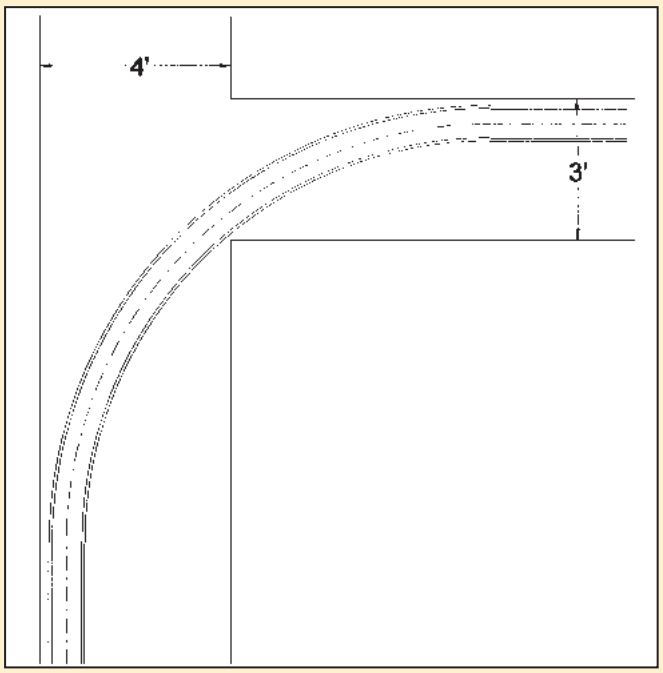
Solution to Problem 57



In **Figure 1** it can be seen that the centerline of the track must be at least a half width of the car less than the far side of the hallways and at least a half width of the car longer than the distance to the corner.

The half width of the car is 2.0625 inches/12 = 0.172', so $(R\text{-}0.172')^2 = (R\text{-}3.828')^2 + (R\text{-}2.828')^2$

R = 10.891' (or 10 feet 10 11/16 inches) by the quadratic equation.

In **Figure 2** you can see that when the right rear of the car is a the B.C. of the tracks the wheels will have moved along the track and deflected the car towards the wall because of the 3 3/4" overhang.

The radius of 10.891' is used to calculate the angle subtended from the middle of the car to either truck pivot:
arcsin (5.75 inches/12)/10.891' = 2°31'18"

The distance from the radius point to the far side of the car at the middle is: (10.891' x cos 2°31'18" + 2.0625 inches/12) = 11.052'

The angle subtended by half the car on the far side is Arctan (9.5 inches/12)/11.052' = 4°05'49"

The distance from the right rear corner to the centerline is:
11.052'/cos 4°05'49" - 10.891' = 0.182'

Anywhere along the track, particularly the corner, the distance from the centerline curve to the side of the car nearest the corner will be:
10.891' - 10.891 x cos 2°31'18" + 2.0625 inches/12 = 0.182'

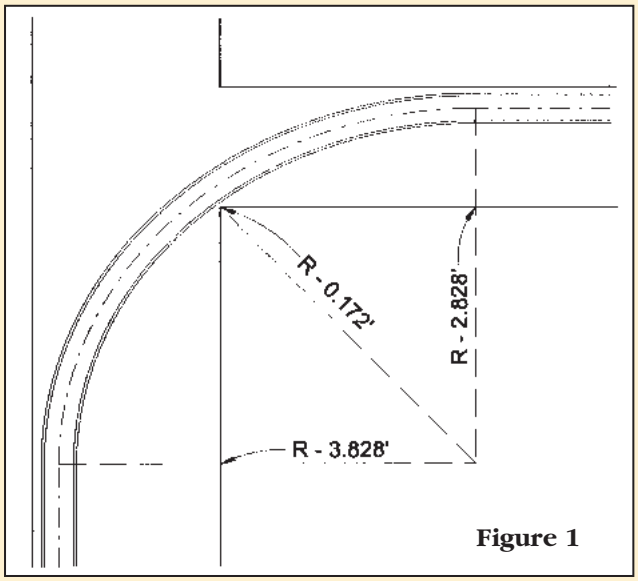


Figure 1

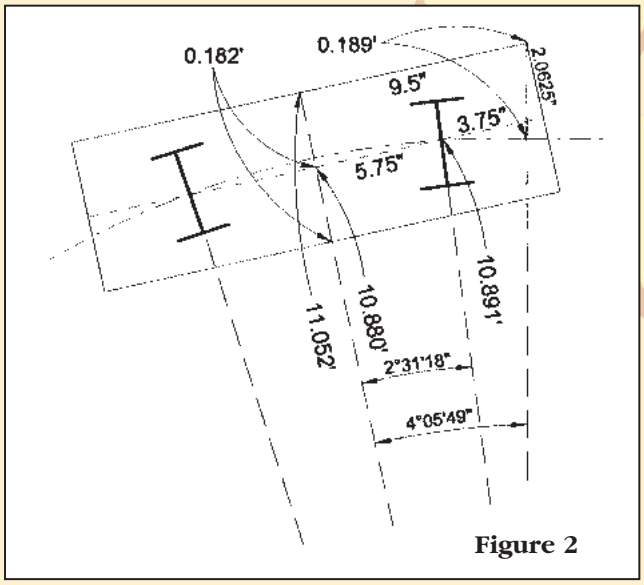


Figure 2

The values in Figure 1 now change to

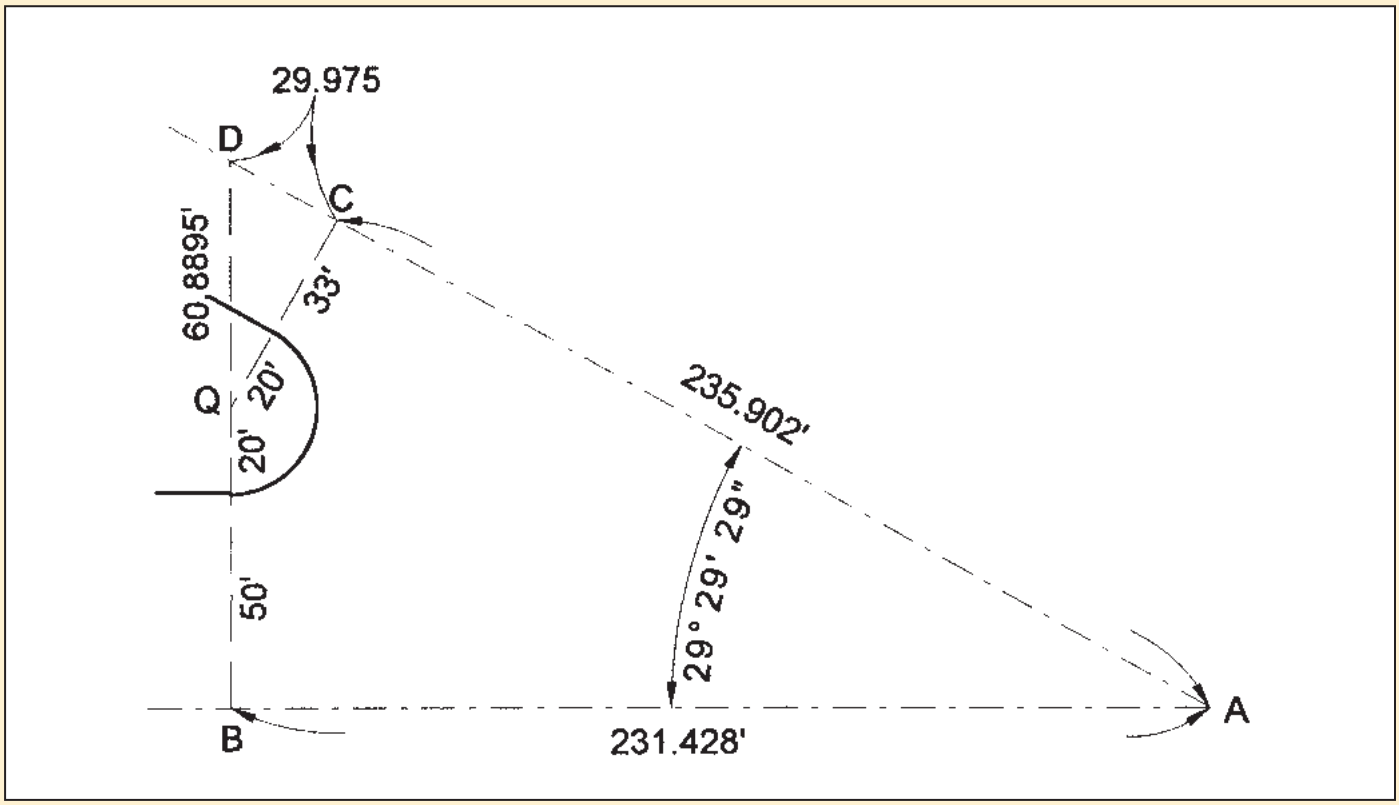
$(R\text{-}0.182)^2 = (R\text{-}3.811)^2 + (R\text{-}2.811)^2$

from which R = 10.808' or 10 feet 9 11/16 inches

(Redoing all the calculations using the new radius changes the offset 0.0007')

Notes: The right rear corner is farthest from the centerline when it is at the B.C. of the tracks. Sketch and calculate the situations where the rear truck is at the B.C., or the middle of the back end of the car is at B.C. and you will see. The track *width* was never a factor.

Solution to Problem 58



$$QD = \frac{53'}{\cos 29°29'29"} = 60.8895'$$

$$CD = 53' \tan 29°29'29" = 29.975'$$

$$AB = (50' + 20' + 60.8895') \tan (90° - 29°29'29") = 231.428'$$

$$AC = \frac{231.428'}{\cos 29°29'29"} - 29.975' = 235.902'$$