

## Comparing Apples to Apples Important with LMC vs. PPC

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Latex Modified Concrete (LMC) overlays have been used to protect the nation's bridge decks since the late 1960's. Designed by the DOW Chemical Company, LMC was designed as a thin (1 1/2" minimum) structural concrete overlay system specifically for bridge deck applications. The low permeability of these overlay systems prevents the penetration of chlorides into bridge decks, plus provides a long lasting surface that is serviceable for upwards of 30 years and beyond, when applied to a hydrodemolition surface prepared bridge deck. The time-tested history of LMC overlays is only reinforced today by the number of states that still specify them.

Polyester Polymer Concrete overlays (PPC) have been around since the early 1980's and used mainly in the Western United States, but have been gaining some movement into the Midwest and Eastern United States in recent years. These are generally thin (3/4" minimum) installations, but can be placed much thicker. The disadvantage of thicker installations is the high price of the material quickly prices itself out of being competitive with alternate products. They are flexible, non-structural wearing surfaces designed to waterproof the deck and prevent infiltration of chlorides into the bridge deck.

The most important thing to understand about both of these overlay systems is that they are dependent upon the surface on which they are placed and the surface preparation performed. The better the substrate, and cleaner the surface, the more likely it is that the treatment will perform for an extended period. A failure to not adequately remove delamination in the existing deck increases the risk of system failure.

Both the LMC and PPC products have the capability for rapid restoration. With the use of CTS-Rapid Set Cement, the concrete

mix becomes a Very Early Strength Latex Modified Concrete (VESLMC) that can allow for restoring traffic within three hours. PPC also has an equally shortened window in which to open to traffic. So, the comparison of the PPC and VESLMC based on the time to open is essentially a wash.

Both systems claim up to a 30 year system life. Again, that most likely depends on the installation, prep and existing deck conditions that the overlay is placed on. Decks that are mainly cracked and have no delamination or active corrosion should be able to get 30 years out of a properly installed overlay. More deteriorated decks that are being overlaid will likely experience less service life. So, for the sake of argument, let's just say the life expectancy of the products will project equally based on bond to a properly prepared surface and decks of similar condition.

It is then really pretty easy to compare the cost of the two systems, if you can get a handle on two things. First, make a straight line comparison of the material cost of each. Second, what is the cost for the surface preparation that is necessary to install the products? There is a misconception that LMC's (or VESLMC's) need to be placed over a hydrodemolished surface, which is completely false. Latex modified concretes perform fine over a properly prepared milled surface, and in fact, that is how all the early LMC overlay installations were done beginning in the 1970's and 1980's. Some of these systems are still in place today and performing well, with between 30 and 40 years of life on them. Many LMC's are still done today with surface milling preparation.

The reason hydrodemolition is closely associated with LMC is that it provides much better value in the long run, where deck repair is required, and it allows for a quicker and more effective installation. The hydrodemolition process also eliminates microfracturing which will not normally be detected in routine sounding. This insures all weakened

concrete is selectively removed and that a monolithic installation of patches occurs with the LMC installation making for a better quality system. It eliminates a layer of repair work and an additional level of breakdown that could occur in the overall system installation. This means a better and longer lasting repair is achievable from the added mechanical grip that the hydrodemolition surface prep gives, when compared to just milling.

LMC or PPC can serve to work equally as well in a preventative mode where little or no deck repair is required. The key is performing the needed deck repair or making sure that there are no deck delaminations left in the base concrete upon which the overlay is to be placed. This is critical to understand, because if you are trying to compare the surface preparation for PPC and LMC, you want to compare just the necessary surface preparation.

PPC overlays are generally going to be placed on better decks that have little to no patching needs, or at least that is where they would perform best and most economically as a system. Surface preparation is normally achieved through shot-blasting to open up the surface and gain the chemical bond between the polyester and the concrete deck. Milling may be required to remove the overlay and also to roughen the surface.

The equal comparison to make here is the necessary minimal requirement of a LMC/VESLMC, which acts similarly to PPC in that the latex grabs to a surface that has been opened up. In other words, a surface that is milled would then require a shotblast or equivalent high pressure water blast (7500 psi minimum) to open up the surface for the chemical adhesion to occur between the latex and the concrete deck. To illustrate the costs, data from a recent job (C203818) let by the North Carolina Department of Transportation was analyzed to compare costs between PPC and VESLMC. This job was actually analyzed by NCDOT as a cost comparison between

PPC and Hydro/VESLMC, and showed the cost of PPC to be about \$237.93 per square yard, while the cost for hydro/VESLMC was found to be \$339.47. However, closer review of these numbers show that the comparison is for two different processes.

On good or better bridge decks, an owner can elect to not use hydrodemolition surface preparation if they are confident no delamination will be left in the deck, and instead, just do conventional, minor deck patching. In this case, the use of incidental milling, general deck patching, shotblasting surface preparation and finish grooving can be used for both the PPC and VESLMC installation process. Cancelling out these like items, we are then left with

the true following equal comparison of the material and placement/installation cost: Also, important to capture is the difference in material unit cost and the effect that an overrun of the PPC material can have. The material cost of polyester

is about double that of VESLMC, so even minimal overruns of the PPC overlay rapidly start to escalate the payout price at twice the rate of the rapid setting latex. This requires tight control of the application to insure excessive material is not being needlessly placed.

Bid Item	Quantity	Unit Price	PPC	VESLMC
Material Cost PPC	60.8 CU YDS	\$3,045.75	\$185,181.60	
Place and Finish	1460 SQ YDS	\$87.02	\$127,049.20	
Material Cost VESLMC	176.8 CU YDS	\$1,631.65		\$288,475.72
Place and Finish	3520 SQ YDS	\$92.46		\$325,459.20
Totals			\$312,230.80	\$613,934.92
Total per SQ YD			\$213.86	\$174.41



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