Design Parameter or Site Factor	Effect on Design and/or Construction and Special Consideration in Precast Concrete Pavement
Slab thickness	■ Determines (or is determined by) the amount of design traffic ■ Influences the amount of prestress required in the design for a given slab thickness and mix flexural strength
Concrete strength properties (flexural or compressive)	■ Key parameter for slab thickness design ■ Affects the extent of fatigue cracking ■ Influences level of effective prestress required
Base material	■ Provides necessary drainage and construction platform ■ Influences bond and frictional characteristics at slab-base interface and therefore affects stresses and slab lift-off due to temperature and moisture gradients in the slab
Subgrade soil characteristics	■ Affects support characteristics ■ Affects soil moisture conditions and faulting potential
Slab length	■ Affects design of slab thickness ■ Also affects smoothness and amount of frictional restraint ■ Determines the expansion joint design and width – very critical if construction is performed during colder climates
Joint design	■ Determines load transfer efficiency ■ Affects joint faulting and smoothness or ride quality
Local climate	■ Daily temperature cycles and seasonal moisture cycles cause curling and warping that affect joint faulting, cracking and smoothness ■ Affects slab expansion and contraction, and therefore expansion joint widths, are determined by temperature changes ■ Wet conditions and extended periods of non-freeze conditions cause reduced support and increased faulting potential
Paving weather and construction practice (Built-in temperature and moisture gradients)	■ Built-in gradients induce stresses and slab deformations that get combined with those resulting from seasonal variations and traffic ■ Little or no built-in gradients can be expected in precast slabs (because slabs undergo built-in curling and warping prior to installation) ■ Casting under controlled conditions controls curl/warp ■ Some shrinkage is still possible after the slabs are installed
Traffic	■ Determines the stress levels reached in the concrete and fatigue damage characteristics ■ Critical for thickness and prestress level design
Longitudinal prestress	■ Influences the slab thickness design ■ Influences tensile stress developed in the slab
Prestressing steel	■ Yield stress important in level of prestress induced
Location of prestress, joint hardware design	■ Post-tensioning operations, joint hardware design have to be accounted for in design and fabrication
Transverse prestress	■ Controls longitudinal cracking by reducing transverse stresses
Handling and Transportation	■ Might be a factor to determine slab geometry ■ Slab design should account for handling and transportation
Fabrication and curing regime	■ Texture and smoothness controlled during the fabrication ■ Curing can affect built-in gradients and durability
Smoothness	■ Precast slabs may be diamond ground after installation to meet smoothness specifications

TABLE 2 – Design features: impact on performance and special considerations for precast concrete pavements
Note: Some design parameters can have confounding effects with others listed in the table.

the pavement's ride quality, which is a functional utility of the pavement but highly dependent on the structural conditions as well. The design exercise was a means to determine the thickness of the PCC slab for a given concrete strength, load transfer mechanism, design traffic, modulus of subgrade reaction, and drainage features at a selected level of design reliability and serviceability. This procedure, which underwent major revisions in 1972, 1986 and 1993, supported highway agencies remarkably well for several decades. However, the 1990s and early 2000s have witnessed a shift in the industry's perspective of pavement management – one from pavement designs for serviceability to designs that meet "performance"