

## **Concrete Pavements: A 50 Year Perspective**

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Concrete pavements are the pavement type of choice for heavily trafficked roadways in the United States and elsewhere. This decision is based on outstanding long-term performance and the economic benefits when considered on a life cycle cost basis. In addition to newly constructed roadways, concrete overlays of existing concrete and asphalt pavements have proven to be an effective solution to rehabilitate minimally to significantly distressed pavements.

It is widely accepted that the majority of concrete pavements have far exceeded their anticipated design lives with correspondingly lower maintenance and rehabilitation costs. Design life is generally specified at 20 to 30 years by most agencies (departments of transportation). However, we are not utilizing the full potential of our historical and statistically based knowledge of concrete as it relates to pavement performance. We can and should be specifying 50 year design life in order to realize the full potential of concrete pavements.

Long-life concrete pavements can be constructed as either jointed plain or continuously reinforced pavements. This decision is based in large part on the available funding and an estimate of future maintenance requirements and timing of rehabilitation. Regardless of the selected option, a mechanistic-empirical pavement design methodology should be employed in order to optimize design features and therefore save money.

The design must consider the anticipated truck traffic volume at the time of opening, axle load spectra, traffic growth rate, support and environmental conditions and a variety of additional input parameters depending on the type of structure being designed. The material properties of the existing subgrade soils, the type of base material specified in the design and detailed concrete material properties must be determined or estimated and rigorously controlled during construction.

Highly detailed specifications must be developed reflecting measurable parameters that can be controlled during the construction process. For example, pavement thickness must be controlled and verified as does jointing configuration, dowel bar location and alignment, concrete properties, surface texture, concrete curing and numerous others. A highly detailed and comprehensive quality control/quality assurance plan must be utilized at all levels of project development, from design to construction.

Innovations in design, materials characterization, paving equipment, and overall concrete pavement technology make 50 year concrete pavements

achievable at minimal increased cost over conventional concrete pavements. GOMACO innovations in paving equipment including dowel bar insertion, stringless paving options, real-time smoothness determination and integrated machine control have made highly accurate placement a reality. The properties of the concrete can be dramatically improved through the use of state-of-the-art mix design procedures, high quality cement, aggregates and admixtures, thorough testing and the use of innovative materials such as PAVIX that are used to minimize durability-related issues such as scaling and freeze/thaw damage.

Global Pavement Consultants, Inc. can provide technical assistance on all aspects of developing strategies to move forward with implementing a plan for 50 year new pavements as well as high performance concrete overlays.

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### **Проблемы строительства цементобетонных дорог в Республике Беларусь**

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В настоящее время в РБ большое внимание уделяется строительству автомобильных дорог с цементобетонным покрытием. Мировой опыт показывает, что первоначально строительство цементобетонной дороги может быть на 30% дороже, чем асфальтобетонной - очень многое зависит от доступности и цены на основные материалы: щебень, песок, цемент и битум. В мировой практике срок эксплуатации цементобетонных трасс равен 30-40 годам и, если учитывать именно этот жизненный цикл, то цементобетонные дороги обходятся на 30 % дешевле. Очевидно, такой период службы возможен при надлежащем содержании дороги, в основе которого лежат три требования. Во-первых, уход за швами и замена их раз в 5-10 лет. Во-вторых, своевременное устранение локальных дефектов и трещин в покрытии. И, в-третьих, своевременная замена отдельных фрагментов покрытия с использованием стандартных или быстротвердеющих бетонов. Обычно, других работ цементобетонное покрытие не требует. О долговечности цементобетонных дорог говорит общеизвестный факт, что до сих пор функционирует участок дороги Берлин - Штеттин, с оригинальным покрытием 1936 года. Этому участку автобана уже 80 лет. Достигается такой уровень долговечности только при неуклонном соблюдении всех требований хорошо разработанного проекта, высоком качестве проведения строительных работ, а также при соблюдении предписанных режимов эксплуатации и содержания дороги. Наиболее (ответственными) процессами при бетонных работах в дорож-