

# FAQ

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## Concrete Parking Lot Design & Construction Specifications

*The intent of this document is to address common questions and issues that arise during concrete parking lot pavement design and construction.*

### Steel

**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 strains or traffic loading stresses. To be effective, the mesh must be installed correctly, which is rarely done. Below are references citing further explanation:

1. **ACI PRC-330-21/ACI 330.2R-17:** "When a pavement is jointed to form short panel lengths that will reduce warping and curling, and relieve internal stresses, mid-panel reinforcement is not necessary. The practice of adding distributed steel to increase panel lengths has largely been discredited and leads to excessive joint movements and interior panel cracks that deteriorate over time. Shorter unreinforced panels are generally more economical and provide better performance."
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 nonreinforced 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?

Experience has shown that dowels or other load-transfer devices are not needed for most parking lot conditions. In thinner pavements of 7 inches and less, dowels can be impractical or counterproductive. Usually, it is more economical to provide load transfer through aggregate interlock by keeping sawcut joint space close and by slightly increasing pavement thickness to reduce deflections at the joint. Dowels should be considered at construction joints for heavier traffic loads. For additional information, refer to ACI PRC-330-21 for unreinforced concrete parking lots which is applicable for passenger vehicle parking areas, driveways and drive lanes that can include some trucks, busses or fire trucks, and delivery and trash pickup areas that may see moderate numbers of loaded tractor trailers, delivery trucks and/or garbage trucks. For heavier duty and industrial applications, refer to ACI 330.2R-17, Design and Construction of Concrete Site Paving for Industrial and Trucking Facilities.

### Are tie-bars the same as dowels and when should they be used?

Dowels provide load transfer and allow movement at joints. Tie bars should not be used to provide load transfer and they restrain movement at joints. Tie bars are typically used at construction joints where you want concrete elements to move together, such as the slab joint along a curb & gutter or a longitudinal joint of a driveway centerline. For more information refer to ACI PRC-330-21 and ACI 330.2R-17.

## 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 or owner. References and other educational materials related to jointing may be found in:

1. **ACI PRC-330-21 (Section 3.7)**
2. **ACI 330.2R-17 (Section 4.4)**
3. **NRMCA Concrete In Practice (CIP) Series #4 and #6**
4. **NRMCA Jointing Webinar**
5. **ACPA Intersection Joint Layout IS006P**
6. **ACPA Design and Construction of Joints for Concrete Streets IS0061P**
7. **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 individual concrete placements completed at 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 (ACI) documents. The Federal Highway Administration (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. Isolation joints are used when concrete pavements meet structures. The use of wood strips to divide panels in lieu of standard sawing or tool jointing contraction joints is not recommended. Wood divider strips break the aggregate interlock that is important for holding panels in a flat, horizontal plane.

1. **ACI PRC-330-21 (Section 3.7.3):** "Isolation joints are not needed to accommodate expansion when contraction joints are properly spaced; their use should be limited to the role of isolating other structures or fixed objects."

2. **ACI PRC-330-21 (Section 3.7.4):** "When pavement is jointed in accordance with Table 3.7, expansion joints are not necessary."
3. **ACI 330.2R-17 (Section 4.4.2.1):** "Isolation joints should not be confused with expansion joints, which are not needed in jointed, unreinforced concrete pavement."
4. **ACPA – IS400.01P:** Proper Use of Isolation and Expansion Joints in Concrete Pavements.
5. **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 may 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 PRC-330-21 (Section 3.4):** "It is typically not economical to use imported subbase material or to chemically treat the subgrade for the sole purpose of increasing k-values. Note that increases in subbase thickness do not result in proportional k-value improvement. Furthermore, a thicker subbase layer can experience secondary consolidation that can be detrimental to the uniform support of the pavement."
2. **ACI 330.2R-17 (Section 3.1):** "When the existing soil has adequate strength, volumetric stability, and nonpumping material properties, the pavement can be placed directly on the existing prepared, graded and compacted subgrade."
3. **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, uniform 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."

4. **ACPA EB204P:** "Subgrades and Subbases for Concrete Pavements" page 43."
5. **AASHTO 1993 Manual:** "In cases where design traffic is less than 1 million ESALS, an additional subbase layer may not be needed."
6. **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."
7. **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 with closely spaced joints.

1. **Design of Subgrades and Bases Under Concrete Pavements in Low Volume Pavement Applications** <http://www.rmc-foundation.org/>
2. **ACI PRC-330-21 (Section 3.7)**
3. **ACI 330.2R-17 (Section 4.4)**
4. **<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. **ACI PRC-330-21:** *Commercial Concrete Parking Lots and Site Paving Design and Construction*
2. **ACI 330.2R-17:** *Guide for the Design and Construction of Concrete Site Paving for Industrial and Trucking Facilities*
3. **[www.pavementdesigner.org](http://www.pavementdesigner.org)** a free web-based pavement design tool for streets, local roads, parking lots and intermodal/industrial facilities.

A photograph showing a person's legs and hands as they lift a yellow kettlebell from the ground. The person is wearing dark shorts and sneakers. The floor is concrete, and there is a cloud of dust or steam rising from the kettlebell. The background is dark and out of focus.

Let our Pave Ahead  
Design Assistance  
Team do the heavy  
lifting for your  
pavement design.

We know that no two paving jobs are alike. That's why NRMCA developed the Design Assistance Program (DAP). Our dedicated team of professional engineers will provide concrete pavement options designed specifically for your project, based on the latest industry standards and paving technologies. Additionally, we can provide Computer Aided Design (CAD) jointing plans.

- **We'll also help you find qualified, professional concrete contractors who will get the job done right!**
- Scan the QR code below, or go to [paveahead.com](http://paveahead.com) and select Design Center to get your project started.
- For more information, email us at [info@paveahead.com](mailto:info@paveahead.com) or call 833-485-1192

A photograph of a parking lot with several cars parked in front of a brick building. The cars are of various colors, including white, black, gold, and blue. The ground is paved with concrete. A green diagonal graphic element is overlaid on the bottom left of the image.

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