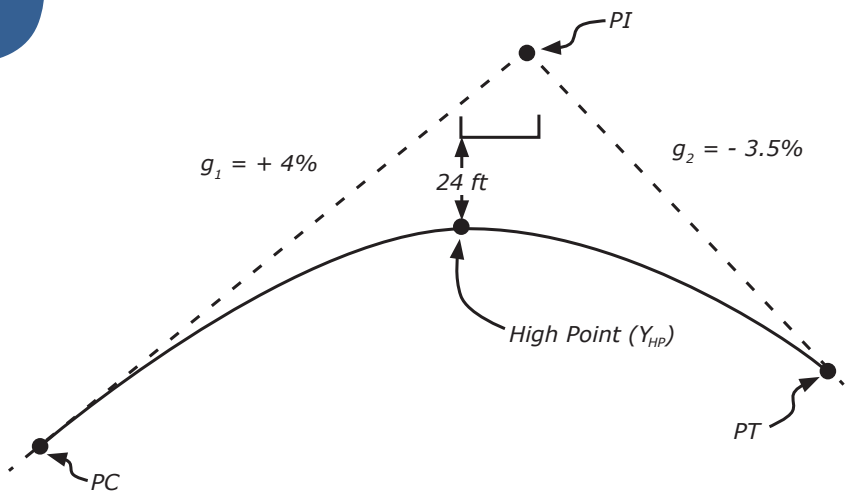
PROBLEM 13

The lowest point of an overpass is required to be 24 ft above the high point of a crest curve, as shown. The distance between the PT and the PI is 400 ft. The elevation of the PI is 1100 ft. Find the elevation of the high point of the curve (Y_{HP}).



Process for answering the problem (quickly write these down for each problem):

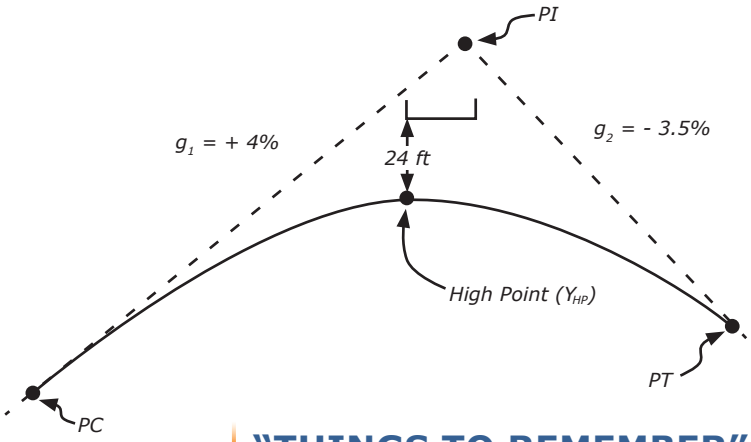
1. What type of problem is it? (5 seconds)
2. What is the problem asking for? (10 seconds)
3. Is there extraneous information? (10 seconds)
4. What references or equations are needed? (10 seconds)
5. Use the space on this sheet or scratch paper to find your solution.
6. Circle the right answer or write down the correct letter (do not fill in the answer sheet bubble yet).
7. If the answer does not appear, see passthecivilPE Exam Advice.

A) 1100.00 ft
B) 950.74 ft
C) 1092.53 ft
D) 678.69 ft

passthecivilPE

SOLUTION 13

The lowest point of an overpass is required to be 24 ft above the high point of a crest curve, as shown. The distance between the PT and the PI is 400 ft. The elevation of the PI is 1100 ft. Find the elevation of the high point of the curve (Y_{HP}).



1. What type of problem is it?
   - Transportation: Geometrics
2. What is the problem asking for?
   - The elevation of the high point of the curve *(Y_{HP})*
3. Is there extraneous information?
   - The information requiring the overpass is not needed
4. What references or equations are needed?
   - The general equation for the high point of a crest vertical curve is:

$$Y_{HP} = Y_{PC} - \frac{L(g_1)^2}{2(g_2 - g_1)}$$

   - The general equation for the elevation at PC is:
5. Solution:

$$Y_{PC} = Y_{PI} \pm g_1 \frac{L}{2}$$

"THINGS TO REMEMBER"

The general equation for the distance from the PC to a low point on a sag vertical curve or a high point on a crest vertical curve is:

$$X_{LP/HP} = \frac{L(g_1)}{(g_2 - g_1)}$$

"THINGS TO REMEMBER"

For the general equations for the elevation, the positive or negative sign depends on if it's a crest or sag curve. Add the second term in the equation if the PC or PT is upslope from the PI. Subtract the second term in the equation if the PC or PT is downslope from the PI.

STEP 1 Find the elevation at PC:

$$Y_{PC} = 1100ft - (0.04)\left(\frac{(2)(400)}{2}\right) = 1,084\ ft$$

STEP 2 Find the elevation at the high point (Y_{HP}):

$$Y_{HP} = 1084ft - \left(\frac{(2)(400)(0.04)^2}{2(-0.035-0.04)}\right) = 1,092.53\ ft$$

Correct Answer: (C)

"THINGS TO REMEMBER"

For vertical curves, PI is located at L/2, this comes in handy for finding L if given PI or vice versa.

"THINGS TO REMEMBER"

L for a vertical curve is the horizontal length between the PC and the PT, not the length of the actual curve along the road.