



Calculation Book Report

Date: October 4, 2017

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

Calculation Book No. 551 **Standard Drawing No.** P-551

Drawing Title: Sidewalks



Expires 06/30/2019

The following is the equivalent single axle load (ESAL) calculation for a 4-inch thick concrete sidewalk.



20170310141109210
.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

The following is the calculation for maximum joint spacing.



20170316141920374
.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 Sidewalk, 4-Inches
Route: Anywhere
Location: City of Portland
Owner/Agency: Transportation
Design Engineer: Brett Kesterson

Rigid Pavement Design/Evaluation

Concrete Thickness	4.00 inches	Load Transfer Coefficient	3.20
Total Rigid ESALs	18,900	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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/// 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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