U.S. DOT Federal Railroad Administration

Office of Passenger and Freight Programs

Monitoring Procedure 33 – Capital Cost Estimate Review

# PURPOSE

This Monitoring Procedure (MP) describes the analysis, recommendation, and reporting that FRA requires of the Monitoring and Technical Assistance Contractor (MTAC) when evaluating the Grantee’s cost estimates. Using the Key Principles and other requirements below, the MTAC should perform the evaluation.

This MP is applicable to Design-Bid-Build, Design-Build and other delivery methods. Regardless of method, the MTAC should ensure the Grantee establishes a base cost or cost range from which future estimates are measured; when the Grantee divides the work into contract packages for construction, the estimates for the individual packages should sum at or close to the base cost within the cost range.

The MTAC’s review should help the Grantee make decisions regarding cost control measures, contingencies, and other mitigations; in addition, it should inform FRA’s decisions regarding project advancement and funding.

# KEY PRINCIPLES FOR COST ESTIMATING

1. PROVEN METHODOLOGIES: Proven professional quantity surveying and cost estimating practices should be used to develop the estimates;
2. THE WHOLE PICTURE: The cost estimate should reflect the project scope and schedule fully – meaning the estimate should not only reflect what is shown, but what is known to be needed to make a complete project.
3. REAL RELIABILITY: The cost estimate will incorporate a level of detail that is appropriate for the project phase; however, at any phase, adequate consideration of risks, uncertainties, and unknowns should be reflected in cost contingencies and reserves, so that a reliable estimate results. This means the estimate will remain relatively unchanged as the project progresses through planning, design, construction, and revenue operations.

# REQUIRED DOCUMENTS

In addition to the project drawings, specifications, narratives, design criteria reports, and project schedule, the MTAC shall obtain and study the following Grantee materials:

* The project capital cost estimate in original and SCC format
* Capital cost estimate backup data (take-offs, cut sheets, work breakdown structure, calculations) for the purpose of traceability
* Capital cost estimating methodology memo (refer to Appendix A).

# SCOPE OF WORK

## Evaluation of the Grantee’s management and control of project cost

The MTAC shall evaluate the Grantee’s management and control of project cost through consideration of the following:

* The Grantee’s project control staff and organizational structure; experience and size of staff; ability to communicate with agency executive leadership regarding project costs and related practices; willingness of executive leadership to communicate with project controls staff;
* The Grantee’s project control systems, tools and software, and suitability for the size and complexity of the project;
* The Grantee’s own project control plans, procedures, and cost management contractual requirements; methods by which the Grantee’s checks its own estimate, such as peer reviews, independent cost estimates, etc.; frequency of revisions during the design and construction process.

## Evaluation of the Grantee’s cost estimate

**4.2.1 Selecting the Review Approach**

After a cursory examination of the required documents, the MTAC should propose to FRA for its decision, an appropriate level of review for the project estimate. The level may range from a sampling approach, using only parametric cost estimating methods, to a full independent cost estimate, using detailed engineering estimating methods. The proposal should describe the level of review, and provide examples from previous projects. The proposal shall identify the sources of comparable data to be reviewed including third parties, market indices, other projects or databases, schedule options, etc.

The MTAC may perform the following upon the direction of FRA:

* Characterizing the Grantee’s level of estimating and general approach
* Parametric and Analogous estimating reviews of the Grantee’s estimate. Metrics such as cost per mile are compared to similar projects or industry standards.  **NOTE: These should be part of the first review of ANY estimate.**
* Detailed reviews, where cost estimates are analyzed in great detail in all areas (unit costs, cost estimate reviews, contingency, escalation, inflation, etc.), to ensure that all scope elements are covered, the estimate adequately reflects the project scope, quantity takeoffs are correct, the methodology is correct, and all elements of the estimate are appropriate.
* Development of a completely independent cost estimate. This goes beyond the detailed review of the Grantee’s estimate.
* Analysis of cost contingencies and readiness for MP 40 Risk Analysis
* Bid-tab analysis, where contract bids are compared to the detailed project estimate and analysis to determine adequacy of the bids
* Specific element reviews, where one or more specific elements are analyzed in detail, such as professional services, real estate, finance charges
* Cost estimate baseline validation
* Establishment of specialized quantitative cost modeling or assessments and surveillance reporting or trend analysis
* Reevaluation of project cost information periodically or when event-driven
* Presentation to the Grantee of findings, analysis, recommendations, and opinions
* Participation in workshops with the Grantee to discuss the project

Cost estimate reviews may be conducted at any time, although detailed cost estimate reviews are generally conducted at the transition from one project phase to the next.

**4.2.2 Characterizing the Grantee’s Level of Estimating and general approach**

The MTAC will verify that the Grantee’s approach to developing cost estimates is adequate and appropriate for both the project type and complexity and the current level of project development. The MTAC will characterize the methodologies used and the level of support provided for the costs.

1. Methodologies - Characterize the methodologies used:

* Parametric (Statistical) -- Estimating using statistical relationships.
* Analogous (Comparison) – Estimating based on historical data of a similar item.
* Bottom-Up (Detailed Engineering) -- Uses a detailed Work Breakdown Structure (WBS) and prices out each work package making up the project.
* Extrapolation (Earned Value) -- Estimates which are based on actual project costs

1. Support for costs - Characterize the support for costs, i.e. how they were derived; how the scope was captured, how it was priced, what assumptions were considered, referring to the levels below.

* Level 1: Line items and /or the estimate
  + - the product of unit cost and quantity
    - a cost estimating relationship (CER)[[1]](#footnote-1)
    - a lump sum (sometimes referred to as an “allowance” or “plug number”)
* Level 2: Subdivide Level 1 as follows:
  + - quantities indicated in both the design documents and the cost estimate
    - quantities indicated only in the cost estimate or only in the design documents
* Level 3: Subdivide Level 2 into the following subcategories:
  + - Cost to Cost CERs; Non-Cost to Cost CERs; Cost or Non-Cost to Non-CERs
* Level 4: Subdivide Level 3 as follows:
  + - Project direct costs / indirect costs
    - Escalation of materials and labor
    - Total project allowances
    - Construction contractor profit
    - Total inflation costs (nationwide/regional change in costs over time)
    - Total project contingency (allocated, unallocated, hidden or latent)

**4.2.3 Performing order-of-magnitude checks on the main project components /cost drivers**

The MTAC must conduct checks on the estimate using parametric data from historic projects to avoid order-of-magnitude errors and omissions that no amount of contingency or other mitigation can remedy – for example, an estimate that includes $10K per lineal route foot of twin bore tunnel when the average is $20-35k per lineal route foot. These two checks are high-level reviews using metrics such as cost per mile compared to similar projects or industry standards, rules of thumb for allocated and unallocated contingencies, calculation of inflation onto Base Year costs to arrive at Year-of-Expenditure costs (ref. SCC Main and Inflation Worksheets.)

1. Parametric Estimating Check -- Identify the project’s key input drivers (i.e. independent variables) and rank their relative impact on the estimate. Develop cost estimating relationships (CER) for the key variables; support the information and inputs used with historical costs that are calibrated to current conditions. Compare with the Grantee’s costs.
2. Analogous Estimating Check -- The MTAC shall perform a check on the Grantee’s estimate using “analogous” estimating. Analogous estimating uses historical cost information from existing completed projects as a basis for comparison. The completed projects are similar in design and operation to the proposed project. The cost of the proposed is estimated by adjusting the historical cost to account for differences between the two projects in size, performance, technology, and/or complexity. One source of historical cost information is the FTA Capital Cost Database.[[2]](#footnote-2) The Database presents as-built costs for federally-funded, Light Rail, Heavy Rail, and Commuter Rail projects, tracked in SCC format and validated by the project Grantees. For elements common to both transit and rail, such as tunnels, aerial structures, real estate, etc., the Database can be useful for identifying variances in unit costs from Database averages or from specific known projects. FRA may in the future put rail project as-built costs into the Database.

**4.2.4 Review for Traceability, Integration, Coordination, and Consistency, and Usefulness as a Project Management Tool**

1. The MTAC will make sure estimates and methods of estimation are:

* Mechanically correct and complete
* Appropriate for the current project phase
* Consistent with relevant industry or engineering practices
* Based on consistent methods of calculation
* Consistent with project scope and schedule; consistent with project construction packages and that all scope elements are accounted for.

1. The MTAC will assess the Grantee’s baseline cost or cost range and if necessary, shall develop its own baseline for presentation and discussion with the Grantee and FRA.
2. **NOTE: Considering historical rates and economic forecasts, the MTAC will assess the Grantee’s costs have been calculated reasonably for:**
   1. **material and labor escalation due to global or regional market forces;**
   2. **inflation from the Base Year to the Year of Expenditure. The MTAC shall ensure the Base Year used is in fact the current year.**
3. The MTAC will provide its professional opinion on any overstatement or understatement in the Grantee’s cost estimate, and it will support its opinion with spreadsheets and calculations.

**4.2.5 Review of Definitive Project Cost Estimate (Refer to Appendix B for Checklist)**

Review and characterize the Grantee’s cost estimate using the checklist. Determine that the estimate reflects a thorough and reasonable incorporation of all cost elements consistent with the project scope, schedule, known and unknown risk elements, and correlates with current construction contractor pricing and work quantities. Assess and evaluate construction contract package elements and the impact of the terms in the General and Supplementary Conditions of the Contract, and Division 1 provisions, on the anticipated bid price. Describe and characterize the Grantee’s construction contract package information as follows:

* Identification of restrictive schedule or mobilization requirements that would materially affect bid prices;
* Identification of construction contract elements or contract language that would reasonably serve as a basis for reduced competition, increased pricing (due to passed-on risks), and ambiguous or incomplete terms leading to additional compensation, which is not part of a scheduled payment item;
* Geotechnical data;
* Provision for third party, real estate, utility relocations and support issues.
* Evaluative and pricing approach to changed conditions;
* Unit pricing and allowed variability in unit pricing (including maximum limits of variance);
* Provision for an adequate amount for the construction contractor’s general conditions;
* Requirements for specific services such as QA/QC or scheduling, appropriately allocated to each contract and evident in bidding documents.

The MTAC shall develop an independent detailed cost estimate of the construction contractor’s general conditions for the systems work and for the three largest construction contracts, and shall compare and contrast and make recommendations of change to the Grantee’s estimate.

**4.2.6 Review During** **Engineering, Pre-Bid, Post-Bid: Market Conditions Review**

During project implementation, the Grantee will receive bids or offers that may have a significant impact on the project budget. The MTAC shall analyze project information Pre-Bid:

* Identify, organize, characterize, and analyze substantial construction contracts, signaling, and equipment procurements;
* Describe and evaluate the Grantee’s contract packaging strategy, its relationship to the project cost estimate, and the rationale (political, economic, engineering, etc.) for the contract packaging strategy;
* Characterize and evaluate the Grantee’s proposed plan and processes for solicitations;
* Characterize and evaluate the material elements of the project risk assessments as available, emphasizing scope, cost and schedule reviews as highlighted in internal risk registers, and the Grantee’s Risk and Contingency Management Plan (RCMP). Correlate these elements with the contract packaging strategy analysis, bid/bidder information, market conditions information, specialty equipment requirements, etc.

Address the following Post-Bid:

* Correlate and analyze bids or proposal amounts against the estimated values for each bid or proposal by element. Assess the impact of each deviation on the overall estimate, risk assessments, cost risk-cost ranges and risk mitigations;
* Characterize and evaluate the Grantee’s bid process (plan sets distributed, pre-bid conference attendance, bid question activity, exit conferences, telephone interviews, analytical products, bid tabulations);
* Characterize estimate reconciliation exercises performed between the Grantee and the contractor (i.e. post bid negotiations, inclusions and exclusions);
* Where significant variances between bid received and estimates are discovered:
  + Trace variances on bid tabulation elements back to the cost estimate and risk register;
  + Sample unit cost and quantity information to evaluate the reliability of estimate compared with bid pricing; obtain independent market data and adjust as necessary to compare to pricing and estimate. Sample scope elements from the contract documents to support conclusions;
  + Survey the market to ascertain reasons for no bids, price drivers, retained risks, etc.;
  + Develop an estimated allocation between unit cost and quantity variance;
  + Organize causal factors into groups such as market factors, general conditions, risk transfers, etc.;
  + Evaluate contract award against design scope to assess whether the contract includes all of the planned scope as originally estimated (sometimes designs are adjusted after the estimate is prepared and large portions of work are not included in the solicitation package leading up to contract award).
  + That the Grantee has established a plan to utilize bid results to adjust future packages for similar unsolicited work (if necessary).

**4.2.7 Review During Construction -- Assessment of Grantee’s Cost Estimate**

Characterize the Grantee’s estimate of the project cost-to-complete the project. Describe the level to which it:

* Is integrated with and makes adequate use of the Grantee’s previously developed supporting documentation for the estimate;
* Reflects current project schedule, including the Contractor’s Critical Path (CPM) scheduling plan;
* Reflects the Grantee’s change order experience on the project;
* Evaluates and incorporates project progress and trends to date; and
* Reflects reasonable provisions for testing, commissioning, start-up, and revenue service.

**4.2.8 Review During Construction -- Assessment of Grantee’s Cost Estimate – Contingency and Risk**

Cost Contingency

Per the requirements of MP40c, perform a review of the project cost contingency to ensure that appropriate amounts are included commensurate with the stage of project development. Prepare a cost draw-down curve including both forward pass and backward analysis analyses. Also, refer to the requirements Risk and Contingency Management Plan Structure, Cost Contingency Management Plan to ensure that the estimate itself is fully coordinate with the Grantee’s plan.

Readiness to perform MP 40a or 40c Risk Analysis

During the project the FRA may direct the MTAC to conduct/refresh an MP 40 Risk Assessment. The risk assessment includes a cost and schedule risk analysis as described in MP40. In order to perform a cost risk analysis the project estimate must first be reviewed or characterized (MP 33) and adjustments must be made if so determined by the MTAC. To prepare for the Risk Analysis all contingencies and constraints must be removed from the project estimate once they have been identified and documented. Similar to the project schedule, the project estimate must be completely stripped of all contingencies (patent and latent) to prepare for the Risk Analysis.

# Report

### Executive Summary

The MTAC will provide an executive summary that:

* Synthesizes findings related to the cost estimate
* Characterizes significant uncertainties based on likelihood (probable, remote, improbable) and their consequences (catastrophic, critical, serious, moderate, marginal)
* Includes a professional opinion on how reliable the cost estimate is
* Includes a statement of the potential range of the cost estimate (lower, upper bound, and most likely)
* Outlines recommendations for additional work—including, but not limited to, investigation, planning or design work by the Grantee or other party—with a schedule for performing the work

### Introduction

The MTAC will provide an introduction that:

* Shows date the estimate was received
* Shows the level of design completion for the cost estimate

### Methodology

The MTAC will describe its approach for:

* Sampling rates and will provide the selection rationale, for example, higher sample rates for higher cost items, etc., overall sampling rate of \_\_ percent
* Checking costs against scope and schedule
* Identifying allowances
* Identifying patent (exposed) and latent (hidden) contingencies
* Accepting Grantee cost and other information with or without adjustment

### Evaluation of the Grantee’s management and control of project cost

The MTAC team will describe the findings, provide opinions, recommendations.

### Cost Estimate Assessment

The MTAC team will assess the various cost documents and other documents provided by the sponsor using this outline:

* 1. Describe the structure, quality, and level of detail of the project information (including Grantee and third party information):
* Describe the contract packages and the estimating approach/consistency for each
  1. Classify Cost Items:
* Classify estimate data into one of three categories: Lump Sum, Unit Cost, or Cost Estimate Relationship
* Select sample totals based on individual sampling rates for each cost grouping
* Identify cost items for detailed review based on random selection of individual cost items
* Evaluate whether allowances for the scale of the work covered are used reliably
  1. Mechanical Check of Estimate:
* Add lump-sum prices, unit price and quantity calculations, and cost estimating relationships to confirm the sponsor’s total cost estimate
* Perform a mathematical check of all the sampled unit price or quantity calculations
  1. Comparison to Industry Standards:
* Review sampled unit prices and quantities to ensure estimates conform to industry standards, regional variations, or other unique characteristics
* Check unit costs of similar items used in different conditions to ensure that local conditions and difficulty factors are considered
* Check sampled quantities from the design documents to confirm that the calculations are accurate
  1. Correspondence with Scope Review:
* Check sampled quantity estimates with those outlined in the project scope to determine the correlation between the design deliverables and the project cost estimate
* Give the total estimate a “sanity check” to ensure that all major components are included
* Review sample quantities for reasonableness and confirm that the major components accurately represent the design scope and industry standards
  1. Costs associated with General and Supplementary Conditions of the Construction Contract—Division 1 Provisions:
* For each contract package, evaluate the Grantee’s proposed language and the scope allocation, schedule, and cost risk
* To allow comparisons with the Grantee’s estimates, develop independent cost estimates for General and Supplementary Conditions (Division 1) for the three largest construction contracts and the systems work
  1. Present and evaluate cost contingency elements in the Grantee’s cost estimate for patent (exposed) and latent (hidden costs that are functionally equivalent to contingency but not identified)
  2. Escalation and Inflation Review:
* Evaluate if escalation and inflation factors are applied uniformly
* Review and evaluate how escalation factors are applied to costs for materials, labor, and equipment.
* Review and evaluate how inflation rates to the Base Year dollar costs are applied to arrive at Year of Expenditure dollars
* Consider the adequacy and reasonableness of the rates and the soundness of the economic forecasts
* Compare the escalation and inflation factors used by the sponsor with the Producer Price Index data from the Bureau of Labor and Statistics (<http://www.bls.gov>) and other sources—such as ENR, Means, Richardson, etc. This will ensure that escalation and inflation costs are adequate to carry the project to the mid-point of construction (the assumed time that FRA will complete contract unit awards)

### Appendices

The MTAC will provide the MTAC Evaluation Team Member(s) and qualifications and other appendices as required.

# REFERENCES – SEE MP 01

The MTAC shall review the Grantee’s memo or report regarding its cost estimating methodologies and approach. The memo should be developed by the Grantee as part of its Concept Design work and updated with each subsequent estimating effort. The memo or report outline should be as follows:

1. Introduction to the project;
2. Estimating Methodology – Describe the general approach to defining and quantifying the project capital cost estimate; if multiple parties are estimating parts of the project, this memo should help to ensure consistency of approach
   1. Parametric Approach
   2. Analogous Approach (using peer data, historical database information, etc.; typically used by Grantees in Concept Design and Preliminary Engineering) The breakdown may be organized into typical vs non-typical components of guideway, stations, support facilities; and/or into project-wide elements/costs and alignment segment-related costs.
   3. Bottom Up Approach (using built-up quantities and units for labor, material, equipment, and all supporting services or acquisition costs and based upon more defined and educated provisions as developed during the design process; typically used by Grantees in Preliminary Engineering and Final Design.)
3. Define the basis, sources and assumptions for costs:
   1. Cost of construction by railroads or other third parties
   2. Material and labor escalation
   3. Contingencies (allocated, unallocated, and hidden or latent)
   4. Inflation costs
   5. Allocated Contingency
   6. Unallocated Contingency
   7. Latent (or hidden) Contingency
4. Estimate Limitations – Describe perceived or known risks, as well as unknowns that could lead to changes in the estimate; these could stem from changes in project scope and design standards, schedule, incorrect unit cost or quantity assumptions, and unforeseen problems in implementation, or other conditions.

The MTAC shall review the cost estimate against the following criteria. Structure the review to incorporate as much of the concepts below as is practical and consistent with the Grantee’s project design or construction plan.

Review of Grantee’s cost estimate shall indicate whether:

* Estimate was developed by those with substantial experience in the type of construction under consideration;
* Sufficient judgment was applied to forecast design development, especially during early design stages;
* Evidence exists indicating sufficient collaboration with design team, especially in the application of value engineering;
* Work Breakdown Structure has been formatted to conform to the FRA Standard Cost Categories (SCC).

The MTAC shall further consider the following category-specific items:

SCC category 10-50: Fixed Construction (guideways, stations, support facilities, site work, systems)

Construction Materials

* Quantities have been calculated with appropriate conservatism to accommodate development to a more advanced stage of design if appropriate
* Allowances for material quantities have been included for commodities which cannot be fully quantified at the present level of design
* Unit Prices have been developed using the best available local market information
* Project sales tax exemption status has been established if appropriate and incorporated in material cost projections
* Quotes have been obtained for specialty and price-sensitive materials
* Material cost projections reflect reasonable allowances/provisions for market volatility

Construction labor

* Local wage rates, fringe benefits, and work rules are incorporated and are consistent with federal labor laws (e.g. Davis-Bacon Act)
* Local payroll taxes and insurance rates are incorporated
* Holiday / show-up / vacation pay is incorporated
* Crew productivity is appropriate and conservative for the task under evaluation
* Availability and variability of utility and railroad outages and “track time” have been incorporated in a conservative manner in determining the crew productivities for impacted work

Construction equipment

* Local equipment rental rates and current fuel costs are incorporated
* Consideration has been given to procuring certain pieces of equipment via a cost/benefit analysis that supports purchasing, rather than leasing
* Quotes have been obtained for specialty equipment (TBM’s, etc), an appropriate evaluation of market conditions has been incorporated, and currency adjustments as applicable have been made.

Escalation for Construction Materials, Labor and Equipment

* Confirm that reasonable escalation rates have been applied to estimates of material, labor and equipment costs to anticipate prices at the time of project bid. Cost escalation can result from increased global or local demand (example is China’s construction boom results in high demand for copper, steel, cement), or reduced supply (example is the reduced labor pool in neighboring states when construction workers flocked to New Orleans after Hurricane Katrina).

Special considerations

* Utility and Railroad labor, equipment, and overhead rates have been verified and incorporated in third party or “force account” work pricing, as well as local utility/RR work and safety rules
* Special consideration has been given to support operations and facilities for tunneling operations, facilities to support operations in contaminated/hazardous materials, etc.

Construction Indirect Costs, Multipliers for Risk etc.

* Contractor indirect and overhead costs are advanced beyond a percent of the associated construction direct costs and should be analyzed based on field and home office indirect costs such as contract duration, appropriate levels of staffing (including project managers, engineers, safety engineers, schedulers, superintendents, QA/QC engineers, craft general foreman, labor stewards / nonproductive labor, warehousing, project trucking, survey layout, purchasing, timekeeping, etc.), mobilization / demobilization costs, equipment standby / idle time costs, reviewer office / lab / tool facilities, safety equipment, QA/QC testing equipment, temporary utilities (sanitary / power / light / heat), jobsite and public security measures, etc.
* Appropriate provisions have been included for payment and performance bonds and special insurance requirements (RR protective, pollution liability, etc.).
* Other construction insurance provisions and/or project-wide coverage (Owner Controlled Insurance Policy) has been included based on quotes from appropriate carriers.
* Contractor profit / risk costs have been incorporated that reflect the expected level of competition by contract package (higher profit margin where few competitors will bid) and the sharing or assumption of risks by the contracting community as a result of he contract terms and conditions, project scope, and schedule.

Cat. 60 - Real Estate

* Provisions for professional services (contracted and in-house legal, appraisal, real estate and relocation consultants) and conservative provisions for property acquisitions, easements, and associated costs for the real estate and relocations have been included. Check that easements, acquisitions, inspections, takings, etc. have been appraised or estimated by qualified professionals familiar with local real estate markets and practices. For projects that involve acquisition of railroad property or property rights, verify that the estimate has been performed by a specialist familiar with these unique transactions. Include reasonable provisions for any market volatility and taxes. The real estate estimate should also contain an additional allowance above each estimated Fair Market Value (FMV) to reflect settlements and court awards which should be considered inevitable. This allowance should be based on historical data regarding complete acquisition costs on similar projects in the recent past. The cost estimate for real estate should include all of the relevant cost elements identified in MP 23.

Cat. 70 - Vehicles

* Costs for professional services (both contracted and in-house) for vehicle design and procurement as well as construction of prototypes and vehicles themselves. Review estimates for current purchase prices for similar vehicles or quoted prices from manufacturers; costs for spare parts and project requirements for non-revenue support vehicles are included. Also, consideration should be given to current market conditions and production schedules due to the relative shortage of vehicle suppliers.

Cat. 80 - Professional Services

* Costs both contracted and in-house for all professional, technical and management services related to the design and construction of fixed infrastructure (Cats. 10 - 50) during the engineering, construction, testing, and start-up phases of the project. This includes environmental work; surveying; geotechnical investigations; design; engineering and architectural services; materials and soils testing during construction; specialty services such as safety or security analyses; value engineering, risk assessment, cost estimating, scheduling, Before and After studies, ridership modeling and analyses, auditing, legal services, administration and management, etc. by agency staff or outside consultants. Provisions for professional liability insurance and other non-construction insurance should be included on 80.05.
* Refer to Sponsor’s contracts for services.
* Confirm that cost estimates are based on realistic levels of staffing for the duration of the project through close-out of construction contracts.
* Confirm that the Sponsor has developed a staffing plan that properly contemplates the cost of attrition, staffing interruptions, and replacement of key personnel.
* Confirm that costs for permitting, agency review fees, legal fees, etc. have been included.

Cat. 90 - Unallocated Contingency

* Confirm that adequate contingency has been added to the total project cost based on the perceived project risk and the stage of design/construction development.

Cat. 100 – Finance Charges

* Confirm that finance charges are included if necessary. Ensure that the Sponsor and FTA’s Financial Management Oversight Consultant review the reasonableness of the amount of finance charges.

Allocated Contingency - Confirm that adequate contingency has been allocated to each of the SCC categories based on the perceived risk inherent to each and the stage of project development.

Inflation - Confirm that adequate and reasonable inflation rates have been applied to Base Year project costs to anticipate costs at procurement or bid (through the use of cash flow analysis). The Year of Expenditure costs should be developed thoughtfully. Reference indices that may be useful are the ENR Building Cost Index and Construction Cost Index, some with regional cost databases.

1. A CER is an equation used to estimate a given cost element using an established relationship with one or more independent variables. The relationship may be mathematically simple (e.g. a simple ratio) or it may involve a complex equation (often derived from regression analysis of historical systems or subsystems). CERs should be current and applicable to the system or subsystem. In a “cost-to-cost” CER, the cost of one element is used to estimate that of another. In a non-cost-to-cost CER, a characteristic of an element is used to estimate the cost of another element. For example, the number of engineering drawings (independent variable) is used to estimate the costs for professional services for the project. [Introduction to Cost Analysis, DAU,2009] [↑](#footnote-ref-1)
2. http://www.fta.dot.gov/12305\_11951.html [↑](#footnote-ref-2)