



# OHIO DEPARTMENT OF TRANSPORTATION

## Pavement Design

C-R-S: **HOL-179-3.90**

PID: **111085**

Date calculated: **9/13/2023**

Data entered by: **Paul Herman**

### ESAL Calculation

#### Input Parameters

Functional Classification = **Collector (Urban)**  
Design period = **20 years**  
Opening day ADT = **1,000**  
Design year ADT = **1,100**  
Directional distribution = **55 %** (default 50%)  
Trucks (24 hour B&C) = **18 %**  
B:C ratio = **1:1**  
Number of lanes = **2** (both directions)  
Lane factor = **100 %**

#### Flexible Pavement ESAL

B ESAL conversion factor = **1.04**  
C ESAL conversion factor = **0.41**  
Daily B-ESAL = **54**  
Daily C-ESAL = **21**  
Total  $W_{18}$  ESAL = **550,532**  
Use **551,000**

#### Flexible Pavement Design

Reliability,  $R$  = **90 %**  
Standard normal deviate,  $Z_R$  = **-1.282**  
Overall standard deviation,  $S_0$  = **0.49**  
Design serviceability loss,  $\Delta PSI$  = **2.0**  
CBR = **4**  
Resilient Modulus,  $M_r$  = **4,800 psi**  
Log ( $W_{18}$ ) = **5.741151599**  
Trial Log ( $W_{18}$ ) based on SN = **5.741077292**  
Difference = **7.43064E-05**  
Structural Number, SN = **3.67**

AC Surface Courses **1.25 inches**  
AC Intermediate Courses **1.75 inches**  
AC Base Courses **5 inches**  
Aggregate Base **6 inches**  
Pavement Structural Number = **3.93 OK**

#### Rigid Pavement ESAL

B ESAL conversion factor = **1.64**  
C ESAL conversion factor = **0.53**  
Daily B-ESAL = **85**  
Daily C-ESAL = **28**  
Total  $W_{18}$  ESAL = **823,900**  
Use **824,000**

#### Rigid Pavement Design

Reliability,  $R$  = **90 %**  
Standard normal deviate,  $Z_R$  = **-1.282**  
Overall standard deviation,  $S_0$  = **0.39**  
Design serviceability loss,  $\Delta PSI$  = **1.7**  
CBR = **4**  
Resilient Modulus,  $M_r$  = **4,800 psi**  
Subbase thickness,  $D_{SB}$  = **6 inch**  
Subbase modulus,  $E_{SB}$  = **30,000 psi**  
Composite Modulus,  $k_c$  = **278 pci**  
Loss of Support,  $LS$  = **1**  
Effective Modulus,  $k$  = **93 pci**

**Doweled, Edge Support**  $J = 2.7$   
Log ( $W_{18}$ ) = **5.915927212**  
Trial Log ( $W_{18}$ ) based on D = **5.915737153**  
Difference = **0.000190059**  
Slab thickness,  $D$  = **6.1675 inch**  
Rigid Pavement Thickness = **6 inch**



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## Pavement Design

Parameters for Rigid Pavement Design

C-R-S: HOL-179-3.90

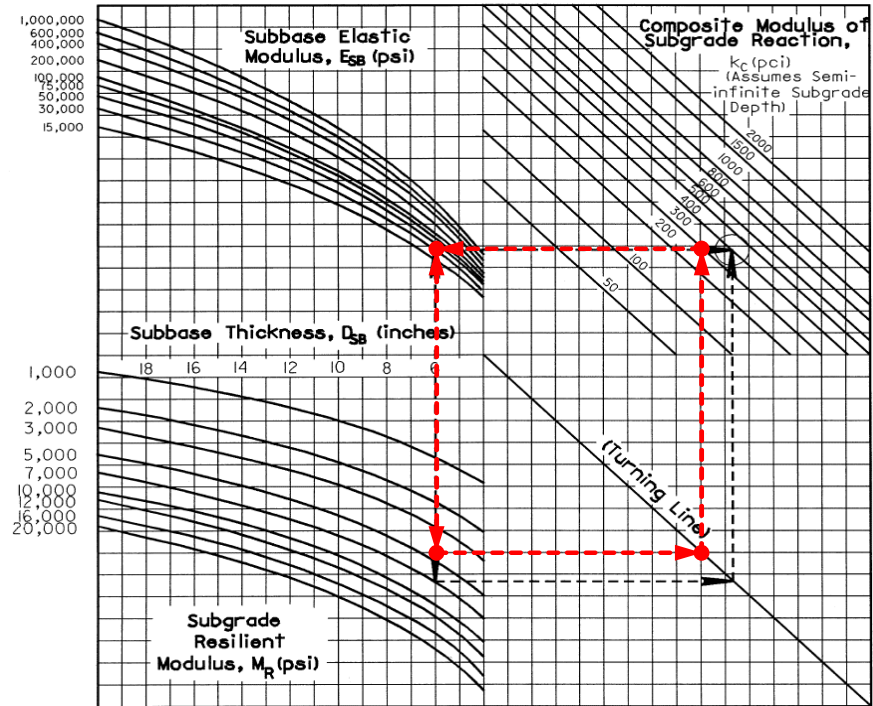
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### Composite Modulus of Subgrade Reaction

$M_r = 4,800$  psi  
 $D_{SB} = 6$  inch  
 $E_{SB} = 30,000$  psi  
 $k_c = 278$  pci



### Effective Modulus of Subgrade Reaction

$k_c = 278$  pci  
 $LS = 1$   
 $k = 93$  pci

