

# ILLUSTRATIVE PROBLEM — CONCRETE TO MACADAM DIFFERENTIAL

Yardage cross-sections have been calculated for a 9"-7"-9" Concrete pavement, 18 ft wide, with 1 in. crown. Required that the crown grade line be adjusted in such manner, for a 4"-4"-3" Bituminous Macadam pavement, 18 ft wide, with 1 3/4 in. crown, so that the yardage will be the same for both types.

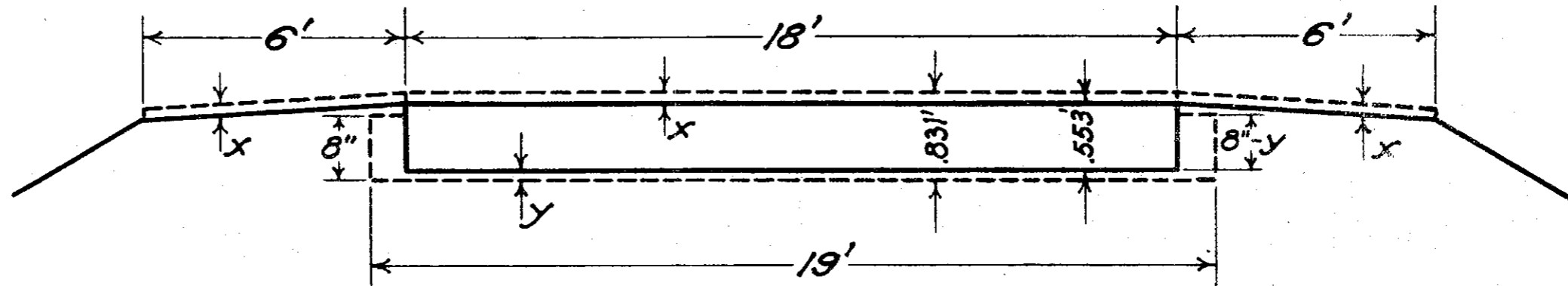
First find the average depth of each pavement below a straight line from edge grade to edge grade (line EE in Dr. No. 120):—

## Concrete

1560 sq in. = Total end area.  
 127 sq in. = End area above line EE (Dr. 120)  
 1433 sq in. = End area below line EE.  
 18'-0" = 216" = Width of pavement.  
 $1433 \div 216" = 6.63 \text{ in.} = 0.553 \text{ ft.} = \text{Average depth of pavement below line EE.}$

## Bituminous Macadam

$216" \times 3" = 648 \text{ sq in.} = \text{Total end area of top course.}$   
 $223 \text{ sq in.} = \text{End area above line EE. (Dr. 120).}$   
 $648 - 223 = 425 \text{ sq in.} = \text{End area of top course below EE.}$   
 $425 \div 216" = 1.97 \text{ in.} = \text{Average depth of top course below line EE.}$   
 $1.97" + 8.00" = 9.97 \text{ in.} = 0.831 \text{ ft.} = \text{Average depth of entire pavement below line EE.}$



$$\begin{aligned}
 12x &= 19y + \{2[0.5'(0.667'-y)]\} \\
 12x &= 19y + .667 - y \quad \text{or} \quad 12x - 18y = .667' \\
 x + y + .553' &= .831' \quad \text{or} \quad x + y = .278' \\
 18x + 18y &= 5.004' \\
 12x - 18y &= 0.667' \\
 \hline
 30x &= 5.671' \\
 x &= .1890' \\
 .1890' + .0625' & \text{ (Diff. in crowns - See Dr. 120)} = 0.25' \\
 &= \text{amount } \frac{1}{2} \text{ grade should be raised for} \\
 & \text{conditions stated above.}
 \end{aligned}$$

## GRADE DIFFERENTIALS FOR EQUAL YARDAGE

DEPARTMENT OF HIGHWAYS  
OHIO

CONST. DR. NO. 121      JUNE 1928.

Approved, 6/12/28 Ch. Engr. Const. E. H.