



PROTECT YOUR GREATEST INVESTMENT

Advanced Concrete Engineering for Industrial Pavements

PNA expands into the exterior space with new, proprietary tools and technologies that optimize pavement designs, reducing construction and maintenance costs while maximizing performance and service life.

PNA's Thin Concrete Pavement (TCP)

PNA's innovative pavement designs allow you to cost-effectively replace asphalt with long-lasting, low-maintenance concrete. We can also customize pavement designs within a facility to account for different traffic and load conditions. For example, heavy-traffic truck aprons and loading docks might use a reinforced concrete design with optimized doweling, while the construction of car entrances and parking lots could leverage PNA's patented Thin Concrete Pavement (TCP) system to maximize cost savings.



TCP System Replaces Asphalt

Concrete is a cost-effective alternative to asphalt, thanks to PNA's patented TCP system. TCP significantly reduces concrete thickness and construction costs while maintaining equivalent or better performance.

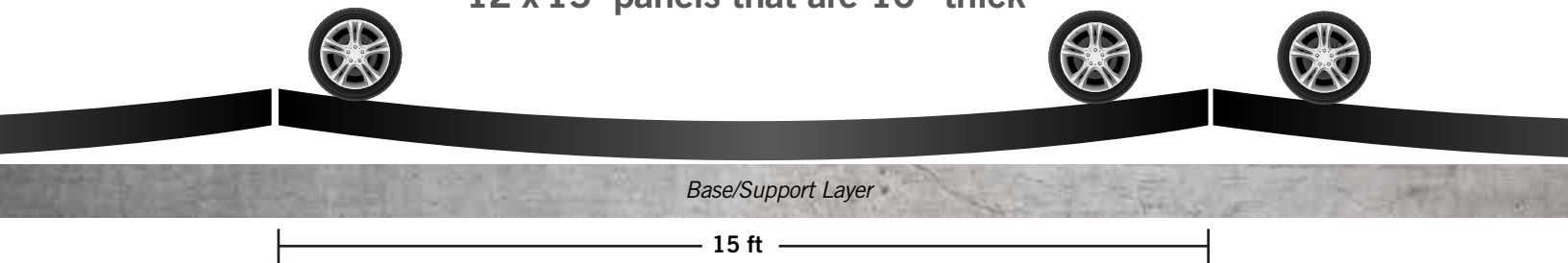
Category	Traditional Concrete Pavement	Asphalt Pavement	Concrete Pavement Designed with TCP
First Cost Savings	Baseline	10-15%	20-30%
Maintenance/Repair Costs (Pothole patching, resurfacing, etc.)	\$	\$\$\$	\$
Safety (Skid/slip hazard reduction, reflectivity)	★★★★★	★★	★★★★★

Less Out-Of-Joint Cracking

Concrete curl can be reduced, but it can't be eliminated. In addition, the curl of a slab is more pronounced in a longer slab than in a short slab that experiences the same radius of curl. The TCP system uses these principles to minimize mid-panel cracking.

With traditional 12- to 15-foot (3.6- to 4.6-meter) panels, wheel loads apply pressure on both ends of the panel, creating stresses that cause top-down cracking in the middle. TCP minimizes these stresses by shortening the panel length to 8 feet or less. This reduces the amount of curl and prevents both edges of the panel from being loaded simultaneously. As a result, the panel experiences less stress and fewer cracks.

Traditional Concrete Design: 12'x 15' panels that are 10" thick



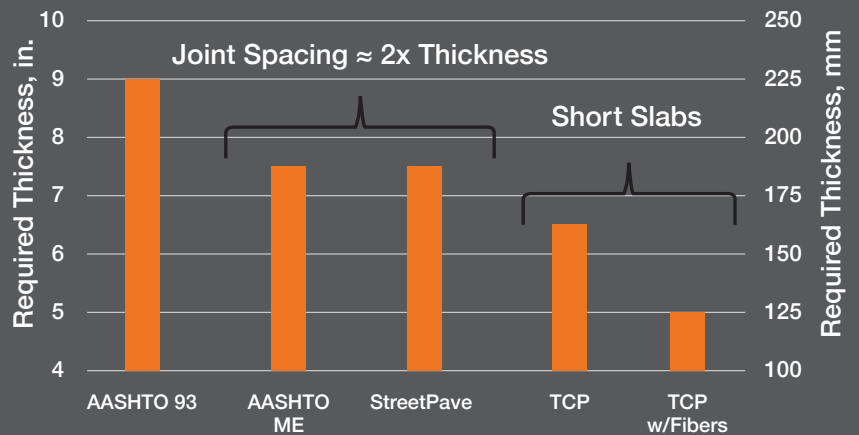
This TCP design uses 37 percent less concrete!

TCP Design: 6'x 6' panels that are 6.3" thick



Reduce Construction Costs

By distributing wheel loads over shorter panels, TCP allows concrete volume to be minimized while maintaining the same load-bearing capacity. Slab thickness can often be reduced by 2 inches or more, saving up to 30 percent in material costs while expediting placement work. In some cases, base and sub-base materials can also be conserved providing additional savings.



Above designs based on 500 trucks/day in freeze-thaw climate. All other inputs are the same across design methodologies.

PNA's Engineering Expertise

PNA's industry-recognized engineers have focused their academic and professional careers on advancing flatwork design principles and best practices. Beyond concrete design, our engineers are skilled in materials science and geotechnical engineering, as well as construction, maintenance, and repair.



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Visit pna-inc.com for more information about our engineering services and to view articles, white papers and presentations on flatwork design and construction.

Contact PNA today to find out how we can help you with your commercial/industrial flooring and pavement needs.

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