

# Trusty Toll Roads

Predictable Costs, Uninterrupted Revenues and Nonstop Traffic are Key to Successful Public-Private Partnerships

## The Future of Transportation

From 1990 to 2004, vehicle travel on the Interstate System increased by an extraordinary 51% while lane capacity increased by just 6%. Even worse, federal and state transportation revenues are insufficient to preserve the system let alone to add significant capacity. To mitigate these problems, public-private partnerships (PPP) are emerging to fund future transportation projects. Reliable pavements are essential for long-term success of such PPPs, or the risk of lost toll revenues due to frequent maintenance cycles is always looming.

To minimize such risks associated with pavements, each component of the total risk should be minimized. The risk components most relevant to pavements are **Cost Risk**, **Performance Risk**, and **Traffic Risk** ...

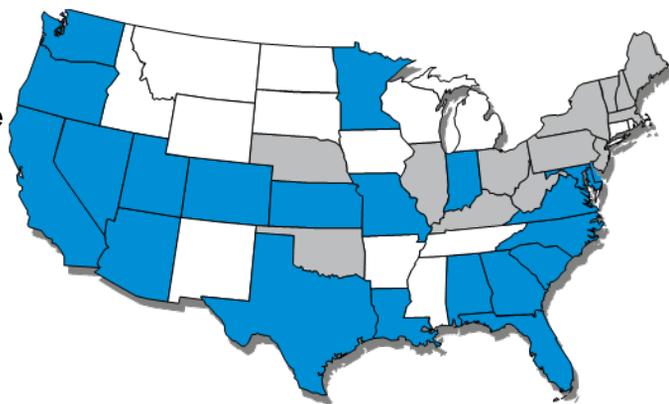
## Cost/Financial Risk

Initial costs of alternate pavement systems can be calculated with considerable confidence. Future maintenance and rehabilitation costs, however, are more difficult to predict and may vary substantially between concrete and asphalt pavements. The Producer Price Index (PPI), a measure of the average change over time in the selling price of a material, is a means to quantify both the overall increase as well as the volatility of material costs.

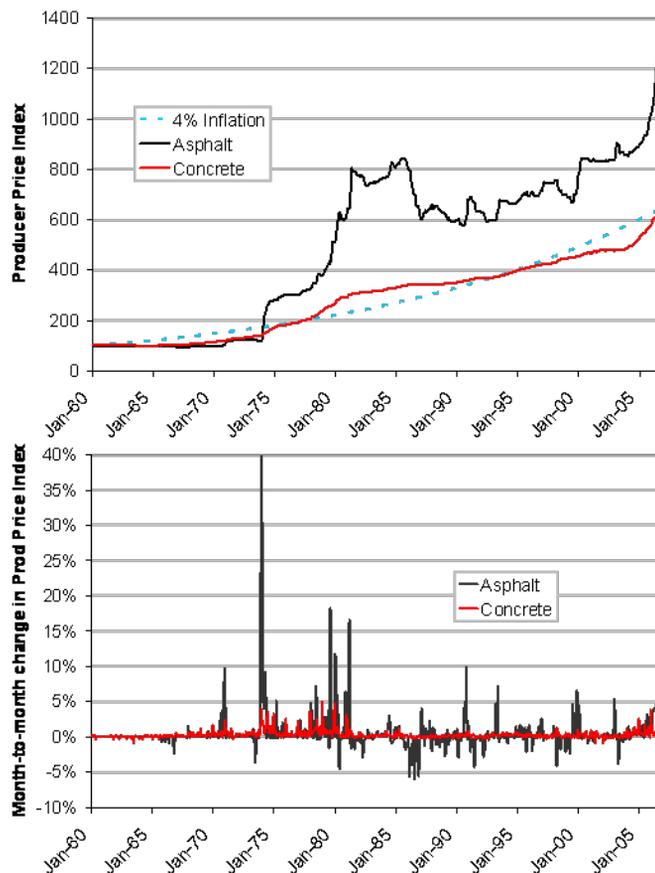
**Concrete** has increased in cost approximately **6 fold** in the past 50 years (less than inflation). In that same time, **asphalt** has increased over **12 fold**.

The volatility of prices can be measured by the percent change in PPI from month to month. During the past 50 years, **concrete** has experienced a monthly change in PPI exceeding 5% only once, while **asphalt** has experienced changes in excess of 5% a **whopping 22 times**. In fact, **asphalt** has exceeded 10% from one month to the next **5 times**.

Uncertainty in prices translates to significant cost risks that can in turn necessitate toll price increases or, even worse, defaulting of the bond.



The states shown in blue have enacted statutes that enable the use of various PPP approaches for the development of transportation infrastructure since the passing of the Public-Private Transportation Partnership Act in 1995. The states shown in grey already had active toll-roads/authorities.



**Top Fig.** Inflation at a rate of 4% and Producer Price Index (PPI) for concrete and asphalt (PPI<sub>1958</sub> = 100).

**Bottom Fig.** Month-to-month change in PPI for concrete and asphalt during the same time.

## Performance Risk

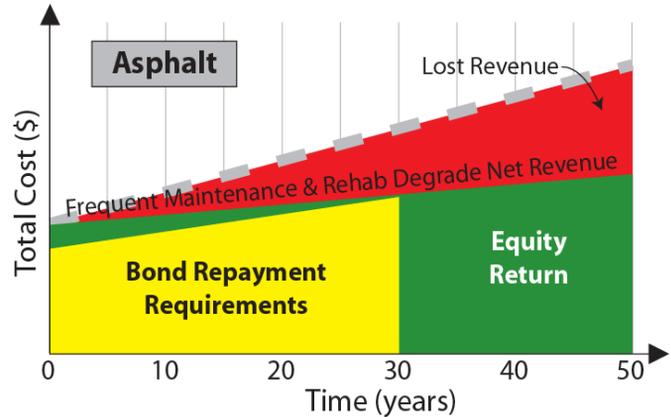
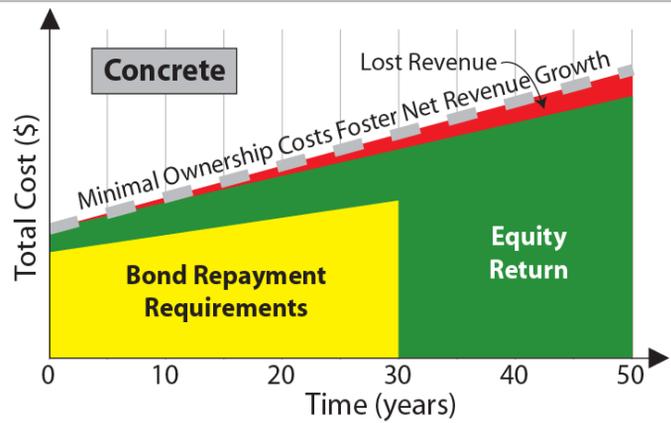
Although pavement material might be a small portion of total construction cost, it is *the* major driver of revenues. If the pavement is in an unacceptable condition, not only must it be repaired or rehabilitated (increase in expenses), but it can also cause traffic to divert to alternate routes (decrease in revenues).

Consider the example in the figure to the right, where concrete pavements, due to their durability, typically require only two repairs and one rehabilitation effort in a 50 year period. In this same period, asphalt may require up to a dozen repair and four rehabilitation efforts. Because there are fewer expenses and losses in revenue over the course of its life, **concrete** pavements will have a **higher equity return than asphalt** pavements.

Furthermore, if the duration of the bond is 30 years, the asphalt might have to undergo two complete rehabilitations in that time. If the time between rehabilitations is overestimated by a few years or the price of asphalt rises significantly, revenue might not be sufficient to repay the bond requirements.

## Traffic Risk

Unlike conventionally-funded roadways, toll roads have traffic risk. Put simply, if for *any* reason usage of the road declines, revenues will decline as well. Because concrete pavements provide a more reliable riding surface by minimizing performance risks, there will be less construction-related congestion. Because there will be less congestion and thus less people selecting alternate routes to avoid traffic, concrete pavements will provide a more reliable traffic flow and resultant revenue source.



Total cost versus time for concrete and asphalt. Equity return (green) is the total revenue (grey dashed line) less the bond repayment requirements (yellow) and any operational costs. Most of the revenue losses (red) could have been prevented by initially constructing the roadway with concrete.

## Risk and Cost Mitigation

In order to maximize the return on investment associated with roadway construction and operation, it is critical to minimize risk. Risk can be managed by employing materials that 1) have stable and predictable prices that reduce the financial risk, 2) are durable and require less frequent rehabilitation and repair, minimizing performance risk and 3) encourage uninterrupted traffic flow, decreasing the traffic risk.

**Have you considered concrete pavement?  
Lower cost and lower risk!**

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## Sources

1. <http://www.bls.gov/ppi/home.htm>
2. <http://www.fhwa.dot.gov/ohim/tollpage.htm>
3. <http://www.fhwa.dot.gov/ppp/legislation.htm>
4. <http://www.tripnet.org/national/InterstateHighwaySystemPR062906.pdf>