



Calculation Book Report

Date: October 4, 2017

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

Calculation Book No. 528 **Standard Drawing No.** P-528

Drawing Title: Typical Separated Sidewalk 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

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



20171002143728851
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The following is the calculation for maximum joint spacing for 8-inch thickness



20171002143741694
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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, 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. |
|------------------------------|-------------|

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 Witzcak; 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 Witzcak, M.W., 'Principles of Pavement Design,' 2nd Ed., 1975.

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Find out what's happening:

ACPA @PaveConcrete
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:

[Calculate](#)

[Save Inputs](#)

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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/// 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