



Two Pavement System

Competition Between Industries Can Lower Unit Costs and Allow Highway Agencies to Do More with Their Budgets

Construction cost inflation and eroding resources has forced agencies to look hard at both their pavement design and pavement type choices. One proven way an agency can address material cost inflation is to instill more competition in their area, stimulating lower bid prices.

Average five-year state DOT bid prices (published by Oman Systems) confirms that states which use a stronger balance of pavement types (asphalt and concrete) get a bigger “bang for the buck” than those who use only one pavement type (asphalt).

In states where both pavement types are specified on a regular basis healthy industries with skilled personnel develop. Construction quality improves

and risks decline, bringing about more cost efficient pavement construction and significant savings. Competition between industries also spurs innovation. Competition between contractors that construct different pavement types adds a dimension to the competitive environment that is not achieved where only one pavement material is used regularly.

Figure1 illustrates that in markets where both paving industries participate, the average unit costs for both concrete and asphalt pavements are lower. The additional competition fostered by the agency allows the agency to extend its currently available budget, do more, and add long-life pavements to their system. The fact that long-life pavements benefit the system’s remaining service life is an added bonus.

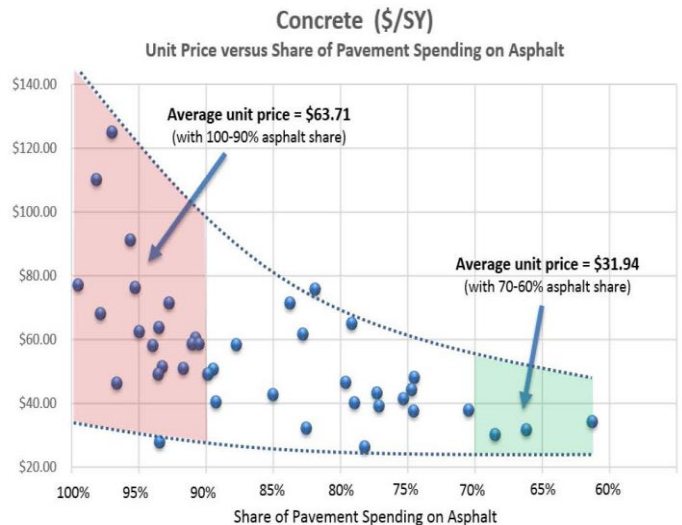
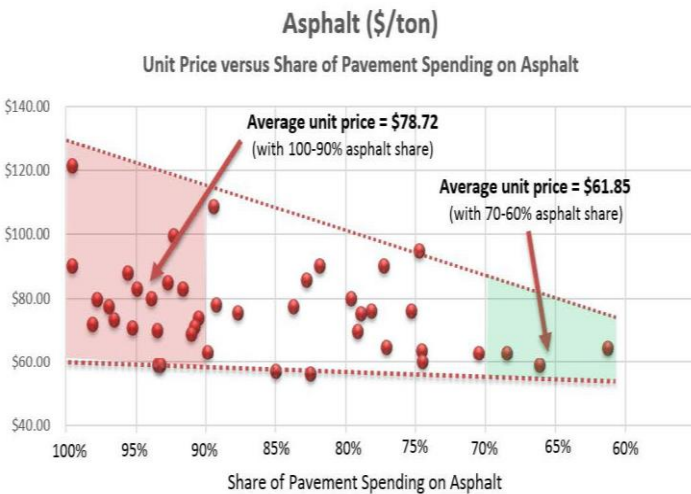


Figure 1. Average 2013 weighted unit bid price vs. five-year average share of pavement spending for asphalt (left) and concrete (right). Red shading indicates areas where asphalt paving is capturing >90% of state DOT spending. (Data source: Oman Systems bid tabulation – Public Information)

Breakeven Analysis

One way to use this information is to perform a breakeven analysis to find out what happens with varying levels of balance in use of concrete and asphalt pavements. Table 1 illustrates the benefit.

For example, assume a state spends \$200 million per year on pavement items, and 95 percent of its pavement dollars are spent on asphalt. At this level, with virtually no competition between the industries, the asphalt bid price would be roughly \$78.72 per ton and the concrete bid price would be roughly \$63.71 per square yard (based on the average bid price data in the region of 90-100% asphalt market share on Figure 1). Thus, the state can purchase a little over 2.4 million tons of asphalt and just under 157,000 square yards of concrete for their \$200 million budget.

Now suppose the state instills more competition by mitigating the asphalt monopoly and introducing concrete pavement into its program (via alternate bidding, programmatic selection or some other means).

Assume the state plans to spend the same \$200 million, but this time, only 65% of its budget is spent on asphalt pavement. The additional competition from the concrete industry results in an asphalt bid price of \$61.85 per ton and a concrete bid price of \$31.94 per square yard (based on average bid price data in the region of 60-70% asphalt market share on Figure 1).

For the same \$200 million budget, the state still is able to pay for nearly the same tonnage of asphalt as before (approximately a 13% reduction), but it also is able to pay for an additional 2 million square yards of concrete pavement (a nearly 16-fold increase).

This data suggests that the additional competition (provided by the presence of more than one industry competing for the highway dollar) will allow an agency to extend its current budget, build more pavements, and add diversified pavement solutions to their system. Moreover, there are no downsides to fostering two healthy industries to compete for state highway projects. The state benefits in terms of cost efficiency, innovation from contractors and network health, the industries benefit in terms of programs that support a quality work force to build quality pavements, and the public benefits from it all.

Table 1. Break-even analysis for \$200 million per year budget for pavement expenditures.

Budget	Asphalt Portion of Budget	Expenditure on Asphalt (millions)	Asphalt Unit Price (\$/ton)	Tons of Asphalt	Expenditure on Concrete (millions)	Concrete Unit Price (\$/SY)	Square Yards of Concrete
\$200 M	100%	\$ 200	\$78.72	2,540,650	\$ -	\$ 63.71	-
\$200 M	95%	\$ 190	\$78.72	2,413,618	\$ 10	\$ 63.71	156,961
\$200 M	90%	\$ 180	\$78.72	2,286,585	\$ 20	\$ 63.71	313,922
\$200 M	70%	\$ 140	\$61.85	2,263,541	\$ 60	\$ 31.94	1,878,522
\$200 M	65%	\$ 130	\$61.85	2,101,859	\$ 70	\$ 31.94	2,191,609
\$200 M	60%	\$ 120	\$61.85	1,940,178	\$ 80	\$ 31.94	2,504,696

Sources

- Oman Bid Tabulation Data, <http://www.omansystems.com>

- Mack et.al., *Improving Network Investment Results by Implementing Competition and Asset Management in the Pavement Type Selection Process*, Proceedings of the 11th International Conference on Concrete Pavements, August 2016, San Antonio Texas.