

FAQ

Concrete Parking Lot Design & Construction Specifications

The intent of this document is to address, through references to industry publications and expertise, common design questions and issues that arise during the course of designing and constructing concrete parking lots.

Reinforcement

We've always used Welded Wire Mesh (WWM) and you are telling us not to. What gives? Welded wire mesh provides no increase in pavement structural capacity as some mistakenly believe. The job of WWM is to keep cracks tight that may form from environmental or traffic loading stresses. To keep cracks tight, the mesh has to be put in the correct place, which is rarely done. Below are references citing more explanations:

1. **ACI 330R-08** "When pavement is jointed to form short panel lengths that will minimize intermediate cracking, distributed steel reinforcing is not necessary. The practice of adding distributed steel to increase panel lengths has largely been discredited, and generally leads to excessive joint movements and interior panel cracks that deteriorate over time."
2. **ACPA (RT3.01)** (<http://www.concreteparking.org/downloads/RT3.01.pdf>) "If the pavement is jointed to form relatively short panels that will control cracking, distribute steel is not necessary. This design is called plain or non-reinforced concrete. For light traffic situations, load transfer is provided by aggregate interlock – the roughness of the cracked faces beneath the joint."

When should dowels be incorporated?

ACI 330 R-08 "Experience has shown that dowels or other load-transfer devices are not needed for most parking lot conditions... In thinner pavements of 7 in. and less, round dowels can be impractical or counterproductive. Usually, it is more economical to keep joint space close, using aggregate interlock, and thicken the pavement slightly, if necessary to reduce deflections."

Jointing

Why is jointing so important? Beyond aesthetics, jointing has many purposes including improving long-term durability. Some of the best concrete parking lots have been achieved with proper jointing patterns, completed at the correct time of placement with proper tools and without secondary reinforcement. Jointing details are often over-looked and can lead to pavement performance issues if not designed and detailed correctly. In fact, NRMCA believes proper jointing is so important that it created a program called the Design Assistance Program to aid engineers in concrete parking lot design and jointing at no cost to the engineer. References and other educational related to jointing may be found in:

1. **ACI 330R-08** (Section 3.7)
2. **NRMCA Concrete In Practice (CIP) Series #4 and #6**
3. **NRMCA Jointing Webinar**
4. **ACPA Intersection Joint Layout IS006P**
5. **ACPA Design and Construction of Joints for Concrete Streets IS0061P**
6. **ACPA Concrete Pavements with Undoweled Joints for Light Traffic Facilities IS00405P**

Expansion Joints

We've always put expansion joints every 25-50 feet to prevent unwanted cracking, what has changed? There are three types of joints:

construction, contraction and isolation joints. Construction joints are for the purpose of providing an interface between placements done at two different times. Contraction joints predetermine crack locations associated with hydration and curing of concrete. For contraction and construction joints, the maximum joint spacing regardless of thickness is 15 feet according to American Concrete Institute documents. The FHWA states that good design and maintenance of contraction (sawcut) and construction joints have virtually eliminated the need for expansion joints, except at fixed objects such as structures. In these situations isolation joints, which are similar in nature to expansion joints, are now used to separate concrete from fixed objects to accommodate for horizontal and vertical movement. In particular, isolation joints are used when concrete pavements meet structures. And, wood strips are not a good idea in any type of concrete joint because they restrain the natural movement of the concrete from changing environmental conditions.

1. **ACI 330R-08** (Section 3.7.3) "Isolation joints are not recommended for routine use as regularly spaced joints. They are difficult to construct and maintain, provide no load transfer, and can be a source of pavement distress, distortion, and premature failure."
2. **ACPA – IS400.01P** *Proper Use of Isolation and Expansion Joints in Concrete Pavements.*
3. **ACI 224.3R-95** *Joints in Concrete Construction – Chapter 6.*

Subbase

We have terrible soil conditions, how can you say we don't need a subbase under concrete? Every job is addressed differently depending on the local conditions and application. Some soils can offer great support for concrete parking lots and can actually perform better than imported aggregates. Many concrete parking lots have been completed with no base and are performing well years later. Other parking lots need additional base due to the conditions of the project. Often light-duty and





heavy-duty pavement sections are differentiated on the plans and can be addressed accordingly.

1. **ACI 330R-08** (Section 3.4) "It is not economical to use subbase material for the sole purpose of increasing k-values—granular subbases are not normally used for concrete parking lots and should not be used as a construction expedient instead of proper subgrade preparation... Normally, pavements that carry less than 200 heavily loaded trucks/day will not be damaged by pumping, especially if speeds are low; therefore, they do not require subbases."
2. **ACI 325.1 R-02** "Experience suggests that for pavements that fall into residential classification (22 kip SAL, 34 kip TAL) the use of a subbase to increase structural capacity may or may not be cost effective in terms of long term performance of the pavement... With adequate subgrade preparation and appropriate considerations for surface and subgrade drainage, concrete pavements designed for city streets may be built directly on subgrades because moisture conditions are such that strong slab support may not be needed."
3. **ACPA EB204P** – "Subgrades and Subbases for Concrete Pavements" page 43.
4. **AASHTO 1993 Manual:** "In cases where design traffic is less than 1 million ESALS, an additional subbase layer may not be needed."
5. **National Cooperative Highway Research Program - NCHRP 27** "It is agreed that base is not required under concrete pavement for low-volume roads and streets except where

the percentage of heavy vehicles is unusually high. Pumping is not a problem unless there are large numbers of heavy wheel loads and the pavement foundation is wet."

6. **Design of Subgrades and Bases Under Concrete Pavements in Low Volume Pavement Applications**

<http://www.rmc-foundation.org/>

Joint sealing

What about joint sealing? We always ask owners if they plan to maintain the joint sealants. If the answer is no, the owner is better off keeping the joint spacing small. Recent studies from Texas A&M...

1. **Design of Subgrades and Bases Under Concrete Pavements in Low Volume Pavement Applications**
<http://www.rmc-foundation.org/>
2. **ACI 330R-08** (Section 3.9)
3. **<http://sealnoseal.org/>** - The Seal/No Seal Group was formed to respond to the age-old industry question about the value of sealing concrete pavement joints.

Pavement Thickness

What is the best way to determine pavement thickness for parking lots?

1. **ACI330R-08** *The Guide for the Design and Construction of Concrete Parking Lots.*
2. **NRMCA's Concrete Analyst Software** – http://www.concreteanswers.org/CPA_software.html



Scan this QR code to visit the Design Assistance Program Webpage.

NRMCA offers a Design Assistance Program (DAP) that supports any designer that is not comfortable with designing parking lots in concrete.

This service is free and more information can be found at: <http://www.concreteanswers.org/services/dap.html>
Or by contacting one of NRMCA's Local Paving Directors in your region: http://www.concreteanswers.org/Natl_Account_Services.html

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