



# Calculation Book Report

**Date:** October 4, 2017

**Technical Owner:** Civil – Brett I. Kesterson, P.E.

**Calculation Book No.** 525

**Standard Drawing No.** P-525

**Drawing Title:** Alley Driveway



Expires 06/30/2019

The following is the equivalent single axle load (ESAL) calculation for a 6-inch thick concrete driveway.



20171002125326772  
.pdf

The following is the equivalent single axle load (ESAL) calculation for an 8-inch thick concrete driveway.



20171002125340943  
.pdf

The following is the flexural strength calculation for concrete that is designed for 3000psi compressive strength in 28 days using the ACPA recommended conversion.



20170310141134119  
.pdf

Calculations made by:  
Name: Brett I. Kesterson, P.E.  
Title: Senior Engineer

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The following is the calculation for maximum joint spacing for 6-inch thickness.



20171002143728851  
.pdf

The following is the calculation for maximum joint spacing for 8-inch thickness.



20171002143741694  
.pdf

# WinPAS

Pavement Thickness Design According to  
1993 AASHTO Guide for Design of Pavements Structures  
American Concrete Pavement Association

## Rigid Design Inputs

Project Name: Concrete Driveway, 6-Inch  
Route: Anywhere  
Location: City of Portland  
Owner/Agency: Transportation  
Design Engineer: Brett Kesterson

## Rigid Pavement Design/Evaluation

Concrete Thickness	6.00 inches	Load Transfer Coefficient	3.20
Total Rigid ESALs	126,600	Modulus of Subgrade Reaction	149 psi/in.
Reliability	50.00 percent	Drainage Coefficient	0.70
Overall Standard Deviation	0.35	Initial Serviceability	3.00
Flexural Strength	478 psi	Terminal Serviceability	1.00
Modulus of Elasticity	3,250,000 psi		

### Modulus of Subgrade Reaction (k-value) Determination

Resilient Modulus of the Subgrade 3,000.0 psi  
Unadjusted Modulus of Subgrade Reaction 0 psi/in  
Depth to Rigid Foundation 0.00 feet  
Loss of Support Value (0,1,2,3) 0.0

Modulus of Subgrade Reaction	149 psi/in.
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# WinPAS

Pavement Thickness Design According to  
1993 AASHTO Guide for Design of Pavements Structures  
American Concrete Pavement Association

## Rigid Design Inputs

Project Name: Concrete Driveway, 8-Inch  
Route: Anywhere  
Location: City of Portland  
Owner/Agency: Transportation  
Design Engineer: Brett Kesterson

## Rigid Pavement Design/Evaluation

Concrete Thickness	8.00 inches	Load Transfer Coefficient	3.40
Total Rigid ESALs	456,400	Modulus of Subgrade Reaction	149 psi/in.
Reliability	50.00 percent	Drainage Coefficient	0.70
Overall Standard Deviation	0.35	Initial Serviceability	3.00
Flexural Strength	478 psi	Terminal Serviceability	1.00
Modulus of Elasticity	3,250,000 psi		

### Modulus of Subgrade Reaction (k-value) Determination

Resilient Modulus of the Subgrade 3,000.0 psi  
Unadjusted Modulus of Subgrade Reaction 0 psi/in  
Depth to Rigid Foundation 0.00 feet  
Loss of Support Value (0,1,2,3) 0.0

Modulus of Subgrade Reaction	149 psi/in.
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### /// STRENGTH CONVERTER ///

Strength (psi):  English / Metric

Convert From:

Convert To:

### CALCULATED RESULTS

English (psi)	Source
520	MEPDG
478	Mindess, Young, and Darwin; Raphael
411	ACI 318
478	ACI 330 *
438 to 548	Yoder and Witczak; Huang

\*ACPA recommended conversion.

### REFERENCES

- MEPDG, 'Guide for Mechanistic-Empirical Design of New and Rehabilitated Pavement Structures: Final Report - Part 2. Design Inputs - Part 2. Material Characterization,' NCHRP 1-37A, Mar 2004.
- Mindess, S., Young, J.F., and Darwin, D., 'Concrete,' 2nd Ed., 2003.
- ACI 318, 'Building Code Requirements for Structural Concrete and Commentary.'
- ACI 330, 'Guide for the Design and Construction of Concrete Parking Lots.'
- Yoder, E.J. and Witczak, M.W., 'Principles of Pavement Design,' 2nd Ed., 1975.

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Heading to #WorldofConcrete? Don't miss our course, Achieving High Quality RCC, Mon., Jan 16,, 8:30 to Noon, North Hall, Rom N222.

5h



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### /// MAX JOINT SPACING ///

#### CONCRETE PAVEMENT STRUCTURE DETAILS

[English / Metric](#)

Concrete Pavement Thickness (in.):

Layer Immediately Below Concrete Surface Course:

 

#### JOINT SPACING RECOMMENDATION

Maximum Joint Spacing:

Note: The ratio of transverse joint spacing to longitudinal joint spacing should not exceed 1.5



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#### CONCRETE PAVEMENT STRUCTURE DETAILS

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Concrete Pavement Thickness (in.):

Layer Immediately Below Concrete Surface Course:

#### JOINT SPACING RECOMMENDATION

Maximum Joint Spacing:

Note: The ratio of transverse joint spacing to longitudinal joint spacing should not exceed 1.5