

Getting Started with PavementDesigner.org



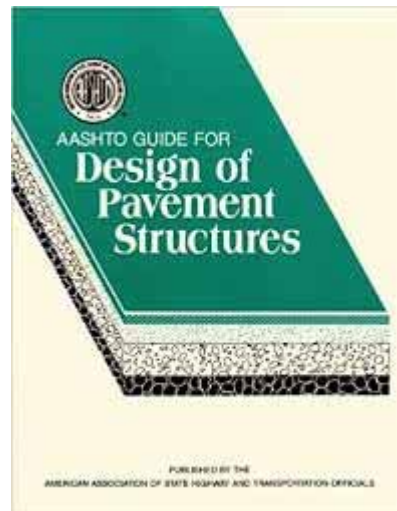
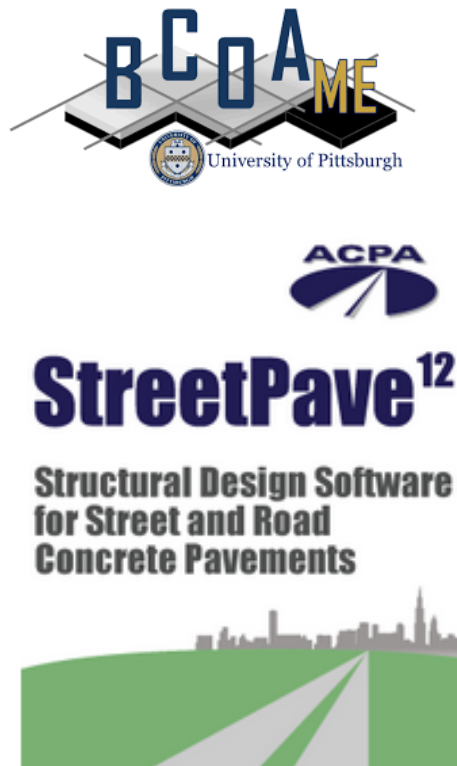
Dan King, E.I.T.
Iowa Concrete Paving Association



What is PavementDesigner.org?

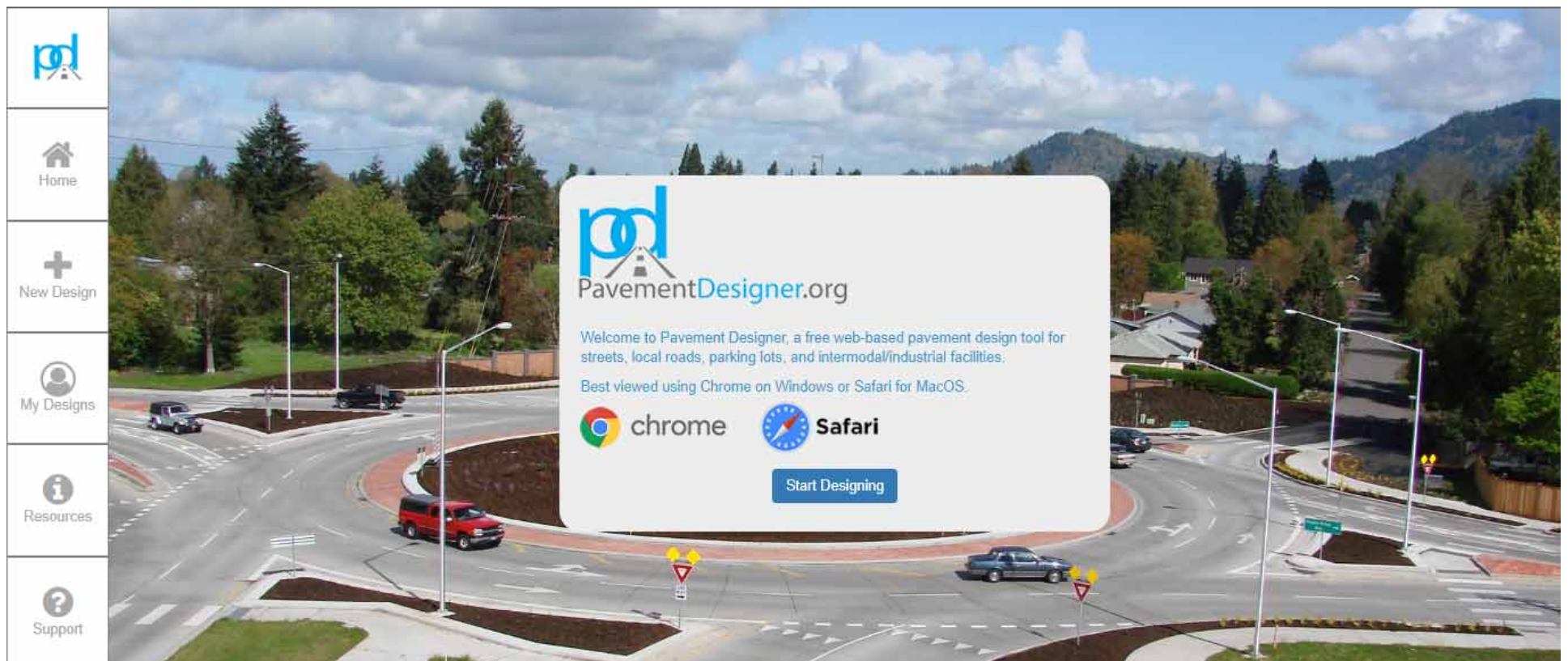
× Background:

- + There are many existing concrete pavement design guides, methods and software applications...



What is PavementDesigner.org?



- ✘ With large variety of programs, industry wanted to bring state-of-the-art methods together into one package—a unified design tool



The image shows a screenshot of the PavementDesigner.org website interface overlaid on a background image of a road construction site. The website interface includes a vertical navigation menu on the left with icons for Home, New Design, My Designs, Resources, and Support. The main content area features the PavementDesigner.org logo, a welcome message, and a 'Start Designing' button. The background image shows a road construction site with a roundabout, streetlights, and a red van.

pd
PavementDesigner.org

Welcome to Pavement Designer, a free web-based pavement design tool for streets, local roads, parking lots, and intermodal/industrial facilities.
Best viewed using Chrome on Windows or Safari for MacOS.

 chrome  Safari

[Start Designing](#)

What is PavementDesigner.org?

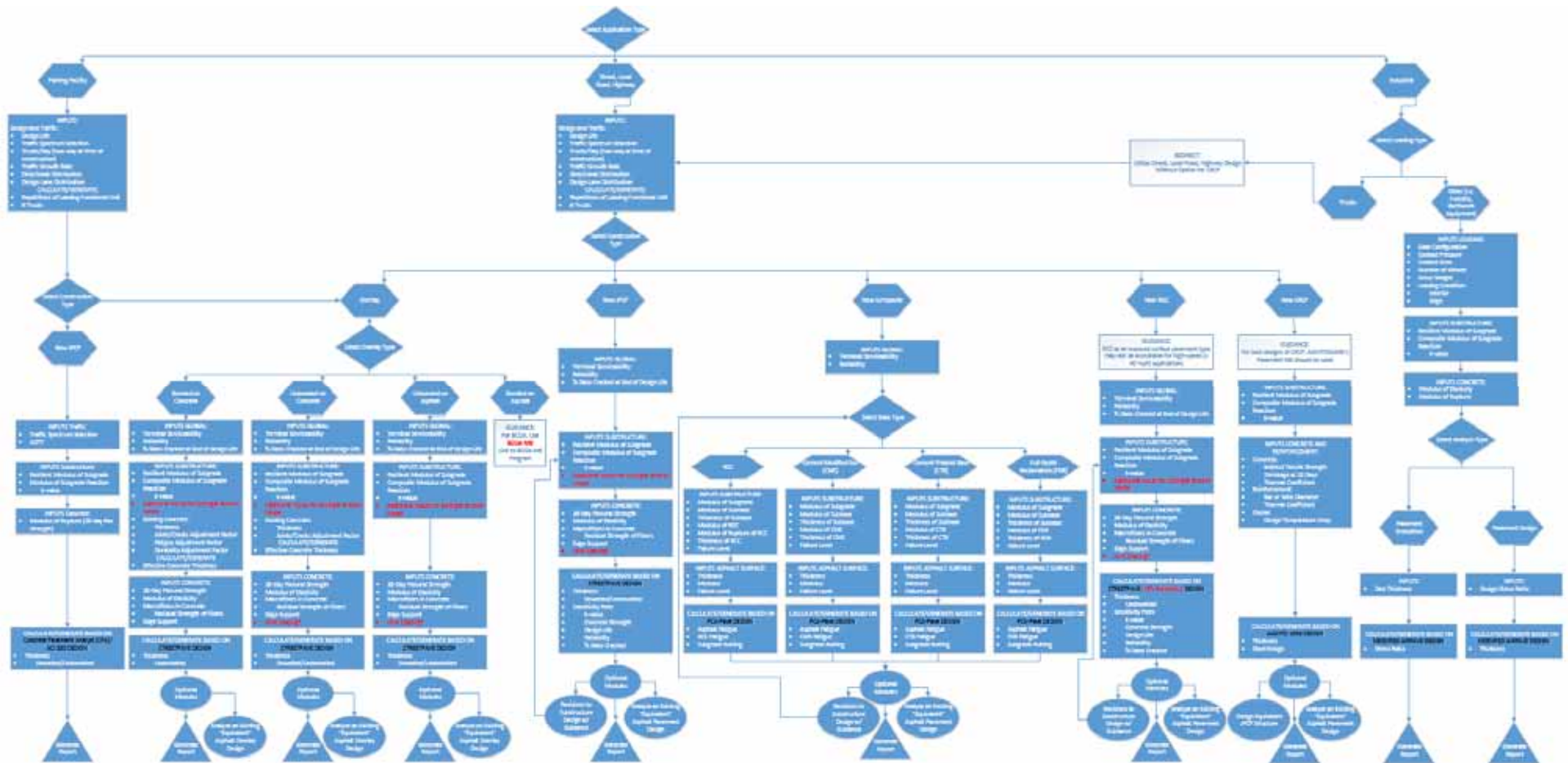
- × A new, **unified** concrete pavement design tool for:
 - + Streets and local roads
 - + Concrete overlays
 - + Parking lots
 - + Industrial parking and trucking facilities

- + Special thanks – Eric Ferrebee, ACPA



What is PavementDesigner.org?

✘ Many design methods in one tool:



What is PavementDesigner.org?

× Other key features:

- + Free-to-use
- + Accessible through web browser
- + Modern, streamlined interface
- + Save and share projects, design reports
- + Links to a library of supplemental resources





Designing Streets & Local Roads

Designing Streets & Local Roads

- × Concrete Street Design in PavementDesigner.org
 - + Uses ACPA's [StreetPave](#) software
 - + Underlying method: PCA pavement design method
 - × Current Iowa DOT concrete pavement design method
 - + MnDOT allows use of StreetPave by city, county and consulting engineers



PCA Method

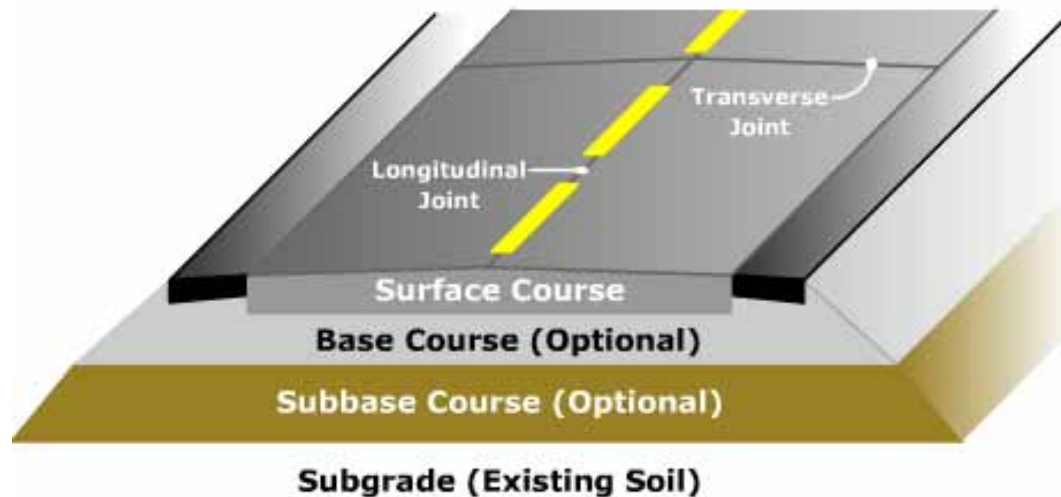
- × Designs the concrete pavement structure based on two design (failure) criteria:
 - + Fatigue
 - × Cumulative damage to the pavement caused by repeated loading at the edge of the slab
 - + Erosion
 - × Cumulative damage (loss of foundation support, joint faulting) caused by repeated deflections at corner of the slab

Designing Streets & Local Roads

- × Procedure produces a design concrete slab thickness
 - + Different thickness will be provided for doweled and undoweled conditions
 - + Depending on number and types of trucks, either the fatigue or erosion criteria will “control” the design
 - × Fatigue analysis may control design under lighter truck traffic, single-axle loads
 - × Erosion analysis may control design under heavier truck traffic, tandem axle loads

Designing Streets & Local Roads

- ✘ User-defined inputs for traffic, concrete strength, soil properties, subbase layers...
 - + Guidance available within the program, as well as from MnDOT



©2003 Steve Muendi

Image: Wikipave

Designing Streets & Local Roads

× Technical Memorandum No. 12-SA-03 (2012):



Link:

<http://www.dot.state.mn.us/stateaid/admin/memos/12-sa-03.pdf>

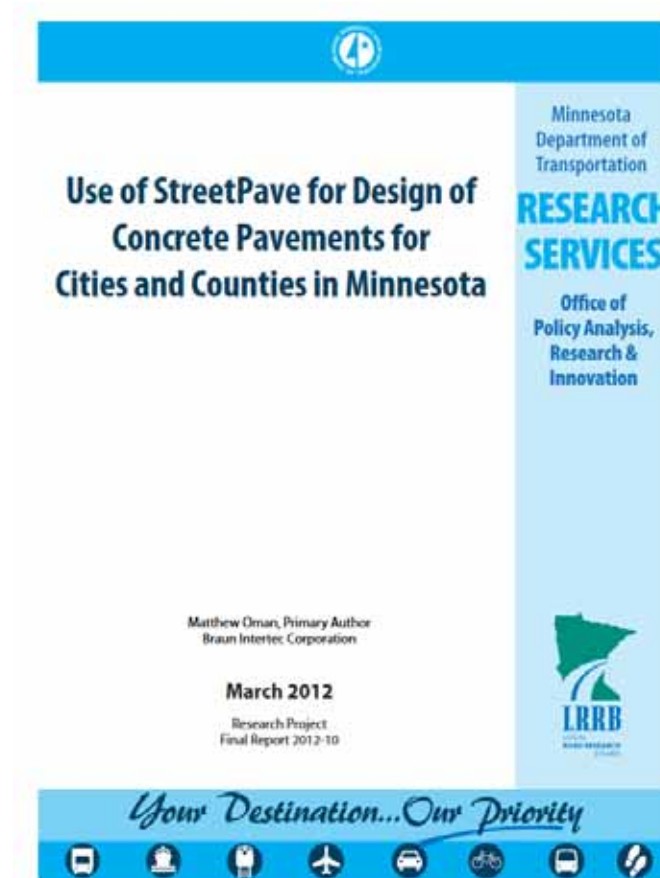
ACPA StreetPave Software Recommendations

The following are some general guidelines for using StreetPave that should be considered while designing concrete pavements:

- Most importantly, use the "HELP" menus in the software for guidance and to select the majority of the input values. The "HELP" menus offer detailed explanations of input choices and values, although the terminology may be different.
- The following are recommended user input values:
 - Cracked Slabs: 15% for arterial/collector roads, 25% for residential roads.
 - Terminal Serviceability: 2.25.
 - Reliability: 75-85% for all road types, or at the discretion of the designer.
- Design Life: Selected by the individual agency
- Traffic Category: Choose the category being designed for, and then enter average daily truck traffic or average daily traffic including percentage of trucks. The method to enter traffic and vehicle classification counts in the StreetPave is being worked on and will be updated. Currently, the StreetPave uses a load spectrum platform to compute concrete pavement thicknesses which is different from Rigid Pav design software.
- Design Lane Distribution: Use StreetPave built-in values based on the number of lanes at the facility.
- Subgrade Support: Use the recommended and composite k-values from the StreetPave "HELP" file. To convert R-value to a k-value, a general range of R-values from 12 to 70 is common for soils in Minnesota; this range corresponds to a k-value range of about 75 to 220 using StreetPave's recommendations. You may also use [this chart](#) to compute the design k-value.
- Concrete Modulus of Rupture: 665 psi.
- Concrete Modulus of Elasticity: Use default value from StreetPave.

Designing Streets & Local Roads

- ✘ Longer report with sensitivity analysis, design examples, comparison to RigidPave:



Designing Streets & Local Roads

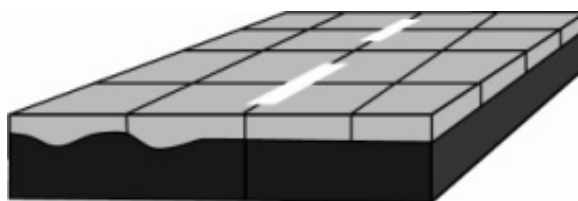
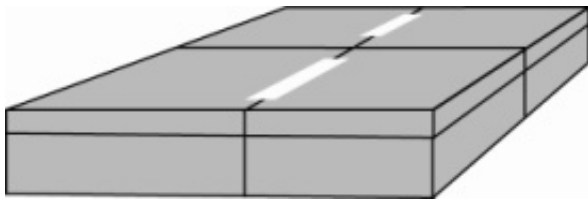
× Demo/walk-through



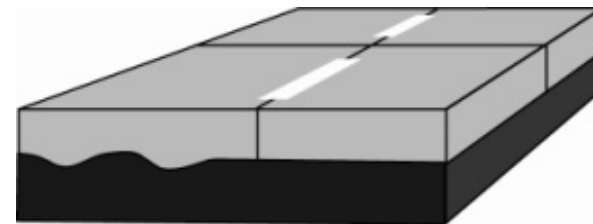
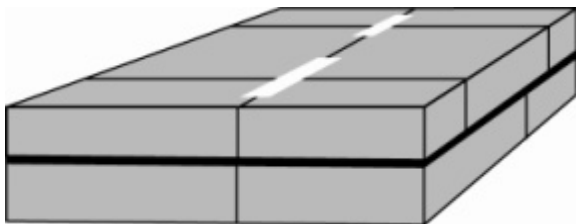
Other Tools in PavementDesigner.org

Concrete Overlays

- × All different types of concrete overlays are included:



Bonded Overlay Family



Unbonded Overlay Family

Concrete Overlays

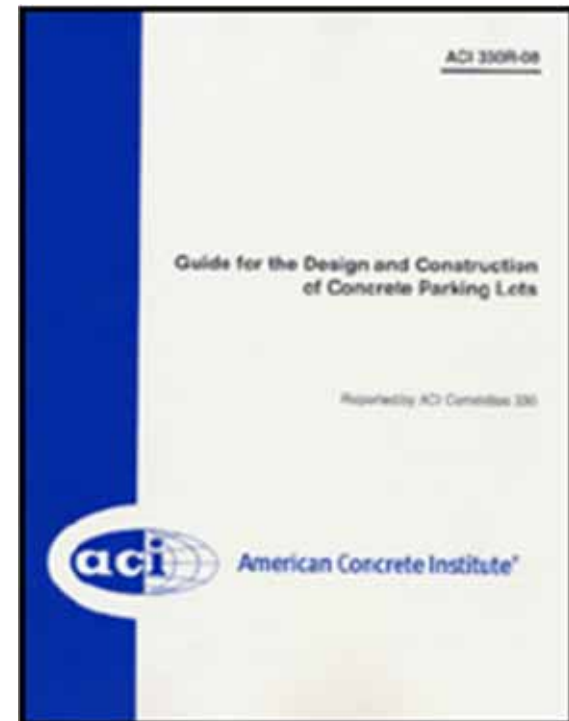
× Design methods:

- + Unbonded overlays: PCA/AASHTO methods
- + Bonded overlays of asphalt: BCOA-ME (external link)
 - × This method incorporates some of the newer mechanistic-empirical pavement design inputs, like climate factors, slab curling, etc.



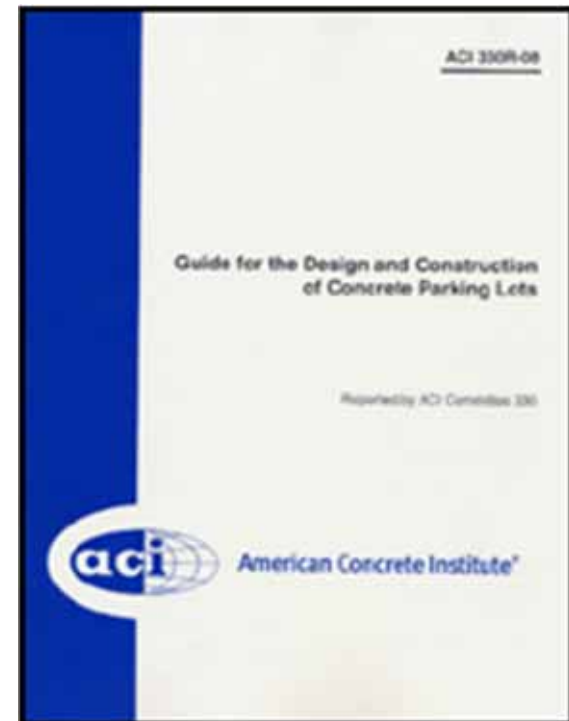
ACI Parking Lot Design

- × ACI 330R-08: Guide for the Design and Construction of Concrete Parking Lots
- × Thickness design components are fully incorporated into PavementDesigner.org
 - + Same StreetPave/PCA design methodology



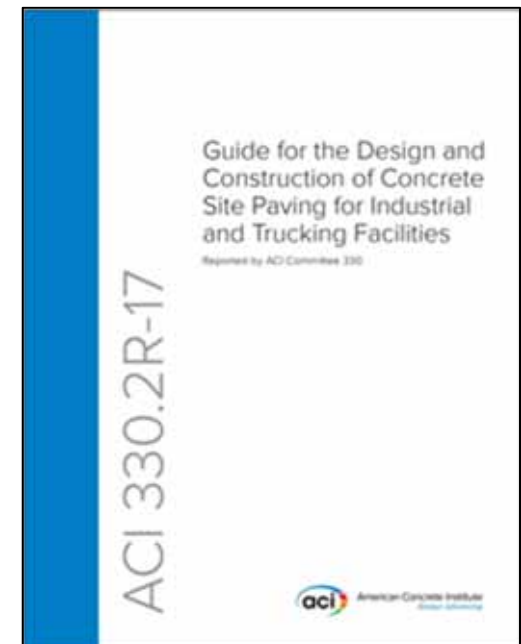
ACI Parking Lot Design

- ✘ The ACI guide also contains good guidance on non-structural design items
 - + Jointing
 - + Reinforcement options
 - + Subgrade and subbase preparation



Industrial & Trucking Facility Design

- × ACI 330.2R-17: Guide for the Design and Construction of Concrete Site Paving for Industrial and Trucking Facilities
 - + New in 2017!
- × Thickness design components use combination of StreetPave/PCA Methodology + ACPA AirPave
 - + Included in PavementDesigner.org



Industrial & Trucking Facility Design

- × Many of the general principles in this guide follow those of “regular” parking lots

- × In
lo



PavementDesigner.org

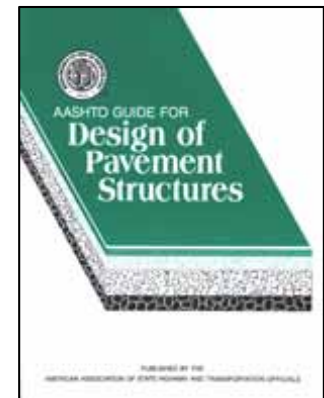
× In summary:

- + PavementDesigner.org is a great resource for designing concrete pavements for all types of applications
- + Online, web-based, easy-to-use
- + Future: program can be updated with improvements to design procedures without need for download, software update, etc.

PavementDesigner.org

× Final thoughts

- + Different design procedures can be effective and useful tools, provided:
 - × Good understanding by practitioner
 - × Applicable to situation you are designing for
 - × Quality of data and inputs
 - × Ability to customize input values





Thank You!