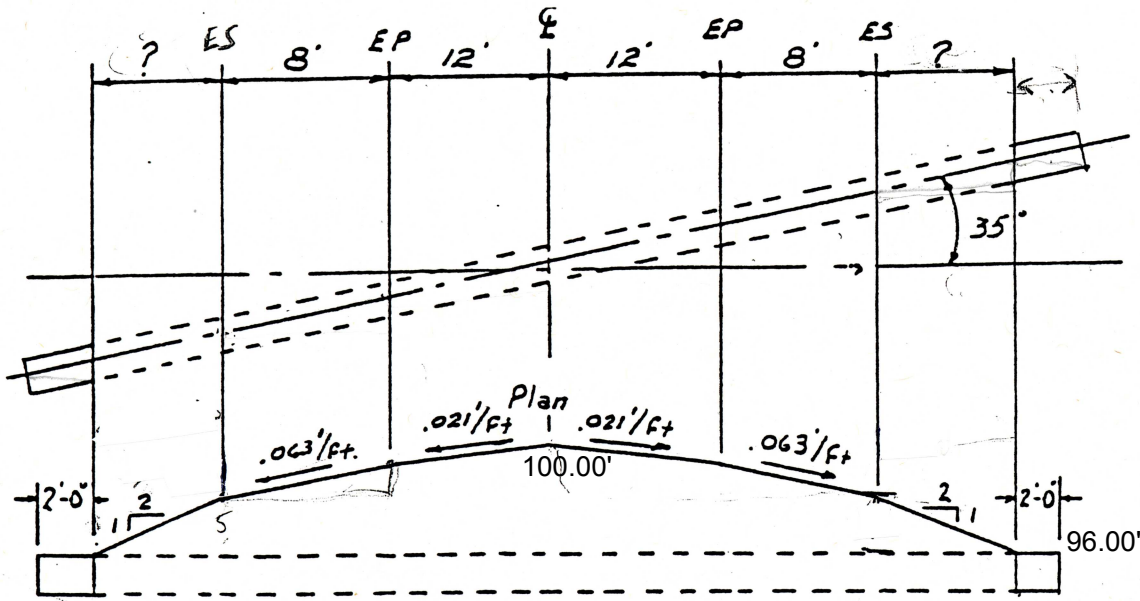
Diagram refers to questions 61 to 65



STA. 76+34.16 TO 93+42.54  
NOT TO SCALE

- 5) What is the nearest invert depth of the underdrain for the centerline of the median.
- A) 3'-4"
  - B) 3'-6"
  - C) 4'-0"
  - D) 4'-2"
- 6) What is the apparent difference between the left side centerline of pavement and centerline of the median.
- A) 2"
  - B) 5½"
  - C) 8"
  - D) 11"
- 7) Assume the roadway is straight between stations. The nearest number of square yards of Top Course are needed to do one side.
- A) 2278
  - B) 4556
  - C) 8542
  - D) 4271
- 8) The distance between Edge of Pavement and Edge of Pavement is:
- A) 68 ft.
  - B) 84 ft.
  - C) 20 ft.
  - D) 44 ft.
- 9) The most appropriate name for this section is:
- A) Two-way traffic with swale median
  - B) Four-lane divide with raise median
  - C) Two-way traffic with raise median
  - D) Two independent roadway with swale median

Questions 10 and 11 are based on diagram below.



10) From the above diagram what is the most apparent difference in elevation from the centerline of pavement and the edge of shoulder.

- A) .55'
- B) .60'
- C) .75'
- D) .80'

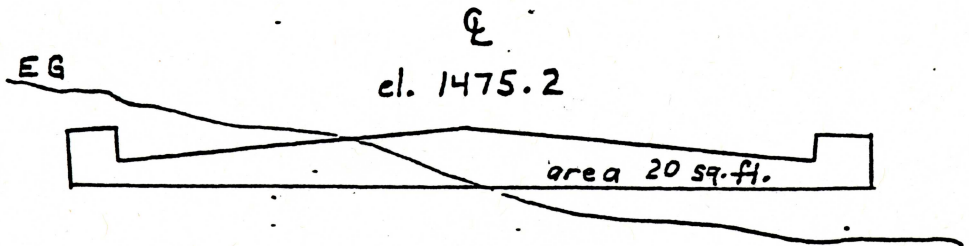
11) What is the most closest length of the culvert.

- ~~A) 28.5'~~
- B) 57'
- C) 65'
- D) 70'

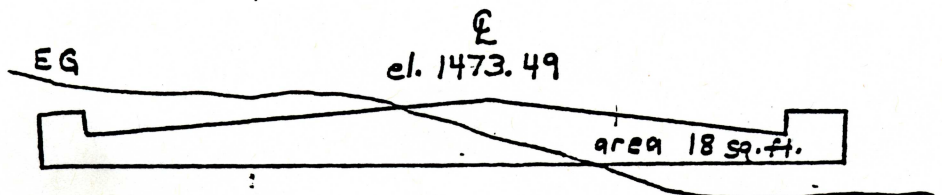
12) The slope between the two stations below is:

- A) -3%
- B) +3%
- C) -8%
- D) +8%

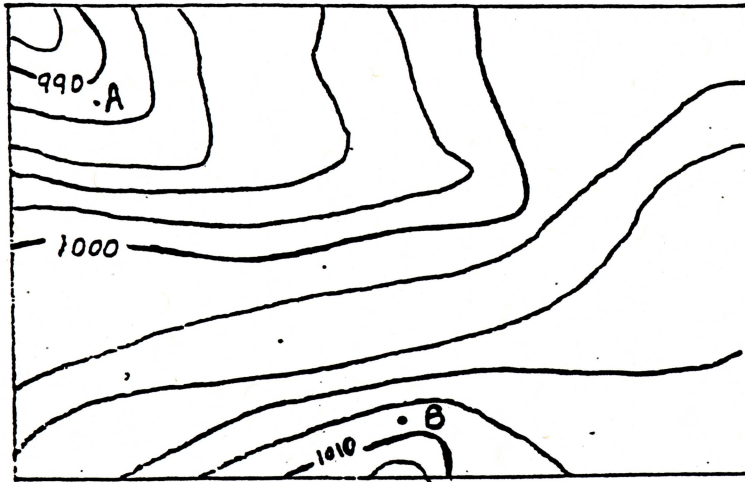
Sta 12+00



Sta 11+43







- 17) What is the difference in elevation from point A to point B?
- A) 14'
  - B) 16'
  - C) 18'
  - D) 20'
- 18) A 24' wide pavement on a curve has an elevation of 708.00 at the inside edge, 708.50 at the centerline and 709.00 at the outside edge. What is the superelevation?
- A)  $\frac{1}{4}$ "/ft.
  - B)  $\frac{1}{2}$ "/ft.
  - C)  $\frac{3}{4}$ "/ft.
  - D) 1"/ft.
- 19) Which one of the following is usually better shown on drawings instead of being described in specifications.
- A) Quality of workmanship, materials, equipment and fixtures
  - B) Finish of materials
  - C) Methods of fabrication and installation
  - D) Location of materials, equipment, outlets, and fixtures
- 20) The subgrade is the sole permanent portion of the roadway...  
Which of the following is best supported by the above sentence?
- A) The subgrade should be constructed so that it will have a considerably longer life than the original road surface used.
  - B) The soils engineer who tests the subgrade and determines its suitability to be used is the most important member of the team which designs the roadway.

- 21) An instrument used generally to determine the area of irregular shapes on drawing is called:
- A) planimeter
  - B) protractor
  - C) durand rule
  - D) french curve
- 22) A match line is used in what instance:
- A) When a drawing won't fit on a single piece of paper
  - B) When tracing a plan and the dimensions are duplicated
  - C) To show a sectional view of a drawing
- 23) What is the most important factor to consider when handprinting letters on a drawing?
- A) The letters should be evenly spaced apart.
  - B) The letters should be bold and dark so that they stand out and can be read at a distance.
  - C) The letters should be printed so that they don't look too bunched up or too far apart.
  - D) The letters should be thin and lightly drawn.
- 24) A 6' deep trench that has been dug on level ground has a top width of 22' and a bottom width of 10'. Which one of the following is the horizontal to vertical slope of the sides?
- A) 0.5 to 1.0
  - B) 1.0 to 1.0
  - C) 2.0 to 1.0
  - D) 1.0 to 4.0
- 25) A new drain line is to be installed under a highway. The way to determine the elevation of the drainage structure at any one station could be from the:
- A) plan view
  - B) profile
  - C) typical section
  - D) drainage structure table
- 26) Which of the following would be used to determine the approximate height of fill required at the centerline of the road:
- A) Plan
  - B) Typical section
  - C) Profile
  - D) R.O.W. Map
- ✓

- 27) The roadbed of a highway is one foot beyond the edge of pavement. From this point one on one slopes are used for a depth of four feet for ditch controls. According to the above, the width of the trapezoidal embankment at the base for a travelway of 12 feet is:
- A) 4'
  - B) 12'
  - C) 21'
  - D) 22'
- 28) On a set of plans for a bridge which view will give you the exact width of the proposed bridge?
- A) detail
  - B) elevation
  - C) longitudinal section
  - D) plan

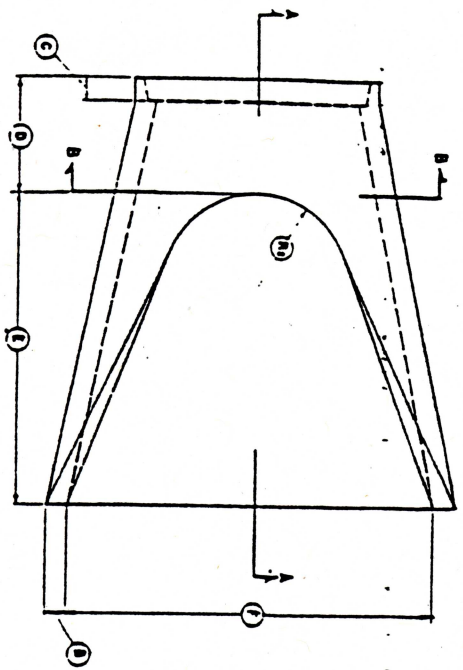
Questions 29 and 30 are based on the following paragraph.

On road construction projects, materials and methods of construction must adhere to Federal and/or A.A.S.H.O. specifications. Corrugated Steel Pipe is one such item.

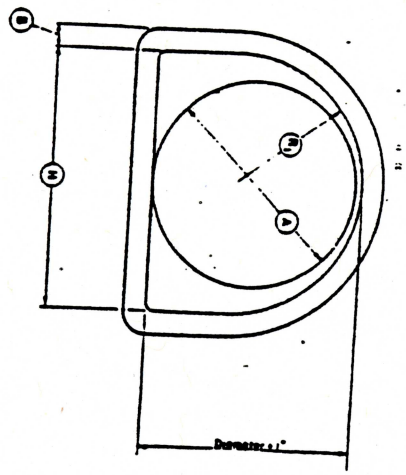
Corrugated steel pipe is fabricated in two foot sections fitted together by riveting and welds at the joints. These two foot sections can be made to any length that is required. The manufacturers, for ease of loading and transportation by railroad car or truck, make pipe lengths in either 20' or 30'. The pipes are available in sizes from 6" to 96" in diameter. The gauge of pipes come in the following sizes; 6, 8, 10, 12, 14, 16, 18, 20, and 22 gauge. Pipes can be made to any length with the use of couplers. Couplers can be made into any length up to 156 inches with corresponding gauge size.

- 29) According to the paragraph, what determines what the length of a pipe is to be:
- A) Federal Fabrication Laws
  - B) A.A.S.H.O. Specifications
  - C) Convenience of loading and transportation
  - D) Diameter and gauge of pipe
- 30) In construction of a road project, a 14 gauge, 7 foot diameter, 44 foot long corrugated metal pipe is required. According to the paragraphs which is true:
- A) Pipe is not made in that gauge
  - B) Pipe is in 2 sections, connected together with a coupler
  - C) Pipe is in 2 sections, connected by a weld
  - D) Pipe is not made in that diameter

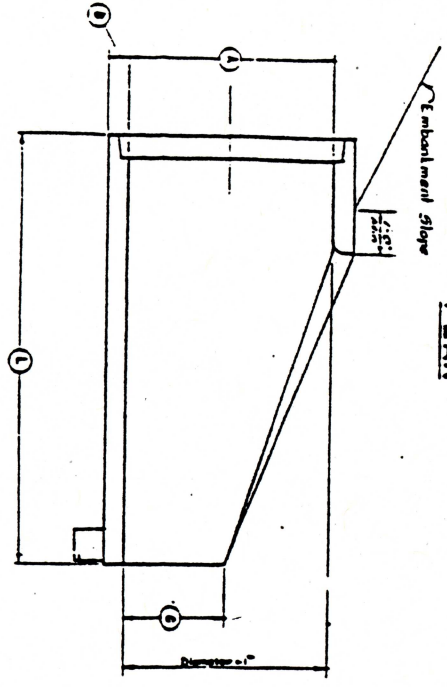




PLAN



SECTION B-B



SECTION A-A

BASIC DIMENSIONS

| A   | B      | C        | D       | E       | F   | G      | H         | DIA ± 1" | SLOPE  | R <sub>1</sub> | R <sub>2</sub> | RATIO A:1 | L         |
|-----|--------|----------|---------|---------|-----|--------|-----------|----------|--------|----------------|----------------|-----------|-----------|
| 12" | 2"     | SEE NOTE | 48 3/8" | 24"     | 24" | 4"     | 19 13/16" | 13"      | 27 : 1 | 10 1/4"        | 9"             | 1.92      | 6'-0 3/8" |
| 18" | 2 1/2" | NO. 3    | 46"     | 27"     | 36" | 9"     | 29"       | 19"      | 27 : 1 | 15 1/2"        | 12"            | 1.66      | 6'-1"     |
| 24" | 3"     |          | 30"     | 43 1/4" | 48" | 9 1/2" | 33 3/16"  | 25"      | 28 : 1 | 16 13/16"      | 14"            | 1.58      | 6'-1 1/4" |
| 30" | 3 1/2" |          | 19 3/4" | 34"     | 60" | 12"    | 37"       | 31"      | 29 : 1 | 18 1/2"        | 15"            | 1.41      | 6'-1 3/4" |
| 36" | 4"     |          | 34 3/4" | 63"     | 72" | 15"    | 47 1/16"  | 37"      | 29 : 1 | 24 3/16"       | 20"            | 1.60      | 6'-1 3/4" |
| 42" | 4 1/2" |          | 35"     | 63"     | 78" | 21"    | 53 7/8"   | 45"      | 29 : 1 | 27 1/4"        | 22"            | 1.46      | 8'-2"     |
| 48" | 5"     |          | 26"     | 72"     | 87" | 24"    | 59 1/2"   | 49"      | 29 : 1 | 30"            | 22"            | 1.40      | 8'-2"     |

\* AREA-1: Area of Nominal Diameter.  
 † AREA-2: Area Thru Section B-B

For questions 31, 32, and 33, refer to drawings and chart on the preceding page.

31) What is the length for an 18' pipe end section:

- A) 6'-1"
- B) 6'-1 $\frac{3}{4}$ "
- C) 8'-1"
- D) 8'-1 $\frac{3}{4}$ "

32) Which one of the following is the outside width for a 30" diameter pipe end section thru B-B?

- A) 37"
- B) 39  $\frac{3}{16}$ "
- C) 44"
- D) 60"

33) Which of the following is the radius "R-2" of a 36" diameter pipe end section:

- A) 12"            B) 14"            C) 20"            D) 22"

Questions 34 - 37 refer to the diagrams on the next page and the following paragraph.

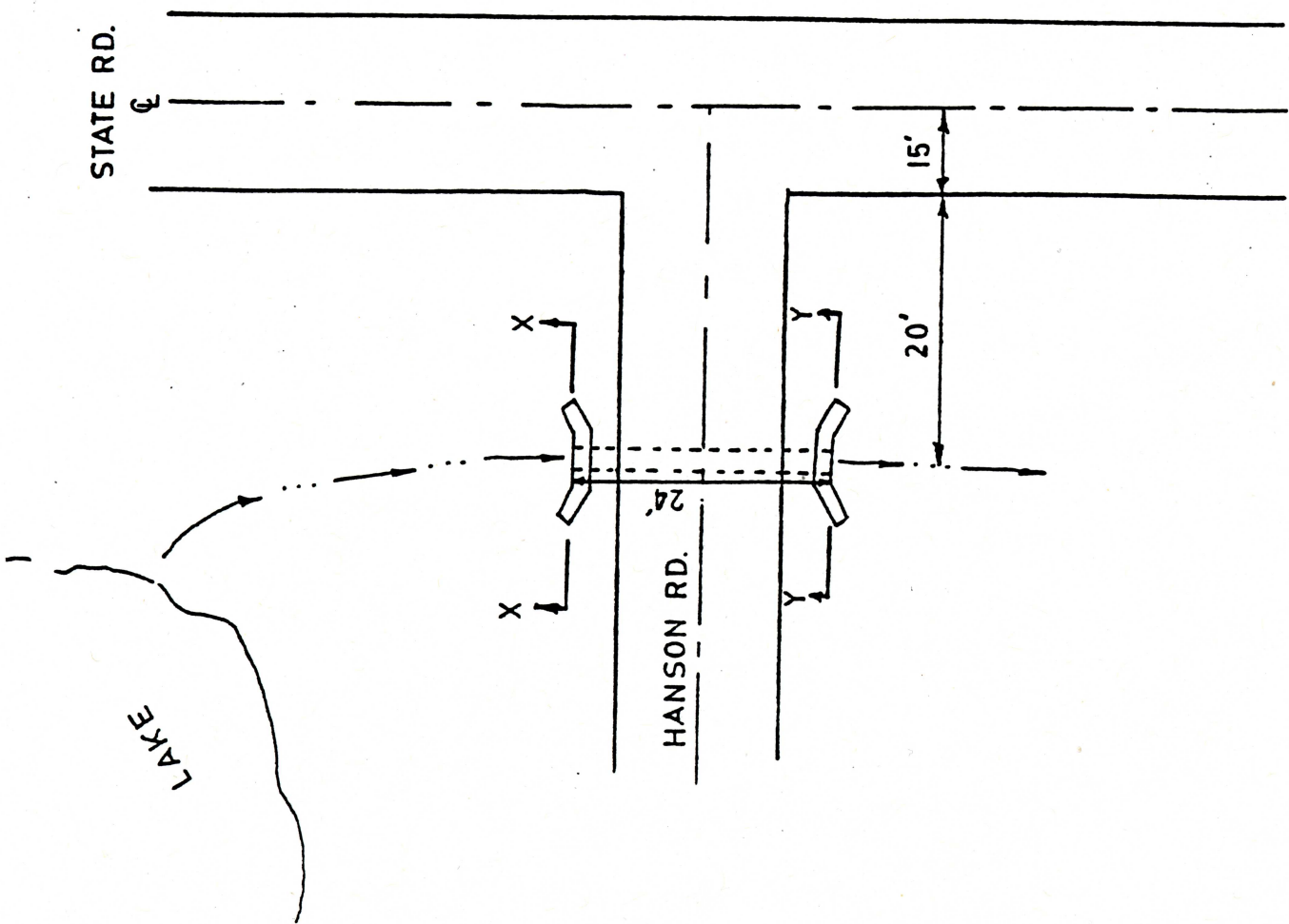
Hanson Road comes into State Road at a right angle. It is planned to replace the existing culvert with a new 12" diameter pipe. The existing culvert is located under Hanson Road 29 feet from the centerline of State Road to the centerline of the culvert. The existing culvert outlets a small lake with an inlet elevation of 672.0.

34) How far is the centerline of the proposed culvert from the centerline of State Road:

- A) 25'
- B) 29'
- C) 35'
- D) 40'

35) The proposed Hanson Road culvert is to be lowered by:

- A) 6"
- B) 10"
- C) 1'
- D) 2'



STATE RD  
⊥

Bottom Ditch  
12" Dia. ○ 670.0'

SECTION X-X

Bottom Ditch  
12" Dia. ○ 669.5'

SECTION Y-Y

NOT TO SCALE

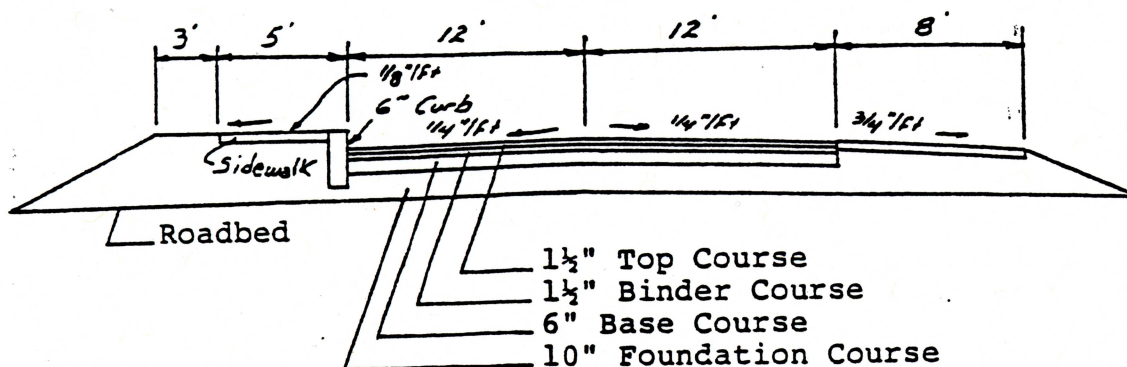
36) The proposed culvert from section X-X to section Y-Y. What is the difference in elevation from section X-X to Y-Y?

- A) 4"
- B) 6"
- C) 8"
- D) 10"

37) How far is the proposed culvert to be moved from the existing centerline location?

- A) 5'
- B) 6'
- C) 7'
- D) 8'

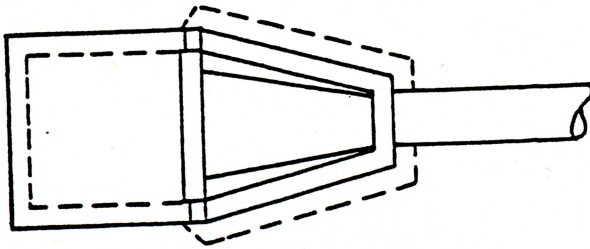
Question 38 refers to the typical section below:



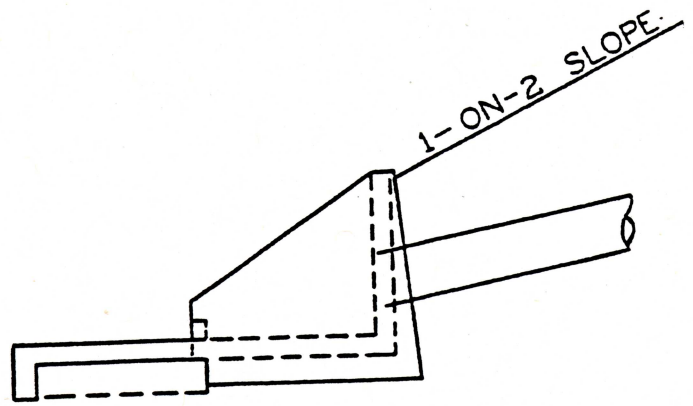
38) Which of the following is mostly nearly the difference in elevation, in inches, between the top of curb and the west edge of the sidewalk?

- A) 1/8"
- B) 3/8"
- C) 5/8"
- D) 7/8"

Question 39 refers to the drawing below:



PLAN



SECTION

39) Which one of the following sewer system structures is shown by the above diagram:

- A) cross-sewer construction
- B) special overflow trap
- C) typical outfall
- D) overdrain outlet

40) In lettering, guide lines are used to control?

- A) Height & slant
- B) Height & thickness
- C) Style & thickness
- D) Thickness & slant

41) Under drafting room conditions, what material is used to obtain a true dimensional drawing?

- A) Acetate film
- B) Linen
- C) Mylar film
- D) Vellum

42) How is the center line designated on a plan drawing?

- A) Short dashes
- B) Long dashes
- C) Long & short dashes
- D) Solid

- 43) If copying a drawing with a scale of  $1'' = 2000'$  to one with a scale of  $1'' = 20'$  what instrument is used?
- A) Planimeter
  - B) Oscillograph
  - C) Pantograph
  - D) Dividers
- 44) A Planimeter is an instrument used for?
- A) Measuring distance in surveying
  - B) Measuring areas on a map
  - C) Measuring altitude of BM on map
  - D) Measuring slope of a plane surface
- 45) What instrument should be used to transfer short measurements on a scale drawing?
- A) Compass
  - B) Drafting machine
  - C) Dividers
  - D) Protractor
- 46) Which lead has the greatest degree of hardness?
- A) HB
  - B) 2H
  - C) F
  - D) 6H
- 47) Essential information can't be shown graphically with?
- A) symbols
  - B) diagrams
  - C) notes
  - D) specifications
- 48) With a pencil, T-square,  $45^\circ \Delta$ ,  $30^\circ - 60^\circ \Delta$  which can be accurately drawn?
- A)  $15^\circ$
  - B)  $22.5^\circ$
  - C)  $105^\circ$
  - D) A & C, Not B

49)

Which are generally used?

- A) 1 & 4
- B) 2 & 3
- C) 2 & 4
- D) 1 & 3

50) Which of the following is the most likely to cause drawings to become dirty?

- A) Eraser
- B) Fingerprints
- C) Graphic dust
- D) Room dirt & dust

51) Lettering guidelines are used to control?

- A) Slant & height
- B)

# PRINCIPAL ENGINEER TECHNICIAN EXAM ANSWER SHEET

- |        |       |
|--------|-------|
| 1) D   | 39) C |
| 2) D   | 40) A |
| 3) A   | 41) D |
| 4) B   | 42) C |
| 5) C   | 43) D |
| 6) C   | 44) B |
| 7) B   | 45) C |
| 8) A   | 46) D |
| 9) B   | 47) C |
| 10) C  | 48) D |
| 11) D  | 49) D |
| 12) B  | 50) C |
| 13) D  | 51) B |
| 14) C  |       |
| 15) A* |       |
| 16) D  |       |
| 17) C  |       |
| 18) B  |       |
| 19) D  |       |
| 20) A  |       |
| 21) A  |       |
| 22) A  |       |
| 23) C  |       |
| 24) B  |       |
| 25) B  |       |
| 26) C  |       |
| 27) D  |       |
| 28) D  |       |
| 29) B  |       |
| 30) B  |       |
| 31) A  |       |
| 32) C  |       |
| 33) C  |       |
| 34) C  |       |
| 35) D  |       |
| 36) B  |       |
| 37) B  |       |
| 38) C  |       |

**\* Answer A is according to civil service, but B is according to NYS Specs and was not an answer choice on the exam.**



# PRINCIPAL ENGINEER TECHNICIAN EXAM

## CONSTRUCTION - GENERAL

1. The most important purpose of grading in Highway work is:
  - A. Provides for surface material in adequate road drain and stable base.
  - B. Allows for runoff of rainwater from pavement.
  - C. Provide for a proper superelevation.
  - D. Prevents fast moving vehicles from leaving the highway.
  
2. Which of the following chemical compounds is used for dust control.
  - A. Calcium hydroxide
  - B. Calcium Chloride
  - C. Sodium Chloride
  - D. Potassium sulphate
  
3. The first thing that should be done before work is begun on the shoulder of a road is:
  - A. Excavate the old shoulder
  - B. The utility companies should be called and the utilities located.
  - C. Protect the traffic from contractor's vehicle.
  - D. Erect Construction signs.
  
4. Underdrain in a roadway should be drained at:
  - A. every 100 foot intervals
  - B. every 200 foot intervals
  - C. into drop inlets
  - D. at the low point in the road
  
5. The term falsework refers to:
  - A. work improperly done by the contractor
  - B. unnecessary work by a contractor in building a structural component
  - C. wooden forms and bracing used to support structural concrete until it has become self-supporting
  - D. work not built to contract specifications

6. The best place to dispose of large stones in an earth embankment which comes from a borrowed area is:
  - A. Near the top of subgrade in roadway area.
  - B. Several feet under the subgrade in the shoulder area.
  - C. Adjacent to culverts and pipe to help stabilize their position.
  - D. Several feet below the subgrade in shallow fills.
  
7. The primary purpose of ditch checks is:
  - A. Protect the side slopes of ditches from eroding.
  - B. Stop water from flowing.
  - C. To drain the water away from the cut slopes.
  - D. To drain the subbase.
  
8. The purpose of underdrain in the shoulder:
  - A. To collect the run-off water of the pavement
  - B. To collect water from the subgrade
  - C. To collect water from the subbase
  - D. To collect surface water
  
9. To scarify a road means to:
  - A. wet the surface
  - B. Use a sheeps foot
  - C. Break up the surface
  - D. Eliminate the bleeding
  
10. The most important factor that the inspector should be concerned about during the installation of subgrade is:
  - A. The angle of repose during pouring
  - B. The per cent of compaction
  - C. The amount of dust raised by work
  - D. The amount of material poured

11. In highway construction, a proper job schedule should have the following in what sequence?

1. roadway excavation
2. compaction of fills
3. clearing and grubbing
4. trimming of road sections
5. compaction of cuts

- A. 3, 1, 2, 5, 4
- B. 3, 5, 2, 1, 4
- C. 4, 3, 1, 2, 5
- D. 1, 3, 2, 5, 4

12. Of the following, which one best indicates the most important reason why weep drains in abutments should be inspected:

- A. To determine whether or not the abutment concrete is deteriorating
- B. To determine whether or not erosion is occurring at the bottom of abutment under the drains
- C. To determine whether or not water pressure is building up behind the abutment
- D. To determine whether or not weep holes should be filled because of adverse affect on appearance of abutment.

13. In constructing the crown of a pavement with an asphalt wearing course and a concrete base course...

- A. the base course will be plane and the crown will be entirely formed by the wearing course
- B. the depth of the base course and wearing course will be uniform over the entire width of the road.
- C. the wearing course will be plane and the base course will be thicker in the center and thinner at the edges.
- D. the concrete course will form half of the crown and the wearing course will form the other half.

14. Which of the following is the best to perform before resurfacing an old gravel road:

- A. Apply prime coat to rolled and graded gravel
- B. Apply hot asphalt directly on gravel
- C. Spray rolled and graded gravel with water
- D. Spray rolled and graded gravel with calcium chloride

15. If the subgrade for a road pavement is accidentally excavated too deep, it should be backfilled if possible with which one of the following:
- A. Concrete
  - B. Earth
  - C. Gravel
  - D. Sandy silt
16. Of the following, the primary purpose of placing underdrains in road shoulders is to prevent
- A. erosion of shoulders
  - B. water from accumulating in subgrade
  - C. puddles from forming in the pavement
  - D. puddles from forming in the shoulders
17. Which one of the following methods of removing course aggregate for cement concrete from large storage piles should be used in order to prevent segregation of remaining material.
- A. remove from the center of the pile at the top
  - B. remove from the perimeter of the pile at the bottom
  - C. remove from the pile in complete layers of even depth from the top
  - D. remove from the bottom to the top from one side of the pile
18. What is the best material to use for a prime coat on structural steel?
- A. asphalt
  - B. creosote
  - C. red-lead
  - D. varnish
19. Assume that it becomes necessary to raise the level of pavement 8". due to economy, 5" of base course asphalt concrete will be placed directly over old pavement with 3" of bituminous binder and wear. The common reason for scarifying the old pavement is to:
- A. create a rough surface for better adhesion
  - B. brake waterproof barrier on existing pavement
  - C. create a more even base

20. The best definition of a borrow pit is as follows:
- A. a trench for a sewer pipe
  - B. a place where sand is taken from to use as fine aggregate
  - C. a place where earth is excavated to use as embankment
  - D. a place where gravel is taken from to use in concrete
21. In repairing the deck of a bridge care must be taken to prevent:
- A. the use of shot crete
  - B. mixing of asphalt cement and portland cement
  - C. the use of reinforced steel
  - D. ponding of water on the finished upper surface
22. A Sheepsfoot Roller is most effective for compacting an embankment that is composed principally of which of the following materials:
- A. slag
  - B. gravel
  - C. silty clay soil
  - D. sand
23. During the construction of earth embankments, water is sprayed sometimes for the purpose of:
- A. Making the grass grow on slopes
  - B. Provide optimum moisture content for compaction.
  - C. Dust control.
  - D. To find out whether or not drainage structures are needed.
24. When possible, earth fills should be constructed using which of the following methods:
- A. Dump large piles in one place
  - B. Place thin layers or lifts
  - C. Complete short sections at a time
  - D. Dump small piles in many places

# ASPHALT

- 1) What is the proper order, of the following, for patching a hole in asphalt concrete road.
  1. Rake and smooth bitumen patch
  2. treat edges
  3. take sign down
  4. place material in hole
  5. roll or tamp
  6. erect signs
  7. clean out hole
  - A. 3, 7, 4, 2, 1, 5, 6
  - B. 6, 2, 7, 4, 5, 1, 3
  - C. 6, 7, 2, 4, 1, 5, 3
  - D. 7, 6, 4, 2, 5, 1, 3
  
- 2) The difference between binder and top in asphalt concrete is:
  - A. Larger size aggregate in the binder
  - B. Larger size aggregate in the top
  - C. More bitumen in binder
  - D. Binder is more pliable
  
- 3) Cutback asphalt is made by:
  - A. modified by aeration
  - B. liquified by fluxing
  - C. refined by steaming
  - D. softened by heating
  
- 4) When is the best time for rolling Asphalt Concrete?
  - A. When a drop of water no longer sizzles on fresh laid asphalt.
  - B. When it doesn't creep under the roller.
  - C. When you can touch it with your hand.
  - D. When the asphalt is as hot as possible.

- 5) The correct order for applying a one step surface treatment for a macadam pavement.
1. rolling
  2. sweeping
  3. application of binder
  4. priming
  5. application of aggregate
  6. broom dragging
- A. 2, 3, 4, 5, 6, 1  
B. 2, 4, 3, 5, 1, 6  
C. 6, 4, 3, 5, 1, 2  
D. 6, 3, 5, 4, 1, 2
- 6) What is the best reason for machine finishing of portland cement concrete as opposed to hand finishing?
- A. better appearance  
B. less efflorescence  
C. a better ride quality  
D. reduce laitance on top of concrete
- 7) On a one mile section of road, a bituminous material was spread using 0.6 gal./s.y. of pavement. If a total of 4,928 gallons were used, what was the width, in feet, of the pavement?
- A. 14'  
B. 15'  
C. 28'  
D. 30'
- 8) The most important consideration during the application of hot-mix asphalt is:
- A. It must be poured on a hot, dry, sunny, summer day  
B. The correct temperature during placing and the proper compaction  
C. It must cure at least 7 days  
D. The paver must be empty before adding another truckload of material
- 9) The principal agent that makes asphalt emulsions workable is:
- A. naptha  
B. flux oil  
C. water  
D. kerosene

- 10) What is the major objection to measuring aggregates by volume?
- A. dry broken stone does not bulk
  - B. sand bulks when wet
  - C. unit weight of small, fine aggregate varies
  - D. unit weight of large aggregate varies
- 11) Very wet aggregates when used for bituminous surfacing tend to
- A. prevent adhesion of bitumen
  - B. promote adhesion of bitumen
  - C. increase ultimate density
  - D. assist in dispersing the bitumen
- 12) A water cement ration of 6 means which one of the following:
- A. a mix contains 6 times as much water as cement
  - B. a mix contains 6 times as much cement as water
  - C. a mix contains 6 gals. of water for each sack of cement
  - D. a mix contain 6 cu. ft. of water for each sack of cement
- 13) Assume you are assigned as an inspector to an asphalt plant. Which 3 of 5 would usually be your specific concern?
- 1. temperature of aggregate leaving dryer
  - 2. temperature of asphalt cement delivered to mixer
  - 3. moisture content of aggregate in stockpile
  - 4. temperature of mixture in haul trucks
  - 5. amount of aggregate in overflow chutes
- A. 1, 2, 4
- B. 1, 3, 4
- C. 1, 2, 3
- D. 1, 3, 5
- 14) Emulsified asphalts are best described as which one of the following?
- A. Asphaltic cements cut-back with naptha or gasoline which evaporate rapidly
  - B. Semi-solid hydro-carbons remaining after lubricating oils as well as fuel oils have been removed from petroleum
  - C. Mixtures in which minute globules of asphalt are dispersed in water or aqueous solution
  - D. Asphaltic cements fluxed or cut-back to greater fluidity by mixing with distillates of the kerosene or light diesel oil type

$\frac{6}{1}$



- 15) What would be used to cut a medium-curing asphalt product:
- A. water
  - B. naphtha
  - C. kerosene
  - D. light oils
- 16) What is the purpose of equipping asphalt concrete pavers with an infrared heater?
- A. To improve compaction capability of the paver.
  - B. Reduce the number of roller passes necessary for compaction.
  - C. Allow for cold weather paving operations.
  - D. Eliminate the longitudinal joint between adjacent lanes.
- 17) What is the principal aggregate in a macadam - aggregate road mix?
- A. sand
  - B. crushed stone
  - C. slag
  - D. bitumen
- 18) Which one of the following is the major difference between the binder and top course of asphaltic concrete mixes.
- A. More bitumen in binder.
  - B. Larger aggregates in top course
  - C. Smaller aggregates in binder course
  - D. Larger aggregates in binder course
- 19) The "Theoretical Maximum Density" of an asphaltic concrete is best defined as:
- A. The percent of voids compacted equals two times the percent of bituminous material.
  - B. The voids compacted are josty fully fills bituminous
  - C. The percent of voids equal percent of mineral aggregate
  - D. The percent of mineral aggregate compacted mixture equals one hundred percent minus the percent of voids
- 20) Before using a hot mix asphaltic concrete surface pavement on an old gravel road or the foundation course of a new road the following should be done:
- A. Apply a prime coat to the graded and rolled surface.
  - B. The graded and rolled surface should be lightly sprayed with water.
  - C. The asphaltic concrete should be directly applied to the graded and rolled surface.
  - D. The graded surface should be sprayed with calcium chloride.

21) Of the following, which one is most often the most important cause of slippery bituminous pavements?

- A. excess of bitumen
- B. excess of coarse aggregate
- C. action of frost
- D. action of water

22) Water is the principal agent in making which of the following workable:

- A. rapid curing cut-back
- B. slow curing cut-back
- C. emulsions
- D. asphalt cement

# BUILDING CONSTRUCTION

- 1) In replacing a window pane the glass should be cut:
  - A. 1/8" less than the sash
  - B. 1/8" greater than the sash
  - C. same size as the sash
  - D. 1/8" less than the sash all around
  
- 2) A built-up roof shows minor cracking and dry felt along a joint for four feet. The best method to fix the roof is:
  - A. seal the crack with tar
  - B. tar and chip entire roof
  - C. remove the old roof and start over
  - D. remove the bad area and start over
  
- 3) When placing a footer for a large building in New York State, the most important factor for the footer should be:
  - A. Footer above the water table.
  - B. Footer below the water table.
  - C. Footer below the frost line.
  - D. Footer five feet below ground.
  
- 4) What is the main use of dummy joints.
  - A. improve appearance
  - B. reinforcing
  - C. predetermine cracks
  - D. a place for a starter key
  
- 5) The timber laid on top of the foundation in order to support the frame is called:
  - A. sill
  - B. header
  - C. stud
  - D. joist
  
- 6) Which of the following is used to achieve an air space between plaster and lathe, and a brick wall?
  - A. stripping
  - B. furring
  - C. ground
  - D. studs

# **PRINCIPAL ENGINEERING TECHNICIAN EXAM ANSWER SHEET - CONSTRUCTION-GENERAL**

- 1) A
- 2) B
- 3) B
- 4) D
- 5) C
- 6) B
- 7) A
- 8) C
- 9) C
- 10) B
- 11) A
- 12) C
- 13) B
- 14) A
- 15) C
- 16) B
- 17) C
- 18) C
- 19) B
- 20) C
- 21) D
- 22) C
- 23) C
- 24) B

**PRINCIPAL ENGINEERING TECHNICIAN EXAM  
ANSWER SHEET - ASPHALT AND BUILDING  
CONSTRUCTION**

**ASPHALT**

- 1) C
- 2) A
- 3) B
- 4) B
- 5) C
- 6) C
- 7) A
- 8) B
- 9) C
- 10) B
- 11) A
- 12) C
- 13) A
- 14) C
- 15) C
- 16) D
- 17) B
- 18) D
- 19) B
- 20) A
- 21) A
- 22) C

**BUILDING CONSTRUCTION**

- 1) A
- 2) A
- 3) C
- 4) C
- 5) ~~B~~ A
- 6) B