



U.S. Department
of Transportation
**Federal Highway
Administration**

Technical Advisory

Subject
Use of Alternate Bidding for Pavement Type Selection

Classification Code

Date

Office
of
Primary
Interest

T 5040.39

December 20, 2012

HIAP

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- 1) **What is the purpose of this Technical Advisory?** This Technical Advisory issues guidance to State and local highway agencies that are interested in using alternate bidding procedures to make the pavement type selection on Federal-aid projects on the National Highway System (NHS).
 - 2) **Does this Technical Advisory supersede another Technical Advisory or prior guidance?** Yes. This Technical Advisory supersedes all prior guidance on the topic of use of alternate bidding for pavement type selection. Superseded prior technical guidance on use of alternate bidding for pavement type selection includes
 - a) Federal Register "FHWA Pavement Type Selection Policy," published November 9, 1981
 - b) 23 CFR 626 Non-Regulatory Supplement, Section 4(b), issued April 8, 1999, and
 - c) HIPT memorandum "Clarification of FHWA Policy for Bidding Alternate Pavement Type on the National Highway System" issued on November 13, 2008.
 - 3) **What is the background on alternate bidding for pavement type selection?** The pavement type selection process involves a level of risk for an agency due to the potential variations in material costs and performance. Volatility of pavement materials costs may make it more difficult to select the most cost effective pavement structure for a project. In response, state highway agencies have a renewed interest in using alternate pavement type bidding procedures to determine the most appropriate pavement type. Guidance previously

issued by FHWA, contained in 23 CFR 626 Non-Regulatory Guidance, Section 4(b) dated April 8, 1999, states that "FHWA does not encourage the use of alternate bids to determine pavement type due to the difficulty in developing truly equivalent designs". Some States that have previously utilized alternate bidding for pavement type selection have identified several benefits. These include: a) flexibility in design, construction, and bidding; b) increased competition, and c) lower unit costs. Several reasons have limited the widespread use of alternative bidding for pavement type selection. These include: a) the absence of national guidance on when to use alternate bidding, b) ensuring that alternate bidding is implemented consistently, and c) providing an open competitive bidding environment which is consistent with 23 CFR 635.104(a).

- 4) **What is the scope/applicability of this technical guidance?** This technical guidance describes recommended practice on Federal-aid projects on the National Highway System. While this recommended practice is suitable for consideration on any project, in accordance with 23 U.S.C. 109(o), contracting agencies may use State design and construction standards, including alternate pavement type bidding, for non-National Highway System projects.
- 5) **What is the FHWA position on alternate bidding for pavement type selection?** FHWA considers alternate pavement type bidding a suitable approach for determining pavement type when engineering and economic analysis does not indicate a clear choice between different pavement designs.
- 6) **When is use of alternate bidding for pavement type selection appropriate?** Factors that should be considered prior to making a decision to utilize alternate bidding for pavement type selection include:
 - a) **Equivalent designs** - Alternate pavements designs should be equivalent to the maximum extent possible. Equivalent designs provide similar level of service over the same performance period, and have similar life-cycle costs. Traditionally it has been difficult for two pavement structures utilizing different materials to be truly equivalent so engineering judgment was needed when determining what is and what is not an equivalent design. However, with the release of AASHTOWare® DARWin-ME™ mechanistic-empirical pavement design guide the process for developing equivalent designs is more rational and mechanistic in its approach. An indicator of similar level of service would be alternates that remain in good condition (<95 inches/mile IRI) and fair condition (<170 inches/mile IRI), based upon historically calibrated models over the performance period. The performance period (analysis period) should be long enough to cover at least one major rehabilitation cycle. Life-cycle costs would be considered similar if the Net Present Value (NPV) for the higher cost alternative is less than 10% higher than the lower cost alternative. This difference is appropriate due to the uncertainty associated with estimating future costs and timing of maintenance and rehabilitation.
 - b) **Discount rate** - Discount rates have a significant impact on the determination of the NPV of alternate pavement designs. The Life-Cycle Cost Analysis (LCCA) in Pavement Design – Interim Technical Bulletin, September 1998, provides guidance on the process of LCCA. The Technical Bulletin recommends that NPV is the economic efficiency indicator of choice. Future cost streams should be estimated in constant dollars and discounted to present using a real discount rate. Discount rates used should reflect historical trends over long periods of time. Real discount rates should be consistent with OMB circular A-94, Appendix C (http://www.whitehouse.gov/omb/circulars_a094/a94_appx-c).
 - c) **Consideration of uncertainty** – The impact of uncertainty in factors such as performance life, materials costs, construction duration and future actions should be considered in the determination of total life-cycle cost for each alternative. The RealCost software program (available for free download at <http://www.fhwa.dot.gov/infrastructure/asstmgmt/lccasoft.cfm>) is a useful tool to perform LCCA as well as quantify the uncertainty of future actions through a sensitivity or probabilistic LCCA.
 - d) **Maintenance and rehabilitation strategy** – The maintenance and rehabilitation (M&R) strategy selected for each alternative pavement should reflect realistic owner-agency pavement management practices. It is critical that real data from pavement management systems be employed to establish pavement performance and the costs associated with

maintenance and rehabilitation. Realistic sequencing of the timing and extent of the M&R activities to keep pavements at the same level of service is vital to the determination of the life-cycle cost to determine if alternate bidding is appropriate and for determining the bid adjustment used when administering the alternate bidding projects. The selected M&R activities and timing should ensure that the competing alternatives provide similar levels of service over the performance period. NCHRP Report 703, Guide for Pavement Type Selection, Section 3.5 describes a reasonable approach for developing realistic M&R strategies.

(http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_703.pdf)

- e) **Non-Economic factors** - An agency may consider the impact of non-economic factors when making the decision to utilize alternate bidding for pavement type selection. These non-economic factors may include constructability, continuity of adjacent pavements, availability of local materials, experience, and conservation of materials.
 - f) **Appropriate application** – Alternate pavement type bidding procedures should only be used where pavement items impacted by the alternate bid are likely to influence the determination of the lowest responsive bidder for a project. Projects with substantial non-pavement items may not be good candidates for alternate bidding. Additionally, projects with substantial quantities of different pavement items may not be suited for alternate bidding due to equipment mobilization costs.
 - g) **Work zone user delay costs** – In the event the anticipated total user delay costs associated with work zones during initial construction and subsequent M&R activities is significantly different, greater than 20%, between design alternates, the suitability of the project for alternate bidding for pavement type selection should be carefully evaluated.
- 7) **How should alternate bidding for pavement type selection be administered?** Factors that should be considered when developing/implementing the process for alternate bidding for pavement type selection include the following:
- a) **LCCA Bid Adjustment** – An LCCA bid adjustment should be used for all alternate bidding projects. The NPV of all unique costs for anticipated future M&R activities over the performance period should be computed. The difference in the NPV of anticipated future costs should be added to the initial bid price of the alternative with the higher NPV for anticipated future M&R costs to determine the lowest responsive bidder. It is strongly recommended that an agency establish a process, with input from industry, for determining the LCCA bid adjustment and the LCCA bid adjustment used for each project is advertised in the project specifications. The LCCA Bid adjustment should include unique direct agency costs. The LCCA bid adjustment should not include non-agency costs, such as work zone related user delay costs, vehicle operating costs, and environmental costs, due to the uncertainty associated with quantifying those costs.
 - b) **Commodity price adjustments** - The use of commodity price adjustments for material prices is not desirable for alternate bidding contracts, as it is difficult to administer equal treatment to various alternate materials. Use of these commodity price adjustments may result in different levels of material cost risk being included in the bid for alternate pavement types.
 - c) **Quality price adjustment clauses** –Quality price adjustment clauses are used by many agencies to incentivize quality construction practices. When used on alternate bidding projects, quality price adjustments should provide similar incentives or disincentives for quality construction for all alternates.
 - d) **Material quantities** - Typically, asphalt concrete and hydraulic cement concrete pavements are specified using different methods for materials quantities. Using materials pay items that are based on weight or mass may result in cost overruns compared to an agency's quantity estimates whereas using a materials pay item based on area is less likely to result in a materials overrun. Incurring material overruns will result in a higher cost to the agency than was anticipated and may invalidate the economic analysis that is the foundation for the LCCA analysis. It is recommended that an agency establish a process to monitor the actual agency costs of the completed pavement system and compare these costs to the estimated costs to the agency at time of award to ensure that a systematic bias does not exist due to contract administration procedures. The agency should use the same type of method for materials quantities such as specifying by area for all alternate materials.

- e) **Approvals** – Title 23 U.S.C. 112 provides that Federal-aid construction contracts shall be awarded only on the basis of the lowest responsive bid. For many years, FHWA allowed the States to evaluate alternate pavement type bidding with LCCA bid adjustments under the authority of Special Experimental Project No. 14 – Innovative Contracting. However, consistent with Mr. John Baxter's memorandum of November 8, 2012, alternate pavement type bidding procedures are no longer experimental.
- f) **Change Orders** – Post-award change orders for pavement type, which was the basis of the contract award, should not be used since it negates the purpose of the alternate bidding process.
- 8) **How can program effectiveness be determined?** The effectiveness of the alternate bidding process can be evaluated by monitoring the number of bidders and the unit cost of pavement items awarded. A decrease in average pavement materials unit costs, when compared to similar projects that do not use alternate bidding, would demonstrate the effectiveness of an agency's process. Input from the respective pavement industry groups can provide additional subjective information about the overall program effectiveness..
- 9) **Are there any reference materials on alternate bidding for pavement type selection?**
Yes. The following references apply to alternate bidding for pavement type selection.
 - a) Guide for Pavement Type Selection, NCHRP Report 703, November, 2011.
http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_703.pdf



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