

Guidelines on Preparing Engineer's Estimate, Bid Reviews and Evaluation  
October 7, 2021

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## 1. PURPOSE

- a. To provide guidance for improving pre-bid, bid review and evaluation policies and procedures.
- b. To outline recommended procedures for preparing the engineer's estimate for reviewing bids prior to concurrence in award.
- c. To improve competitive bidding procedures.
- d. To ensure that the final Engineer's Estimate supports the financial obligation in the project authorization between FHWA and the STA [23 CFR 630.106]

## 2. BACKGROUND

A State Transportation Agency's (STA) procedure for soliciting and awarding construction contracts are an important part of the competitive bidding process. To ensure a competitive contracting environment, the STA has the option to use either prequalification or post-qualification procedures. In either case, the procedures must support full and open competition by ensuring fairness in the pre-bid solicitation process and post award review of construction bids [23 CFR 635.110(b)]. In addition, the STA's procedures for developing a reliable engineer's estimate are critical to the success of such programs. The engineer's estimate should reflect a fair and reasonable cost of the project in sufficient detail to provide an accurate estimate of the financial obligations to be incurred by the State and FHWA and permit an effective review and comparison of the bids received.

This guideline replaces *Guidelines on Preparing Engineer's Estimate, Bid Reviews and Evaluation*, dated January 20, 2004. This guideline is intended to serve as a reference for STAs who are interested in improving their bid review and evaluation procedures. Each STA may consider this guideline in developing its own procedures. State contracting policies and procedures differ, and therefore, the topics in this Guideline should be considered in light of each State's unique policies and procedures.

Except where specifically noted, this guideline applies to the traditional design-bid-build project delivery system. It does not apply to Design-Build (D-B) contracting, Construction Manager / General Contractor (CM/GC) contracting, or Indefinite Delivery / Indefinite Quantity (ID/IQ) contracting. See Section 8 for a discussion of specific estimating issues regarding D-B and CM/GC contracting.

## 3. PRE-BID CONSIDERATIONS

#### a. Contractor Prequalification

In its 1981 Suggested Guidelines for Strengthening Bidding and Contract Procedures, the American Association of State Highway and Transportation Officials (AASHTO) defines prequalification as a means of predetermining job experience and work capacity and to identify individuals from whom the agency may accept a bid. In general, contractor prequalification is used to help determine the quantity and type of work a firm is capable of undertaking. Normally the firm's resources, its financial assets, work experience, and its staffing capability should be identified for it to become prequalified. Some STAs that do not require prequalification find it necessary to collect some information via a financial statement or some other abbreviated process. These STAs do not specify the type of work or limit the size of project a firm may bid upon because they feel prequalification may unduly restrict competition. Other STAs do not prequalify but instead rely on the contractor's ability to provide a performance bond.

While the FHWA does not specify the STA's procedures for qualifying and licensing contractors, the Division Administrator must determine that any such procedures do not restrict competition or operate to prevent the submission and consideration of a bid submitted by any responsible contractor. [23 CFR 635.110(b)]

Prequalification has been identified by some STAs as a useful tool for gathering pertinent information on the intricate management details of a contractor's firm. In the event of a conviction for a crime such as bid rigging, such information proves useful as an aid in determining the appropriate sanctions for the firm and the individuals involved. Another possible use would be to determine the relationship of firms bidding on a project.

Specific information that should be collected from a firm includes the following: financial resources, principal individuals in the firm (anyone having a 10 percent or more interest in the firm), all affiliates or subsidiary companies including material sources, available equipment, work experience, individuals and organizations that have control or influence over the firm's bidding procedures, and whether the firm has ever been suspended or debarred from bidding and the related circumstances.

The instructions for completing the work experience section (of the pre-qualification form) should require that the firm identify all projects for which it was the prime contractor and those on which it worked as a subcontractor during at least the past two years as well as the contracting agency for those projects. Also, the contracting agency should describe the penalties for making false statements in the pre-qualification process.

#### b. Non-collusion Statement

According to 23 CFR 635.112(f), STAs are required to include provisions in the bidding proposals that require all bidders to include a non-collusion statement with their bids. All non-collusion certifications shall be retained by the STA in accordance

with the retention requirements of 2 CFR 200.334, which is three years after the FHWA's payment of the STA's final project voucher.

c. Standard Specifications

All STAs should have standard specifications that address the issue of evidence of collusion among bidders. STA specifications that currently address this item generally specify that the STA may determine that the bidder is not responsible and reject their proposal based on evidence of collusion. In addition to rejection of a firm's proposal, the specification should advise that collusive bidding is a violation of the law and could result in criminal prosecution, civil damage actions, and State and Federal administrative sanctions.

d. Plan Holders Lists

Confidentiality of the plan holders list (those firms that have taken out plans and bid proposal documents) has both advantages and disadvantages with the end goal of maximizing competition.

**Advantage** - disclosing the plan holders list allows potential material suppliers and subcontractors (including DBEs) to know which firms to contact about upcoming projects. However, due to the nature of competitive bidding with suppliers and subcontractors providing last-minute quotes to bidders, open communication is critical to the completeness of bids. Further, because the bidder performs the contract work itself or using subcontracts, the burden lies with the bidder to determine which other firms to work with on a project. Unless the project has new or unusual material or construction requirements, most bidders are likely aware of the available subcontractors and potential material suppliers. Therefore, the bidder is generally the one seeking potential subcontractors, especially if Disadvantaged Business Enterprise goals are included in the proposal. Another advantage of not disclosing the plan holders list is that bidders will submit what is believed to be a competitive bid based upon the company's own individual circumstances. This is especially important for projects where there would be limited competition.

**Disadvantage** - With the availability of bid tabulation information and plan holders lists on the Internet, the potential for bid collusion is higher than in previous years when such information was not readily available. To create the most competitive environment for potential bidders, a firm should not be aware of the identity of the other potential bidders.

A 2017 survey by the AASHTO Technical Committee on Cost Estimating found that most states publish a plan holders list on their web site or make this information available upon request. To discourage bid collusion, FHWA recommends that STAs not publish or release information regarding plan holders. If STAs need to release this information to be consistent with their own policies, consideration should be given to waiting until there are at least three potential bidders for a project.

#### e. Competition

Competition for projects by bidders is an integral part of a successful construction program. An effort should be made by the contracting agency to maximize the competition. An AASHTO 2009 survey by the Construction Subcommittee and the AASHTO Practical Guide to Cost Estimating, 1<sup>st</sup> Edition (2013) provide several strategies for improving bid competition:

- Advertise widely enough to advise those potential bidders interested in the type of work and size of project involved.
- Based on the complexity of the project, consider using an extended advertisement period.
- Consider the project's estimated cost and size to maximize the number of bidders. The size normally varies in each State depending on the makeup of the construction industry. In some situations, it may be desirable to divide the project into several smaller contracts to foster competition. Alternatively, it may be desirable to lump smaller contracts into a bigger project to increase competition.
  - a. Jobs should be allowed to be bid individually or in combination.
  - b. Bundle projects in proposals to make them as attractive as possible. Bundling strategies include matching contract size to contractor capabilities, seeking to increase unit quantities of major cost items so that contractors can reduce their fixed costs such as mobilization and traffic control across more items, bundling projects by the type of work and geographic location, and combining projects that only receive one bid with other similar projects.
  - c. To accommodate both large and small contractors, allow contractors to tie contracts for bidding purposes to encourage more competitive bid prices. Contractors may limit the number of tied contracts they bid based on their bidding capacity.
- Monitor contractor responsiveness to timing of letting to identify seasonal effects on bids.
- Coordinate lettings based on availability and capacity of contractors. Contractors may limit the number of projects they bid if an STA includes many similar projects.
- Consider rejecting non-competitive bids and re-advertising.
- Evaluate using alternate materials (e.g., concrete paving, asphalt paving, recycled materials, etc.).
- Balance work types in each letting.
- Consider including price adjustment clauses for certain materials to reduce contractor's risk.
- Allow more time between advertisement and bid opening.
- Conduct more frequent lettings.
- Update construction cost estimate data.
- Consider using state aggregate sources where industry sources are not competitive.

f. Escrow of Bid Documents

FHWA recommends that STAs consider escrowing bid documents where it is administratively feasible to do so. Section 103.08 – “Escrow of Bid Documentation” of the AASHTO Guide Specifications for Highway Construction, 10<sup>th</sup> Edition (2020) provides a sample specification if an STA wishes to make this a requirement.

g. Price Adjustment Clause

Commodity price escalation clauses, also referred to as commodity price adjustment clauses in a contract, are intended to mitigate the risks related to price changes of specific items or materials due to supply and demand. A STA may also use the term ‘price adjustment clause’ when referencing the impact of construction quality on the price a STA pays for a final product. The use of material price indices in contract price adjustment clauses can be an effective method of sharing the risks of material price fluctuations for both the industry and contracting agencies. [The AASHTO Committee on Construction’s 2019 Survey on the Use of Price Adjustment Clauses for Inflation](#) provides the most recent summary of State practices regarding price adjustment clauses.

FHWA does not participate in retroactive price adjustments. If price adjustment clauses are not included in the bid proposal, FHWA cannot approve the use of Federal funds for retroactive price adjustment clauses subsequently added by change order. [See FHWA’s letter to Maryland SHA dated April 8, 2004, for additional information.](#) [FHWA Technical Advisory TA 5080.3](#) provides additional guidance on the use of price adjustment clauses.

h. Inflation

For large projects lasting several years, STAs should consider the impacts of inflation. Inflation affects the total contract cost, rather than specific items within it. Additional information on inflation can be found in AASHTO Practical Guide to Cost Estimating, Chapter 6 – Inflationary Considerations.

i. Contingencies

The AASHTO Practical Guide to Cost Estimating (2013) defines contingency as “An estimate of costs associated with identified uncertainties and risks, the sum of which is added to the base estimate to complete the project cost estimate.” The Practical Guide provides detailed guidance on how agencies may incorporate contingencies in planning, scoping, design and final design estimates (see Practical Guide Sections 1.2.2 and 3.3.7 for discussions on this topic).

Double-counting uncertainties and risks can lead to inaccurate estimates. Accepted practice is to explicitly identify contingency as a line item in the estimate. Intentional,

hidden contingencies, such as “padding” a line item based on experience, should be avoided. Unintentional contingencies, such as estimator bias, are more difficult to identify and may require independent estimate review.

The Practical Guide provides detailed information on how risk and contingency are established for projects of varying complexity in *Chapter 5 - Risk Based Cost Estimates*. Additional resources include Probabilistic Risk-based Estimating for Highway Project Cost and Schedule, course No. 134205, which provides a detailed overview of the concepts and recommended process to determine reliability-based estimates of contingency.

#### 4. PREPARING FINAL DESIGN ENGINEER’S ESTIMATE

The critical review of any bid depends on the reliability of the engineer’s estimate it is being compared to. The engineer’s estimate is the contracting agency’s benchmark for analyzing bids and is an essential element in the project approval process. STAs should devote attention to preparation of engineer’s estimates using experienced staff that apply the same level of detail as the contract bidders. STAs are encouraged to provide sufficient resources and training opportunities for their staff. Available resources include [AASHTO’s Practical Guide to Cost Estimating](#) (2013) and [NCHRP Report 574 “Guidance for Cost Estimation and Management for Highway Projects During Planning, Programming, and Preconstruction” \(2007\)](#). FHWA-NHI Course No. 134205; Probabilistic Risk-based Estimating (PRBE) for Highway Project Cost and Schedule, provides additional guidance on how to develop reliability-based estimates and emphasizes a scalable process.

The engineer’s estimate should reflect the amount the contracting agency considers fair and reasonable and is willing to pay for performance of the contemplated work. Under-estimating may cause project delays while additional funding is arranged to meet the contract costs. On the other hand, over-estimating causes inefficient use of funds that could be used for other projects. The contracting agency should anticipate changing market conditions and factor the competitive bidding environment into the engineer’s estimate.

##### a. Estimating Techniques

The AASHTO Practical Guide to Cost Estimating (2013) identifies four basic techniques to develop estimates of project costs: Conceptual estimating, historical bid-based estimates, cost-based estimates, and risk-based estimates. Conceptual estimating, or parametric estimating, is used to support development of planning or early scoping phase estimates when minimal information is known. This technique will not be discussed in this guidance since it does not apply to the final design stage of project development. The other estimating techniques are discussed below.

**Historical bid-based** estimating technique matches estimates of line-item quantities from project plans to appropriate historical unit bid prices or average historical unit bid

prices. Under this method, historical bid data are adjusted for project conditions (i.e., project location, size, quantities, etc.) and the general market conditions (i.e. competitive bidding environment). The historical bid-based approach is a cost-effective method to develop the engineer's estimate. However, solely relying on historic data may not be appropriate when the data is based on a non-competitive bidding environment. A file of previous unit bid prices should be maintained according to type, size, and location of project. Upcoming projects should be matched to the most recent projects to develop base prices for estimating the value of the unit prices.

The historical bid-based method requires the least amount of time and personnel to develop and produces an adequate estimate for use in budgeting/programming, if competitive bid prices are used to build the estimate. Further adjustment of the base prices should be considered based upon the ages of the similar projects, but past inflation rates should not be projected into the future unless based on circumstances which can be reasonably expected to occur, such as labor rate increases through labor negotiations and known material price increases. Where the magnitude and timing of future increases are uncertain and would present a significant risk, contractors tend to bid additional cost to cover these risks, regardless of whether they occur or not. As such, the inclusion of price adjustment clauses in project contracts may be a better alternative.

**Cost-based** estimating technique takes into consideration factors related to actual performance of the work (i.e. the current cost of labor, equipment, and materials; sequence of operations; production rates; and a reasonable value of overhead and profit). The estimator should have a good working knowledge of construction methods and equipment to use this approach. The estimator should also have resources available for determining production rates from actual work performed by the contracting industry on similar type projects as well as resources for determining current construction methods and equipment. While adjustments for current market conditions are important, this approach typically produces an accurate estimate and is useful in the bid review process in aiding the decision to award or reject the project. However, this method may be more time consuming and may not be practical for all projects.

**Combination Historical bid-based and Cost-based Techniques** This approach combines the use of historical bid and cost-based data. Most projects contain a small number of items that together comprise a significant portion (e.g. 75 percent) of the total cost. These major contract items may include Portland cement concrete pavement, structural concrete, structural steel, asphalt concrete pavement, embankment, or other major items of work within the contract. To the extent practical, STAs should collect information on local market prices of materials, equipment manufacturers, dealers, and rental companies, and material suppliers to obtain current cost information on a regular basis. Davis-Bacon prevailing wage rates on Federal-aid contracts could be incorporated to provide labor costs as determined by Department of Labor. Current material costs are obtained from local approved sources. Equipment costs can be obtained through rental companies or equipment dealers based on a reasonable depreciation schedule. The remaining items can be estimated based on historical prices and adjusted as appropriate for the specific project.



**Risk-based** estimating (RBE) technique applies risk identification and uncertainty analysis techniques to forecast project contingency. Estimators apply the RBE technique most frequently in the planning, scoping, and early design phases where uncertainty and project risks are greatest. However, it may also be used to develop the final design engineer’s estimate and construction costs and validate project contingency for remaining elements of risks (market, archeological, unsuitable soil, etc.). The AASHTO Practical Guide to Cost Estimating (2013) provides the following recommendations to apply the RBE technique based on project complexity.

<b>Project Complexity</b>	<b>Recommended Methods to Establish Risks and Set Project Risk Contingency</b>
1. Non-complex	Develop list of risks and use a top-down deterministic percentage of project cost to estimate contingency
2. Moderate complex projects	Include the use of more rigorous risk identification methods and a top down deterministic percentage estimation of contingency supplemented with a bottom up deterministic estimate of specific contingency line items.
3. Most complex i.e. major projects	Include a facilitated determination of project risks and a probabilistic determination of cost and schedule completion.

Some STAs have implemented a scalable RBE process that matches the level of effort to the cost of the project.

Probabilistic Risk-based Estimating for Highway Project Cost and Schedule, FHWA - NHI Course No. 134205, provides additional guidance on how to develop reliability-based estimates and emphasizes a scalable process.

b. Documentation of the Final Engineer’s Estimate

The STA’s request to obligate Federal-aid funds must be supported by a documented cost estimate that is based on the State's best estimate of costs.(23 CFR 630.106(a)(3)) The STA is also required to maintain a process to adjust project costs estimates (23 CFR 630.106(a)(4)). Having a documented process is a critical factor to achieving consistency in the estimation of project costs and review of bids received. A documented process increases the STAs ability to provide accurate and timely updates that reflect current estimates. The cost estimating method used by the contracting agency should be documented, up to date, and readily available to staff. Documentation of the estimating procedures enhances the consistent development and application of the engineer’s estimate and provides a benchmark for process improvements. The AASHTO [Practical Guide to Cost Estimating \(2013\)](#) is a valuable resource for the development of cost estimating guidance.

c. Confidentiality of the Engineer’s Estimate

For this guideline, the term “confidentiality of the Engineer’s Estimate” means the Engineer’s Estimate is not released to the public. State laws, policies, procedures, and practices regarding the term “confidentiality” vary.

Some STAs have a policy to keep the estimate confidential from public disclosure even after the project has been constructed and opened to traffic. In general, public procurement should be a transparent process; however, the engineer’s estimate should not be disclosed prior to the award of the contract as there are few, if any, perceived advantages to the contracting agency in doing so. This is especially important in cases where the contracting agency anticipates minimal competition or a single bid for construction.

If information regarding the engineer’s estimate were available, potential bidders would know the price the contracting agency is willing to accept and in cases where competition is limited, the STA may be receiving inflated bids. The industry already has access to preliminary estimates for construction that are required by the State Transportation Improvement Program or Transportation Improvement Program. See, e.g., 23 CFR 450.218(i)(2). Some STAs also have policies requiring project classification information regarding the relative size of the contract so that contractors will know if their bonding capacity is adequate for bidding purposes. For example, a range could be established as follows:

Project Classification	Project Cost
A	\$ 0 - \$100,000
B	\$100,000 - \$250,000
C	\$250,000 - \$500,000
D	\$500,000 - \$1,000,000
E	\$1,000,000 - \$2,500,000
F	\$2,500,000 - \$5,000,000
G	\$5,000,000 - \$10,000,000
H	\$10,000,000 - \$15,000,000
I	\$15,000,000 - \$25,000,000
J	\$25,000,000 or greater

A policy of providing a specified dollar amount for a bid bond could indicate the amount of the estimate. This procedure should be revised to specify a percentage of the bid submitted, thus maintaining the confidentiality of the estimate.

d. Consistency of the Engineer’s Estimate

FHWA recommends that STAs establish measures to monitor the consistency and reliability of the estimating process and identify appropriate revisions when market conditions change. Estimate consistency relies on the estimator using all the available resources to create a fair and reasonable value for the proposed project. STAs should

assess the performance of the engineer's estimate to determine if opportunities exist to increase the reliability of the engineer's estimate for contract award.

Previous editions of this guidance recommended a performance measure based on the engineer's estimate being within  $\pm 10$  percent of the low bid for at least 50 percent of the projects. If an STA elects to use a 10-percent threshold, FHWA recommends that the engineer's estimate be used as the base (or divisor) in any comparison (i.e. the difference between the bid amount and the engineer's estimate divided by the engineer's estimate).

Trend analysis is typically used to monitor the performance data for changes over time. This allows the STA to determine when changes are necessary in the estimating process (e.g. possibly due to inflationary pressures).

Attachment A provides a review guide for assessing a contracting agency's procedures for developing the engineer's estimate.

Attachment B provides a list of performance data that could be used to monitor the health and performance of an STA's letting, award, and contract administration processes. FHWA Division Offices and State DOTs performing risk analyses of their programs are encouraged to consider the data listed in Attachment B.

## 5. BID ANALYSIS AND CONTRACT AWARD

The engineer's estimate should be a fair and reasonable value for the work to be performed. Specialized highway construction work should be evaluated on a case-by-case basis. The following guideline discusses circumstances where an apparently excessive bid may be justified as a basis for award:

### a. Assessing Competition

The criteria used in an initial evaluation of the degree of competition for a given project will depend on many factors. In evaluating the bids for a project, the following factors should be considered in performing a preliminary assessment as to whether competition was adequate:

- number of bids,
- difference between low bid and engineer's estimate,
- difference between low bid and other bidders,
- spread or variation of all bids,
- type of project and the anticipated competition for this type of work,
- time of year,
- bidding opportunities for similar work with other nearby agencies or jurisdictions (e.g. resurfacing work),
- bidding opportunities with neighboring agencies that may result in temporary material shortages (e.g. large steel fabrication contracts);

- relative availability of subcontractors and specialty subcontractors for the project, and
- potential DBE or good faith effort issues with apparent low bid and other bidders as appropriate.

If the preliminary assessment confirms that competition was adequate, the apparent low bid should be further reviewed using the criteria in Section (c) below.

b. Considering Re-Advertisement

If the preliminary assessment indicates that competition was inadequate, then the contracting agency could advance the project based on the determination that the project is so critical that advancing it outweighs the potential benefit of reduced prices through additional competition. Few projects are considered so essential that deferral (even for 60 days to solicit re-advertised bids) would not be in the public interest. However, projects that are considered essential may include the following:

- 1) Safety projects to correct extremely hazardous conditions where the traveling public may be in danger.
- 2) Emergency repair or replacement of damaged facilities.
- 3) Projects to close gaps in otherwise completed facilities to allow opening to traffic.
- 4) Projects that are critical elements in a staged or phased construction schedule, where a delay would mean substantial impact on the completion date of the facility. Contracting agencies should evaluate additional costs against schedule delays when re-advertising projects.
- 5) Projects in areas with limited construction windows such as: winter shutdowns, non-work periods due to threatened or endangered species breeding periods, or discretionary grant-funded projects with statutorily imposed completion deadlines.

It is unlikely that re-advertising would likely result in higher cost without concluding that all practical anti-inflation measures have been employed to the maximum extent possible.

Estimating errors should not be considered as the basis for re-advertising unless the magnitude of the error is significant, and procedures are modified to attempt to prevent the occurrence of similar errors. Some errors are merely mistakes that can be corrected easily once discovered, while others are “errors of judgment” which cannot be as easily explained.

STAs are encouraged to track projects that are re-let and tabulate either savings or higher cost for each calendar year. If higher costs are found in the re-let projects, a thorough review of the current estimates and procedures should be performed. Also,

current bid collusion detection techniques should be employed to identify potential bid rigging or collusion.

The analysis and award process for a project should be thorough even when the low bid is below or at a reasonable percentage above the engineer's estimate. It is reasonable, however, to expect that larger projects will receive a more thorough review than very small projects. The STA should have written procedures for justifying the award of contract, or rejection of the bids, when the low bid appears excessive or rejection is being considered for other reasons.

c. Bid Review Factors

1) Factors that should be considered in reviewing the bids received for a project include the following (as appropriate):

- (a) Comparison of the bids against the engineer's estimate.
- (b) Number of bids submitted.
- (c) Distribution or range of bids received.
- (d) Identity and geographic location of the bidders.
- (e) Potential for savings if the project is re-advertised.
- (f) Bid prices for the project under review versus bid prices for similar projects in the same letting.
- (g) Urgency of the project
- (h) Current market conditions/workload.
- (i) Any unbalancing of bids.
- (j) Whether unit bid prices differ significantly from the estimate or from other bids.
- (k) If there is a justification for the difference; and
- (l) Any other factors the contracting agency has determined to be important.

2) The influence of any one of the above factors may not be meaningful in isolation. However, when considered in combination, the results could be significant. Although the number of bids received is a measure of bidder interest, by itself the number does not indicate the degree of competition. For example, one would not normally expect a firm that is located near a project to be underbid by a firm located a distance from the project and having extensive mobilization and materials transportation costs if both

firms are bidding truly competitively. A number of other factors enter into a particular firm's bid such as workload or the size of project, but a bidder's geographic location is a significant factor.

#### d. Comparison of Bid Prices

A comparison of project unit bid prices should be made at each letting to determine if contractors are submitting consistent prices on the different projects they bid. In general, there will be an adequate number of projects in each letting to make a comparison except for the large or very specialized jobs. Although the projects being compared may not be in the same geographic area, the reviewers should be aware of any geographic price differences, which normally remain constant between areas even when the overall market conditions change.

#### e. Unbalancing of Unit Bid Prices

The unbalancing of unit bid prices by a contractor can be difficult to assess in that it is quite normal for different contractors to place their costs such as overhead or their expected profit for the project in the unit cost of different items. Normally these costs will be in those items, which the individual contractor has determined will not be eliminated or significantly underrun. The main concern of the contracting agency should be to assure itself that the bids have not been materially unbalanced to take advantage of errors in the plans or specifications. Unbalancing of bids may also occur on those lump-sum and unit priced items that can be performed in the early stages of the project. The contracting agency should assure itself that the schedule of payment does not result in advance payment. The following FHWA memos provide additional information on unbalanced bids:

- Bid Analysis and Unbalanced Bids (1988) - <https://www.fhwa.dot.gov/programadmin/contracts/051688.cfm>
- Rejection of Unbalanced Bids (1987) <https://www.fhwa.dot.gov/construction/contracts/870729.cfm>

It can be difficult to distinguish between a mathematically unbalanced bid and a materially unbalanced bid. An example of a process for determining materially unbalanced is the State of Wisconsin DOT's (WisDOT), which utilizes a bid analysis procedure. Using WisDOT's process, an STA would examine significant items that are mathematically unbalanced (as identified by a certain percentage over or under the engineer's estimated unit price for that item). If it appears that a quantity error may have caused a contractor to unbalance, the STA would examine all significant bid items for quantity errors. If quantity errors are found, the STA would examine the impact on the bidder ranking if corrected quantities had been used. A change in the ranking is an indicator of a materially unbalanced bid. See the following link for additional details: <http://wisconsindot.gov/rdwy/cmm/cm-02-10.pdf#cm2-10.2.1>.

#### f. Review Committee

A multidisciplinary review committee should be used to analyze the bids received so that the various perspectives within the contracting agency are represented and are provided with technical and managerial input. This approach can also be used to readily identify the effects of awarding the contract or rejecting the bids. If a review committee is not utilized for analyzing bids, as a minimum, the estimating section should be involved. The estimating section is normally familiar with the project. Any major differences in the unit bid prices and the estimate will be readily identifiable and evaluated. Involving the estimating section also keeps it apprised of any trends in the market conditions so the engineer's estimates can be kept current.

#### g. General Guidelines

It may be beneficial for a contracting agency to develop general guidelines to be used in determining whether to award the contract or to reject all bids. However, each project should be considered on its own merits, as some will normally have a higher priority to begin construction than others. If guidelines are developed, consideration should be given to the use of a "sliding scale" approach for low bids over the estimate. A low bid 15 percent above the engineer's estimate of \$50,000 should not necessarily be treated the same way as a low bid 15 percent above an engineer's estimate of \$5,000,000. Also, if guidelines are used, it is recommended that the specifics be kept confidential from the general public so as not to influence contractors who are preparing bids.

#### h. Submission of Bids

If a significant number of firms take out a set of plans and a bidding proposal, but only a small percentage submit a bid, an effort should be made to determine the reasons for the lack of interest. If the cause for lack of interest can be identified, appropriate steps should be taken to improve the situation.

#### i. Bid Responsiveness

STAs have their own requirements for proposal responsiveness (typically identified in the standard specifications and in the bid proposal package). For projects where a DBE contract goal was established, contractors must submit, at the STA's discretion, DBE commitments or good faith efforts either with the initial bid proposal or within 5 days after the bid opening (49 CFR 26.53(b)(3)(i)).

## 6. POST-AWARD REVIEWS

#### a. Evaluation Period

A conscientious effort should be made to determine if bid rigging is currently ongoing or has occurred in the recent past. To make this determination, an adequate number of projects awarded over a sufficient time period should be evaluated. A time period of approximately 5 years should be selected for the initial evaluation to determine if any abnormal competitive bid patterns exist, unless review of data supports shorter cycles.

b. Review Considerations

The following information should be considered in a post-award review for abnormal bid patterns: (1) number of contract awards to a specific firm; (2) project bid tabulations; (3) firms that submitted a bid and later became a subcontractor on that project; (4) rotation of firms being the low bidder; (5) a consistent percentage differential between the various firms' bids; (6) a specific percentage of the available work in a geographic area to one firm or to several firms over a period of time; (7) a consistent percentage differential between the low bid and the engineer's estimate; (8) location of the low bidder's plant versus location of the second and third low bidders' plants; (9) variations in unit bid prices submitted by a bidder on different projects in the same letting; (10) type of work involved; (11) number of firms that took out a set of plans and a proposal versus the number actually submitting a bid; and (12) any other items discovered in the review that may indicate noncompetitive bidding. Re-advertised projects should be checked to determine if the eventual low bidder was also low in the first letting.

c. Analysis

The information gathered in paragraph b provides the basis to determine if unusual bid patterns exist. While many STAs have their own bid analysis system, the majority of STAs responding to a 2017 AASHTO Technical Committee on Cost Estimating survey said they use the Bid Analysis and Management System / Decision Support System (BAMS/DSS)™, a module within AASHTOWare Project Software. In addition to the ability to analyze bids, BAMS/DSS provides collusion detection capabilities. The use of a computer program is intended only to provide information to indicate whether further investigation is warranted. If for any reason, a person feels that bid rigging or fraud has occurred, they should contact the nearest U.S. DOT Office of the Inspector General (OIG) Regional Office <http://www.oig.dot.gov/offices.php> or the OIG Hotline <https://www.oig.dot.gov/hotline>. This may be based on a suspicion or actual evidence of fraud, waste, and abuse in any project funded by FHWA.

d. In-depth Post-Award Review

The extent to which an in-depth post-award review should be carried out by FHWA or an STA will depend upon the circumstances surrounding each review. If an FHWA Division office believes that irregular bid patterns may exist and further investigation is warranted, any evidence should be furnished to the appropriate OIG office and the State. Further, an STA should provide any evidence of wrongdoing to their State Attorney General's Office, FHWA, and other appropriate officials. The frequency of the



in-depth reviews should be adequate to verify that illegal activities are not ongoing or have not occurred in the recent past.

## 7. SUSPENSION / DEBARMENT

Suspensions and debarments are discretionary administrative actions taken to protect contracting agencies by preventing persons or companies from receiving additional contracts or subcontracts. At the Federal Government level, a notice of suspension or debarment ensures that the Federal Government does not conduct business with a person or a company who has an unsatisfactory record of integrity and business ethics. Suspension and debarment actions are administered Government-wide; consequently, a person excluded by one Federal agency is excluded from doing business with any Federal agency. Governmentwide suspension and debarment policies are in 2 CFR Part 180 and FHWA supplemental policies are in 2 CFR Part 1200. The General Services Administration's System for Award Management (SAM) (<https://www.sam.gov/>) is a website that is updated regularly for individuals and firms that are excluded from participation in Federal programs. Contracting agencies may rely on this list to confirm eligibility prior to awarding any Federally assisted contract or subcontract.

The Government-wide regulations implementing suspension/debarment policy require participants involved in the contracting process to verify that that the person they are doing business with is not presently excluded or disqualified (2 CFR 180.300). The regulations allow verification to be accomplished by:

- Checking SAM Exclusions (recommended), or
- Collecting a certification from that person, or
- Adding a clause or condition to the covered transaction with that person.

While the certification regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion in Section X of form FHWA-1273 provides a level of verification for prime contracts and subcontracts, it is not required to be included in purchase orders, rental agreements, and other agreements for supplies or services. Therefore, FHWA recommends that STAs and Local Public Agencies verify the eligibility of contractors, subcontractors, suppliers, and service providers by checking SAM Exclusions prior to awarding contracts or approving any subcontractor or agreement for services.

It is recommended that each contracting agency have a written policy addressing what action will be taken in instances of contractor irregularities, such as bid rigging. A written policy serves as a deterrent to the contracting industry by advising them, in general terms, what activities the agency considers to be illegal or irresponsible and how it intends to deal with those involved should any wrongdoing be detected. Further, the policy may provide a basis for any action(s) that may be taken against the individual or firm involved in the illegal wrongdoing by those responsible for enforcing the policy.

## 8. Special considerations for Design-Build and Construction Manager / General Contractor Projects

For Design-Build (D-B) and Construction Manager / General Contractor (CM/GC) contracting, the procurement process and the terms used to describe solicitations and proposals differ significantly from the traditional process. As a result, it is important to consider different issues and criteria when describing the development of the engineer's estimate and its use in assessing price proposals or bids in the D-B and CM/GC contracting method.

## Design-Build

As it relates to the procurement process and the development of the engineer's estimate, the D-B procurement process differs from the bid-build process in several key aspects:

- D-B contracts are typically lump sum contracts. Some contracting agencies may require the design-builder to convert the lump sum price to a schedule of values for administrative purposes.
- D-B contracts may be awarded to the lowest responsive proposer or the best-value proposer as defined in the Request for Proposals (RFP) document (23 CFR 636.201).
- When using two-phase selection procedures, contracting agencies typically develop a short-list of 3 to 5 firms who are determined to be most qualified (23 CFR 636.207).
- Contracting agencies may specify the relative importance of price in the RFP. For best-value awards, both price and non-price criteria may be used in the evaluation process. The contracting agency will determine the relative importance of these evaluation criteria and provide this information in the solicitation documents (23 CFR 636.301 and 636.302).
- The level of design presented in the RFP varies with each project. Contracting agencies typically provide a level of design between 20% to 30% in the RFP document.

Because the level of design for a D-B project is relatively low in comparison with the traditional design-bid-build process, it can be challenging for the contracting agency to prepare an estimate of quantities for the engineer's estimate. The contracting agency may need to start with a preliminary design estimate or a semi-final design estimate and apply various *adjustments* to the base estimate to reflect differences in the estimated costs between the bid-build process and the design-build process. The estimate should be prepared as the RFP is being finalized and updated as necessary throughout the procurement process.

Adjustments:

- Design work performed by the design-builder. The adjustment for design services may be estimated as a percentage of the construction cost. It typically varies from a small markup for simple resurfacing contracts to a larger percentage for complex projects where a higher level of effort is necessary to apply standards, evaluate options and implement a design in conjunction with the design-builder's resources and experience. A

typical adjustment factor used to estimate the design-builder's costs for design services ranges from 7% to 20% of the estimated construction cost.

- Risk. The contracting agency should consider factors such as project complexity, location, site conditions, contract schedules, permits, construction calendar time restrictions, sensitive environmental/historic areas, traffic maintenance and phasing issues, material availability and other issues related to the design-builder's risk in completing the contract work. A typical adjustment factor used to account for risk ranges from 0% to 10%.
- Inflation. For contracts with durations longer than one-year, it is recommended that an adjustment for inflation be applied based on the time between the estimate date and the mid-point of construction.
- Coordination issues. Depending on the contracting agency's risk management plan, some agencies may require the design-builder to perform services typically provided by the agency, in whole or in part, such as: preliminary steps in the right-of-way acquisition process (e.g. appraisals, preparation of correspondence, etc.), utility relocation coordination or railroad coordination services, etc. Experience with the delegation of responsibility for these services varies with agency experience and the degree to which the design-builder is required to perform these services may be determined on a project-by-project basis.
- Administrative costs. Some agencies may include an adjustment to account for the design-builder's costs associated with field offices (additional office space to accommodate "co-location or over-the-shoulder" design review requirements of the contracting agency), additional project managers, communications staff, and other personnel resources that are above what is typically required in a traditional construction contract.
- Other miscellaneous costs. Agencies may include adjustments to account for other miscellaneous costs specific to the project. Examples of such costs include:
  - Construction engineering and inspection as required by the quality management plan,
  - Public information / coordination costs as required by the project public outreach management plan,
  - Costs related to performance or warranty requirements, and
  - Professional liability insurance requirements which are required by the RFP.

For contracting agencies that allow the submission of alternative technical concepts (ATCs), it may be appropriate to revise the engineer's estimate after the apparent best-value firm is determined to account for the ATCs being proposed by that firm. A revised estimate will provide the agency with a better comparison with the design-builder's price proposal and serve to supplement the agency's determination regarding the selection of the successful firm.

In summary, the engineer's estimate prepared for a design-build project differs from the engineer's estimate prepared for a traditional project. It is the contracting agency's estimate of a competitive price for all services provided under the design-build contract. If the contracting agency awards the contract on a best-value basis, the engineer's estimate is used to evaluate the reasonableness of price as it relates to other award criteria.

## **CM/GC**

The CM/GC procurement process differs from the bid-build process in several key aspects:

- The contracting agency may select the CM/GC firm based on qualifications, experience, best value, or any other combination of factors considered appropriate by the contracting agency and the Division Administrator (23 CFR 635.504(b)(5));
- The engineer's estimate for construction is not used in the selection of the CM/GC firm for preconstruction services, but it is used in determining price reasonableness by comparing it with the price proposal or bid submitted for construction services (23 CFR 635.506(d)(3) and (d)(4));
- Many contracting agencies also use an independent cost estimate (ICE) as a supplemental basis for determining price reasonableness prior to awarding early work packages or the primary construction contract (23 CFR 635.506(d)(3)); and
- Contracting agencies prepare cost estimates for early work packages and the entire project (23 CFR 635.506(d)).

Adjustments:

In contrast to the design-build project development process, adjustments in the contracting agency's cost estimate are made as the design develops based on the input received from the CM/GC contractor and the firm preparing the ICE.

- During the design-development process, the contracting agency, the firm preparing the ICE, and the CM/GC contractor meet regularly to discuss risk, preliminary design issues, cost, schedule, and administrative issues. The contracting agency may review the CM/GC contractor's cost model in comparison with the ICE and discuss factors that lead to differences in prices. The contracting agency typically does not release information regarding its engineer's estimate. All three parties develop a shared understanding of risk issues that affect the project cost. This enables the contracting agency and the firm preparing the ICE to prepare realistic cost estimates.
- Typically, the discussions allow the contracting agency and the contractor to discuss requirements and issues that may have an impact on cost. As a result, the contracting agency can identify, manage, and possibly share risk in a manner that produces the lowest possible price for the contracting agency.

Attachment A –

POTENTIAL QUESTIONS AND STEPS FOR REVIEWING ENGINEER'S ESTIMATE PREPARATION

1. Are any State laws or administrative regulations in effect regarding release or protection of the engineer's estimate?
2. Are any State laws or administrative regulations in effect for determination of whether a contract award is proper, based on engineer's estimate overrun, competition, or other factors?
3. Review and attach any copies of any procedures or instructions the STA may have pertaining to preparation, revision, checking, and use of the engineer's estimate.
4. Briefly describe the intended process for preparation of estimates. Verify the actual method used in comparison with intended process and note any differences.
5. Does the STA have an estimating section? Which other portions of the agency become involved in preparing, checking, or approving the estimate?
6. Briefly describe the personnel resources available for preparing estimates and note any workload changes vs. personnel available over the past 3 years.
7. What is the primary basis for establishing estimated unit prices?
8. What methods are used to identify and incorporate anticipated changes in cost of labor, equipment, and material?
9. Are upcoming labor negotiations considered in the process?
10. Are material suppliers contacted for anticipated material costs?
11. Are adjustments made for individual project conditions? In what way?
12. What other factors are used to adjust the primary basis to determine the estimated prices for the project?
13. How is contingency determined? Is contingency based on historical data or specific risks to cost and schedule completion?
14. Does the State have a method to adjust the engineer's estimate to account for locally changed market conditions?

15. In typical cases, how far in advance of the letting date is the estimate prepared? How often is the estimate revised during the advertising period? Discounting addenda and quantity changes, what are the usual reasons for revising estimated prices?
16. Is every estimate routinely evaluated by anyone other than preparer? If so, when?
17. If possible, determine how often further study and/or revision is believed desirable but not accomplished due to workload restriction.
18. Is any information released publicly, which may indicate the actual or approximate value of the estimate prior to opening bids? Is the estimate released after opening bids?
  - a. When?
  - b. Is it published and where?
  - c. Who receives copies, if published?
  - d. In detail or only giving total cost?
19. Is any other information regarding the estimate available to contractors upon request?
20. Review the STA's experience during the past calendar year for Federal-aid contract.
  - a. Determine the percentage of projects sampled where the low bid fell within +/-10 percent of the estimate and plot the distribution of low bids above and below the estimate.
  - b. Determine the percentage of projects with zero, one, two, three, four, etc., bids. Are there any project size trends noted?
  - c. Prepare graphs with percent above or below estimate for each project vs. cumulative percent of number of low bids for three separate groups of projects, single bids, two or three, and four or more bids. (Each group should be arranged in ascending order to facilitate preparing these graphs.) Are any trends noted?
21. Review the Contracting agency's procedure for evaluating bids received prior to recommending award or rejection.

- a. Is there an established policy on, or apparent pattern of, awards or rejections of bids at a set level above the engineer's estimate?
- b. In the case of poor competition or excessive difference between the estimate and the low bid, does the Contracting agency contact the bidders and non-bidders who requested proposal forms?
- c. Are there any "ground rules" for adjusting estimates after receipt of bids? Is such action taken on its own merits or may it be prompted by pressure to award an apparently excessive bid?

## Attachment B

The following information may be useful in monitoring the estimating, letting, award, and contract administration processes under FHWA's Risk-based Stewardship and Oversight program.

### Letting and Award Data (project basis)

- Engineer's estimate
- Low bid
- Number of bidders
- Percentage difference between low bid and the engineer's estimate
- Range of other bids and variation from the engineer's estimate

### Letting and Award Program Data

- Average number of bidders
- Average number of bidders by contract size
- Average number of bidders per project per month
- Average number of bidders by work type (e.g. resurfacing contracts, bridge replacement, etc.)
- Number of projects with one bid, two bids or more than two bids
- Number of projects bid per month
- Value of projects bid per month
- Number of projects bid per year
- Value of projects bid per year
- Percentage of projects with low bid within +/-10 percent of the engineer's estimate
- Number or percent of projects let on schedule
- Annual number of projects re-let
- Average bid prices (and trends) of key work items susceptible to inflationary pressures (paving, grading, structural steel, etc.).

### Construction Contract Administration Monitoring

- Percent difference between award amount and final contract amount on a project basis
- Percent difference between award amount and final contract amount on a monthly or annual basis
- Percent difference between engineer's estimate and final amount on a monthly, quarterly, annual, or other basis.
- Annual percent of construction projects completed on schedule (per current contract schedule)
- Reasons for change orders - This information is related to a State's administration of the construction program. Relatively high percentages of change orders initiated for a certain reason may reveal underlying issues.
  - STA directed changes



- Plan quantity changes
- Unforeseen conditions
- Plan errors and omissions
- Other