







INFORMAL STAFF REPORT

MEMORANDUM

To: Margie C. Rose, City Manager 

Thru: Mark Van Vleck, P.E., Assistant City Manager 
Valerie H. Gray, P.E., Executive Director Public Works 

From: Jeff Edmonds, P.E., Director of Engineering Services 

Date: June 2, 2017

Subject: CITY COUNCIL ACTION REQUEST (CCAR) – April 25, 2017
BIDDING STREET BOND PROJECTS WITH BOTH PORTLAND CEMENT
CONCRETE (PCC) AND HOT-MIX-ASPHALT-CONCRETE (HMAC)

ISSUE:

During the April 25, 2017 Councilmember Guajardo requested analysis on how to evaluate bids when projects are designed with both PCC and HMAC.

BACKGROUND & FINDINGS:

As per the attached memorandum, several of the Bond 2012 and Bond 2014 projects are being designed with both HMAC and PCC pavements. When projects are designed both ways, a 30-year design life is assumed, and the required pavement section is determined based on the Association of State Highway Transportation Officials (AASHTO) Guide for Design of Pavement Structures. Recommendations to City Council have historically been based on the lowest priced construction bid. The one exception is the Kostorytz Road project (2012 Prop 1). In the case of Kostorytz, the cost differential to award the concrete alternative was bid price for concrete was \$35,489.85 or less than 0.5% of total project cost. That was an easy recommendation but does raise the question of how award recommendations will be made when the decision is a closer call.

Life-Cycle Cost Analysis (LCCA):

There is abundant literature on how to conduct LCCA relative to infrastructure investment alternatives. LCCA is a tool to help agencies make economically sound decisions when project alternatives have varying cost patterns over the asset's service life. LCCA seeks to incorporate a total cost approach that considers all relevant costs, rather than just up front cost, when evaluating alternatives. These analyses can become quite complex and involve hundreds of inputs.

LCCA for HMAC versus PCC pavements:

The Federal Highway Administration (FHWA) began promoting pavement LCCA in the 1990's. A great deal of research has been published on the application of LCCA to the question of HMAC versus PCC pavements. Various Departments of Transportation have developed LCCA policies and some have developed software to help with LCCA. Typically a large number of assumptions are required such as timing of future activities, costs of future maintenance, a discount rate for future cash flows, user impacts from future construction, etc. These analyses can become burdensome and may increase confusion.

Potential Budget Impacts:

While LCCA is useful to help agencies select alternatives with an overall lower cost, it does not address the budget impacts of doing so. It is assumed that PCC offers maintenance savings over HMAC pavements and that those savings support a decision to pay a certain premium for PCC pavement. The question still exists, though, of how to budget for that additional up front cost. The savings result from future maintenance cost reductions. Those savings are not currently available to fund a higher cost bid award. Current Bond programs do not have an allowance set aside for additional construction costs even if they are justified by LCCA. This issue will need to be addressed for future Bond programs. It may require increasing project budgets to allow for a certain percentage of projects to be awarded to the higher bid price alternative.

RECOMMENDATION:

Engineering Services has performed some preliminary LCCA comparing the maintenance cost differential between PCC and HMAC. The LCCA confirms that PCC provides maintenance cost savings over HMAC. The maintenance cost savings justify paying a higher construction cost for a PCC roadway. The maintenance cost savings with PCC are estimated at \$100,000 per lane-mile (\$14.20/square yard).

Where projects are designed and bid with HMAC and PCC, Engineering Services will consider those maintenance cost savings when making the bid award recommendation. If the PCC pavement bid alternate is within \$100,000 per lane-mile of the HMAC bids, Engineering will recommend the PCC alternative.

For illustration purposes, the recent Yorktown Boulevard project included approximately 6 lane-miles of total pavement surface when turn lanes, intersections and bike lanes are included. In that case, Engineering Services would have recommended paying up to an additional \$600,000 for the PCC bid alternate. Since the bid price difference between PCC and HMAC was \$1.7 million, Engineering recommended the HMAC alternate.