







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.

**FEBRUARY 2, 2017
INFORMAL STAFF REPORT
(TRUNCATED FOR BREVITY)**



INFORMAL STAFF REPORT

MEMORANDUM

To: Margie C. Rose, City Manager *MR*

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

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

Date: February 2, 2017

Subject: CITY COUNCIL ACTION REQUEST (CCAR) – January 31, 2017
BIDDING STREET BOND PROJECTS WITH BOTH PORTLAND CEMENT
CONCRETE (PCC) AND HOT-MIX-ASPHALT-CONCRETE (HMAC)

ISSUE:

During the January 31, 2017 City Council meeting, Mayor Pro Tempore Vaughn requested Staff to provide an informal report explaining past council directives relative to the selection of PCC or HMAC for street reconstruction projects.

BACKGROUND & FINDINGS:

BOND 2012 PROJECTS:

In late 2014, there was recognition that the majority of the Bond 2012 projects were under budgeted. Various strategies were considered to address the funding shortfall. A council resolution (**see ATTACHMENT 1**) was approved on February 17, 2015 that provided specific guidance on project deferrals, bicycle accommodation and pavement design. The pavement design guidance indicated that certain Bond 2012 projects were to be bid HMAC, others PCC and most were to be bid both HMAC and PCC.

BOND 2014 PROJECTS:

In April 2013 Council approved a Bond 2014 Execution Strategy that involved funding and initiating the project design efforts in advance of the Bond referendum. In July 2013, Council approved a Reimbursement Resolution to fund design efforts and directed staff to begin procuring design services for the streets listed on Proposition One of the Council-approved project list. Those design contracts were approved by City Council in early 2014. Consultants were directed to take the design effort to an Engineering Letter Report (ELR) level (**see ATTACHMENT 2**) in order to provide a better budget basis for the Bond referendum. Included in the scope of work for the Bond 2014 ELR's was a pavement lifecycle cost analysis and recommendation.

Determining the required pavement section is primarily based the *Association of State Highway Transportation Officials (AASHTO) Guide for Design of Pavement Structures*. The inputs include anticipated vehicle loads, the structural properties of the subbase soil, the desired reliability level and the desired service life. For the lifecycle cost analysis, equivalent pavement sections are

developed for both HMAC and PCC using a 30-year service life. The lifecycle analysis is conducted for a minimum of 30 years considering the cost for initial construction, anticipated maintenance and major repairs at the end of the design life. In some cases, there are other factors that may drive a recommendation for HMAC or PCC such as underground utilities, driveway access requirements and compatibility with existing adjacent pavement.

After the Bond 2014 referendum passed in November 2014, the design engineers were released to complete the designs for the Proposition One projects. The original guidance in late 2014 was to base the roadway design on the ELR pavement recommendation for each of the projects. That guidance has not been modified.

Amendments have been negotiated on many of the Bond 2014 projects. Those amendments; however, only addressed the *Bicycle Mobility Plan* recommendations and Value Engineering on drainage systems. Staff is unaware of any formal council direction to negotiate contract amendments to redesign Bond 2014 projects for both PCC and HMAC pavement structures.

RESIDENTIAL RECONSTRUCTION:

On December 13, 2016 Council passed a Motion of Direction (see ATTACHMENT 3) that the residential reconstruction pilot projects should be designed as both HMAC and PCC pavement structures. That direction was clarified during the December 20, 2016 meeting to indicate that both designs were to be applied for full reconstruction projects and not situations where the existing pavement can be rehabilitated (see ATTACHMENT 4).

SEPTEMBER 22, 2015 COUNCIL MEETING:

During the January 13th 2017 City Council Retreat, the question was raised about a discussion that took place during the September 22, 2015 City Council meeting. There was a discussion of pavement design during the item awarding the construction contract for the Bond 2012 Proposition 1 Project - Williams Drive Phase 3 (see ATTACHMENT 5).

During the discussion, a question was asked whether projects would continue to be bid both ways. There was perhaps a misunderstanding regarding the staff response to this question. Some council members may have considered this as a motion of direction to design all future projects with both HMAC and PCC pavement. The staff response was intended to mean that many of the future projects on both the 2012 and 2014 Bond Programs were being designed to bid both ways. Staff did not consider this discussion as formal direction to pursue design amendments for all Bond 2014 projects that were not scoped at that time to bid with both HMAC and PCC pavement.

NEXT STEPS:

Staff will continue with the designs of the Bond 2012 projects in accordance with the February 2015 resolution. Additionally, staff has reviewed the Bond 2014 ELR recommendations and determined which projects could be designed with both PCC and HMAC without significantly impacting the schedule.

Staff is proposing to include three projects (current ELR's recommended HMAC) that will be re-scoped and designed to include a PCC and HMAC pavement structure. This will involve negotiation of staff-approvable contract amendments. The attached table (see ATTACHMENT 6) shows the currently proposed and recommended pavement structure for the Bond 2014 projects.

**BOND 2014
CURRENT AND PROPOSED
PAVEMENT RECOMMENDATION
ATTACHMENT 6**

Street Bond Projects - Pavement Recommendations

PROJECT NUMBER	PROJECT TITLE	Bond	STATUS	Current Design	Proposed Design
E13099	Waldron Rd (Airdome Dr to Caribbean Dr)	Bond 2014 Prop 1	Complete	HMAC	HMAC
E13100	Santa Fe St (Elizabetht St to Hancock St)	Bond 2014 Prop 1	Complete	HMAC	HMAC
E13095	Southern Minerals Rd (Up River Rd to IH-37)	Bond 2014 Prop 1	Construction	PCC	PCC
E13086	Alameda St (Kinney St to Ujpan St)	Bond 2014 Prop 1	Construction	HMAC	HMAC
E15111	North Padre Island Beach Access Road 3A	Bond 2014 Prop 2	Construction	PCC	PCC
E13088/E13089	Gollihar Rd (Weber Rd to Carroll Ln.)	Bond 2014 Prop 1	Council Award	HMAC	HMAC
E13087	Gollihar Rd (South Staples to Weber Rd)	Bond 2014 Prop 1	Council Award	HMAC	HMAC
E15109	Ennis Joslin Road Extension (Holly to Williams)	Bond 2014 Prop 2	Council Award	HMAC	HMAC
E13092	Ayers St (Alameda St to Ocean Dr)	Bond 2014 Prop 1	Bidding	HMAC	HMAC
E13096	Yorktown Blvd (Everhart Rd to Staples St)	Bond 2014 Prop 1	Pending Bid	Both	Both
E13097	Carroll Lane (Houston St to McArdle Rd)	Bond 2014 Prop 1	Pending Bid	HMAC	HMAC
E13091	Corona Dr (Flynn Pkwy to Everhart Rd)	Bond 2014 Prop 1	Pending Bid	HMAC	HMAC
E15122	Creek View Drive Extension	Bond 2014 Prop 2	Final	HMAC	HMAC
E15111	North Padre Island Beach Access Road 2	Bond 2014 Prop 2	Pre-Final	PCC	PCC
E13098	Old Robstown Rd (Highway 44 to Leopard St)	Bond 2014 Prop 1	Pre-Final	HMAC	HMAC
E13093	Yorktown Blvd (Lake Travis to Everhart Rd)	Bond 2014 Prop 1	Pre-Final	HMAC	HMAC
E15106	Ayers St - Pedestrian Improvements and Turn Lane	Bond 2014 Prop 2	75%	HMAC	HMAC
E13094	Staples St (Alameda St to Morgan St)	Bond 2014 Prop 1	60%	Both	Both
E15107	Chaparal Street - Phase 2 (Schatzel to Taylor)	Bond 2014 Prop 2	30%	HMAC	Both
E15110	Flato Road - Agnes to Bates	Bond 2014 Prop 2	30%	HMAC	Both
E15112	Rodd Field Road Expansion (Saratoga to Yorktown)	Bond 2014 Prop 2	30%	HMAC	Both
E13090	Morgan Ave (Staples St to Ocean Dr)	Bond 2014 Prop 1	On Hold	Both	Both

Advertised or in Construction

PCC
HMAC
Both