

## SECTION C

### STATEMENT OF WORK

#### **C.1 BACKGROUND**

The United States Department of Transportation (DOT), Federal Transit Administration (FTA), is responsible for the administration of grants and loans to assist State and local public bodies (Grantees) in financing acquisition, construction, reconstruction, and improvements of transit facilities under 49 U.S.C. Chapter 53.

FTA may not approve a grant unless the applicant grantee has, or will have the legal, financial and technical capacity to carry out the project, including safety and security aspects of the project. The provisions of 49 U.S.C. also requires FTA to only approve grants for projects where FTA has determined that (1) the proposed project will not degrade the Grantee's ability to maintain and operate the entire public transportation system without requiring a reduction in existing public transportation services or level of service to operate the proposed project; (2) the Grantee has or will have satisfactory continuing control over the use of the equipment or facilities; and (3) the Grantee has the capability and willingness to maintain the equipment or facilities and that (4) there is a reasonable likelihood that the project will continue to meet such requirements. (49 U.S.C. 5309 (c))

FTA monitors grants to confirm that Grantees establish and follow procedures that are reasonable and comply with FTA requirements in FTA circular 5010.1, Grant Management Guideline.

To receive United States Government financial assistance for a major capital project a Grantee must prepare and carry out a Project Management Plan (PMP) approved by FTA. Further, the Grantee is required to develop and implement such Project Management Plans (PMP) for all project activities. The PMP shall recommend a phased project management approach where each phase (1) starts with inputs or a baseline, (2) has a process(es) that refines the project definition and generates outputs that (3) become the inputs or baseline for the subsequent phase. 49 U.C.C. 5327 (a) By defining the requirements for each phase and sound approaches to their accomplishment, a PMP allows Grantees to define project requirements, allocate resources, perform project activities, monitor progress, and make adjustments, as required, to obtain the proper information and assure decisions are made at the appropriate time.

Therefore, FTA must ensure that Grantees execute authorized projects professionally, efficiently and in accordance with applicable laws and regulations. To assist FTA in fulfilling this responsibility, the Contractor will provide Project Management Oversight (PMO) services for selected Grantee projects in accordance with Task Order assignments made pursuant to the terms of this contract.

## **C.2 OBJECTIVE**

The objectives of the Project Management Oversight contract(s) as assigned are to provide FTA with critical programmatic inputs for a variety of program decisions for its grants programs that are supported by contractors performing services, delivering products and producing outcomes that are derived from, based upon, or contain: (1) sufficient quantities of reliable, relevant and useful contractor or third party data and information (2) properly structured and clearly identified Contractor's professional opinion, analysis, and estimates (3) personnel performing services only in areas of their demonstrated competence and (4) quantitative techniques that meet or exceed FTA's requirements.

Products and services delivered under this contract will assist FTA in accomplishing its legislatively mandated mission to assess and evaluate the effectiveness and efficiency of the Grantee's development and implementation of federally assisted transit projects to ensure that the Grantee organization:

- Provides continuous administrative and management direction of project operations.
- Provides, directly or by contract, adequate technical inspection and supervision of all work in progress for conformance with approved plans and specifications, using qualified professionals.
- Assures conformity to grant agreements, applicable statutes, codes, ordinances, reevaluations, sound engineering and program/project management practices and safety standards.
- Maintains the project work schedule agreed to by FTA and the Grantee and constantly monitors grant activities to assure that schedules are met and other performance goals are achieved.
- Keeps project expenditures within plus 5 percent of the latest approved project budget.

FTA's intent is also that Contractor services or products do not convey any real or apparent perception to the Grantee organization or its management that the Grantee has been relieved of any component of its responsibilities and liabilities as the responsible party for carrying out the Federal grant.

The Contractor may be directed to provide similar services to other federal agencies as may be required by the Economy Act, 31 U.S.C. Chapter 1535. The geographic scope of this requirement includes the United States and its territories.

## **C.3 DEFINITIONS**

A glossary and definitions of basic terms follows:

- a. **Contracting Officer (CO):** Contracting officers have authority to enter into, administer, or terminate contracts and make related determinations and findings. Contracting officers may bind the Government only to the extent of the authority delegated to them.
- b. **Contracting Officer's Technical Representative (COTR):** Contracting Officer's Technical Representative (COTR) acts as a liaison with the contractor during the performance of the contract. COTR is authorized to direct the technical effort being performed under the designated contract under the purview of the FTA and monitor the progress and quality of the contractor's performance in accomplishing tasks required by the contract.
- c. **Full Funding Grant Agreement (FFGA):** An agreement which establishes the terms and conditions for Federal financial participation in a New Starts project; defines the project; sets the maximum amount of Federal funding for the project; covers the period of time for completion of the project; and facilitates efficient management of the project in accordance with applicable Federal statutes, regulations, and policy. Within the limits of law, an FFGA provides assurance and predictability of Federal financial support for a New Starts project while strictly limiting the amount of that Federal financial support.
- d. **Monitoring Activities:** Monitoring activities include, but are not limited to, interviews, review of documents, observations, examination of records, analysis of data and information, and forming professional opinions.
- e. **Oversight Procedures (OPs):** Instructions, guidance, or procedures issued by FTA for use by the selected contractors in performing oversight of major capital projects during planning, design, construction and operation. See section J.
- f. **Project Management Oversight (PMO):** Project Management Oversight includes but is not limited to the monitoring of a project in order to determine if the project is on schedule, within budget, proceeding in conformance with the Grantee's approved plans, specifications and grant agreements, and is being implemented efficiently, effectively, and safely and the Grantee organization continues to demonstrate the required technical capacity.
- g. **Project Management Plan (PMP):** Project Management Plan is a document that explicitly describes, at a minimum, each of the following for each phase of the project: the applicant's staffing and organization, budget, schedule, document control, change orders, construction staffing, quality control and quality assurance, materials testing, internal reporting, property acquisition, operational systems testing, and safety and security. The Project Management Plan is central to FTA's determination of whether an applicant has the technical capacity and capability to build, operate, and maintain a New Starts project throughout the life of the project.
- h. **Task Order:** Supplementary contractual and obligating document that usually includes a task description, budget, and schedule, subject to approval by the COTR and/or CO.

- i. **Task Order Manager (TOM):** An FTA employee who has been authorized by the CO to monitor the progress and quality of the Contractor's performance in accomplishing tasks required by the Task Order. The TOM is not authorized to take any action, either directly or indirectly, that could result in a change in the pricing, quantity, quality, period of performance, or any other terms and conditions of the contract or to direct the accomplishment of effort which would exceed the scope of the contract.
- j. **Technical Assistance:** Assistance and guidance provided to a Grantee, after a finding of deficiency, in the development of technical plans, schedules, analyses, etc.
- k. **Technical Capacity:** A set of processes inclusive of resources and authority, defined, implemented, and maintained by the Grantee project organization that demonstrates the ability to meet Grantee responsibilities for grant administration and management.
- l. **Work Order:** A supplementary contracting document issued under an approved task order with a refined scope of work, subject to approval by the COTR.
- m. **Work Order Manager (WOM):** An FTA employee appointed by the COTR for each work order issued under a specific task order, which is authorized to monitor the progress and quality of the Contractor's performance in accomplishing tasks required by the Work Order. The WOM is not authorized to take any action, either directly or indirectly, that could result in a change in the pricing, quantity, quality, period of performance, or any other terms and conditions of the contract or to direct the accomplishment of effort which would exceed the scope of the work order.

#### **C.4 DELINEATION OF TASKS**

The Project Management Oversight Contractor (PMOC) shall only perform tasks, produce deliverables and deliver services as required by approved task orders. Task orders may include all or some of the tasks, deliverables or services described in this Statement of Work, or FTA's Project Management Oversight Procedures (OPs). As provided for in Section G, the COTR or TOM will further require the PMOC to deliver products and perform services subject to the issuance of individual work orders. Unless otherwise stated in the task order or work order, the PMOC shall produce deliverables and perform services in conformance with the current version of FTA's OPs which are incorporated into this contract and as incorporated by reference in individual task orders or work orders. Hereinafter, for purposes of Section C only, all references to task orders are meant to include work orders unless noted otherwise.

In support of all tasks, the PMOC shall review project documents and perform interviews in sufficient detail to become familiar with the aspects of the project pertaining to the specific task order, or OP requirements. Typical documents to be reviewed may include, but are not limited to, design criteria, plans, specifications, environmental reports, cost estimates, third party agreements, contract packages,

organizational charts, project management plans, rolling stock fleet management plans, real estate acquisition plans, operations plans, maintenance plans, start up plans, safety and security plans, project performance and forecasting analysis. Personnel to be interviewed shall typically include, but are not limited to, project personnel, project design and construction staff and consultants, suppliers and FTA regional office and headquarters' personnel.

## **C.5 TASKS / REQUIREMENTS**

The following are tasks that FTA may assign to the PMOC under the respective contract line item number (CLIN):

### ***CLIN 0001- Contract and Program Support***

#### **A. Administrative Tasks**

##### **1. Implementation Plans and PMOC Transitions**

The PMOC shall develop and submit for review, comment and approval Implementation Plans at the contract, task order, and work order levels that include, but is not limited to the following items:

- Integrated budget
- Labor distribution chart (by hours)
- Deliverables description and integrated implementation schedule
- Technical approach for providing deliverables and services
- Staffing resources (Contractor and subcontractor) that include areas of expertise and all contact information, order of succession, etc. and key personnel contact information
- Integrated FTA/PMOC organization chart
- Project communication procedure and order of contact
- Project status debriefing and deliverables progress reports
- Financial administration and cost controls
- Correspondence and document control procedures

The PMOC shall articulate measurable goals consistent with FTA's strategic plan for program oversight. If the PMOC is transitioning into an on-going project, the implementation plan should address the transition efforts as directed by FTA staff.

##### **2. Status Reporting**

The PMOC shall use management procedures in the performance of this

contract or task orders that provide for:

- Planning and control of costs;
- Measurement of performance (value for completed tasks and major subtasks); and
- Generation of timely and reliable information to be reported at the contract level or at the specific task order level such as the monthly progress report.

## **B. Ancillary Support**

The PMOC may be required to perform ancillary services or produce deliverables in support of, but not limited to, the following activities:

### **1. Quarterly Review Meetings Between FTA and Grantee**

The PMOC may be required to produce deliverables for, make personnel available to attend, or present materials at various meetings, including quarterly review meetings held between Grantees and FTA. Examples of such PMOC services include:

- Advance briefings to FTA staff on major project issues
- Participation in the review meeting
- Development of the agenda for the meeting
- Pre-meeting with FTA
- Documentation of the results of the meeting
- Participation in conference calls

### **2. DOT and FTA Sponsored Meetings and Teleconferences**

FTA may require the PMOC to produce deliverables for, make personnel available to attend, or present materials at FTA sponsored meetings and teleconferences. Examples of such FTA sponsored meetings are the FTA Annual Engineers' Meeting, FTA Annual Oversight Conference, Annual PMO Conference and quarterly PMO teleconferences, and Transit Construction Roundtables.

### **3. Presentations**

FTA may require the PMOC to produce deliverables for, make personnel available to attend, or present materials jointly with FTA or on behalf of FTA at public meetings by organizations that FTA sponsors such as the Transit Research Board and National Transit Institute, or other organizations such as the American Public Transportation Association.

### **4. Legislative Support**

FTA may require the PMOC to produce deliverables for, make personnel available to attend, or present materials in support of:

- Legislative efforts such as agency appropriations or authorizations for Grantee projects
- Agency efforts to evaluate Grantee projects for funding purposes such as the Section 5309 New Starts program
- Agency efforts to determine either technical capacity or grant compliance with respect to federally funded Grantee activities such as acquisition of real estate or vehicles, Buy America or environmental elements of the Grantee project.

## ***CLIN 0002 – Project Management Services***

### **A. Review of Grantee's Technical Capacity and Capability**

The PMOC shall review and evaluate the Grantee's management, organization, and project definition data to assist the FTA in determining the technical capacity and capability of the Grantee to efficiently and effectively implement proposed and current Federal projects. The objective of these reviews is to ensure grant recipients have adequate staff, project management procedures and policies developed and documented to effectively manage and implement a major capital project, or other projects assigned. PMOC reviews shall include but are not limited to the review of the Grantee's Project Management Plan, Quality Assurance/Quality Control Plan, Safety Security Management Plan, Real Estate Acquisition Management Plan and other documents as needed.

The review shall be performed in accordance with the following elements:

- Compliance with applicable statutes, regulations and FTA guidance documents
- Full Funding Grant Agreement terms including scope, budget and schedule adherence
- Sound engineering and project management practices, and
- FTA's Project and Construction Management Guidelines.

The assessment shall include, but not be limited to key Grantee and Grantee consultant personnel interviews, review of the Grantee's organization, policies, procedures and line of authority (including of succession planning), as well as a review of Grantee's consultants and contractors and how these consultants are being integrated into the Grantee's organization without conflict of interest. These assessments may be done at the Grantee organization level, or more limited reviews such as the Grantee's project management office including integrated staff.

If, in the opinion of the PMOC, the Grantee does not possess the technical capacity

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and/or capability to carry out the proposed project, the PMOC may be required to make written recommendations to correct the deficiencies identified.

**1. Project Management Plan (PMP)**

The PMOC shall evaluate the Grantee's Project Management Plan (PMP) to assure it complies with FTA's guidelines. The plan shall include: project overview; organization and staffing; project management and controls; planning/conceptual design phase management; final design phase management; construction phase management; close out phase management; quality management; risk management; procurement; contract administration; and communications.

The PMOC shall provide FTA with a written, factually-based analysis, and an assessment of project management, inclusive of identifying Grantee risk areas, to support an initial determination of whether the Grantee possesses the technical capacity and capability to carry out the proposed project in conformance with the Grantee's requirements for grant administration and management and there is a reasonable likelihood that the Grantee organization will continue to meet such requirements.

**2. Quality Control/Quality Assurance (QC/QA) Program**

In reviewing a Grantee's PMP, the PMOC shall verify that the Grantee's QA/QC program plan complies with FTA's Quality Assurance and Quality Control Guidelines ([http://www.fta.dot.gov/publications/reports/other\\_reports/publications\\_3876.html](http://www.fta.dot.gov/publications/reports/other_reports/publications_3876.html)) including but not limited to the following fifteen areas:

- Management Responsibility
- Documented Quality Management System
- Design Control
- Document Control
- Purchasing
- Product Identification and Traceability
- Process Control
- Inspection and Testing
- Inspection, Measuring and Test Equipment
- Inspection and Test Status
- Nonconformance
- Corrective Action
- Quality Records
- Quality Audits
- Training

Once a Grantee's QA/QC program and staffing levels have been determined to be appropriate, the PMOC shall focus on independently verifying that the Grantee is adequately implementing its QA/QC program.

As part of the PMOC's verification process the contractor should routinely monitor the Grantee's QA/QC activities. Monitoring should include reviews

of Grantee's implementation of its overall quality program including process, documentation and results. The PMOC should hold periodic interviews with individuals, such as the project's quality manager, resident engineers, project control engineer and design engineers, and review, on a random basis, the various documents maintained by these individuals related to the overall quality of the project. The review should establish that the appropriate reports do in fact exist and that the data contained in the documents are indicative of an adequately implemented QA/QC program. Typical documents that may be reviewed on a random basis include: design completion/coordination check list, quality audits, inspection reports, non-conformance logs and compliance measures taken to correct deficiencies. Through observation of design and construction activities, discussions with the key individuals such as the quality manager and random reviews of key documents, the PMOC will be able to establish, with a high degree of confidence, whether or not the Grantee is adequately implementing its QA/QC program.

Due to the importance of having Grantees implement a proper QA/QC program, the PMOC shall include a specific section (paragraph) on the status of the Grantee's QA/QC program in each monthly report. The report shall indicate whether the Grantee is properly implementing the QA/QC program and if not what specific actions should be taken to ensure its proper implementation.

### **3. Safety & Security Management Plan (SSMP)**

The SSMP Review is conducted by the PMOC to determine if the Grantee is adequately performing required safety and security management activities for its capital project, and it provides major input to FTA regarding the review and approval of the SSMP. As part of the PMP, the SSMP must be approved by FTA for the recipient to remain eligible to receive Federal funds for further project development.

For recipients with major capital projects affected by FTA Circular 5800.1, Safety and Security Management Guidance for Major Capital Projects, the PMOC's SSMP review must:

- Determine which safety and security activities the Grantee must perform, as specified in Chapter II, Paragraph 2 of Circular 5800.1 and following the process outlined in Chapter III of Circular 5800.1.
- Verify that the Grantee has documented its approach to performing the required safety and security management activities in an SSMP, which is included as a separate chapter or plan referenced within the PMP.
- Verify that the Grantee's SSMP includes the applicable sections specified in Chapter IV of Circular 5800.1 and meets all identified requirements.

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- Verify that the Grantee has the technical capacity to implement its SSMP, including adequate personnel, organization, budget and schedule.
- Determine whether the approach documented by the Grantee's SSMP is being implemented, as appropriate, for the project's current stage: preliminary engineering (PE), final design (FD), at application for a FFGA, construction, and start-up.

To conduct this review, the PMOC must apply the criteria specified in Chapter II, Paragraph 3 of Circular 5800.1.

For Grantees with major capital projects affected by FTA Circular 5200.1A, Chapter II, Section 6, Safety and Security Management Plan, the PMOC's SSMP review must:

- Verify that the Grantee has documented its approach to performing the required safety and security management activities in an SSMP, which is included as a separate chapter or plan referenced within the PMP.
- Required activities are identified in Chapter II, Section 6 of FTA's FFGA Circular 5200.1A, and in the DRAFT Guidance for the Development of Safety and Security Management Plans (January 2002).
- Verify that the Grantee has the technical capacity to implement its SSMP, including adequate personnel, organization, budget and schedule.
- Determine whether the approach documented by the Grantee's SSMP is being implemented, as appropriate, for the project's current phase.

#### **4. Real Estate Acquisition and Management Plan (RAMP)**

The PMOC's real estate consultant shall review the project real estate schedule and cost estimates at specific points in project development as directed by FTA or on an ongoing basis and tailor the review to the information and materials available at the time. During preliminary engineering, it is critical that potential real estate problems are identified and probable solutions determined. More elaborate schedules will be generated by the Grantee as time goes on and the schedule review should reflect the increase in information provided.

The PMOC's real estate consultant shall obtain from the Grantee the RAMP, latest schedules produced and supporting scope and cost information. The RAMP should be reviewed at various stages in the development of the project and should contain the following information at these stages of the NEPA Process:

- Prior to selection of Locally Preferred Alternative during or before the Draft Environmental Impact Statement (DEIS) process, the RAMP should be in an early stage of development and should contain information demonstrating an adequate staff organization complete with well defined

reporting relationships, responsibilities, job descriptions and job qualifications.

- Prior to FTA's approval to enter Preliminary Engineering, the RAMP should also contain: a map highlighting the parcels proposed to be acquired; a list of and written description of proposed total and partial acquisitions; a list of and written description of the anticipated number of residential and non-residential displacements/relocations; a list of and written description of the impacts due to the acquisitions and displacements/relocations; a schedule and cost estimate for the acquisitions and displacements/relocations.
- Prior to FTA approval to enter into Final Design, the information in the RAMP should be refined. The schedule should portray the critical path. The RAMP shall demonstrate that adequate relocation planning has been accomplished per 49 CFR Section 24.205, including recognition of problems associated with displacement and an evaluation of program resources available to carry out timely and orderly relocations.
- Prior to FTA award of the FFGA, the information in the RAMP should be further refined and third-party agreements should be made. The schedule should portray the critical path.

The PMOC's real estate consultant will provide oversight to the extent needed to ensure compliance with statutory, regulatory and FTA circular requirements. With consideration of the laws, regulations, policies, circulars, guidance documents, and practices that apply to the Grantee's work, the real estate consultant should at a minimum:

- Review and analyze all pertinent information available for reasonableness within the scope and cost parameters; for completeness, adequacy, consistency, appropriateness of level of detail given the phase
- Identify real estate acquisition program risks
- Be a full service company having experience in early right-of-way (R/W) planning and having a working knowledge in the four major areas of Uniform Act compliance (Appraisal, Acquisition, Relocation and Property Management)
- Have a working knowledge of 49 CFR Part 24 and FTA Circular 5010.1C and FTA Project Management Oversight Program Guidance
- State findings in descending order of importance (most likely, largest consequences, least likely, moderate consequences) and make recommendations for modifications.

## B. On-site Monitoring and Reporting

### 1. Grantee Project Development and Implementation Monitoring

During the design, construction, start-up and operational phases of a project, the PMOC shall monitor and report on the project's development and implementation for conformance with the Grantee's approved Project Management Plan, including project development and execution, and accepted engineering and project management practices.

The monitoring activities and written recommendations shall be sufficient to provide FTA with the factual basis, engineering analysis, and an assessment of project management to support FTA's on-going determinations that the Grantee possesses the technical capacity and capability to carry out the project, elements of which include:

- Continuing acceptability of the Grantee's Project Management Plan.
- Grantee's ongoing compliance with Full Funding Grant Agreement (FFGA) and/or other applicable Grant Agreement terms and conditions.
- Adequacy of Grantee's project quality, schedule, and budget, including contingency, for the current phase of the project.
- Monitoring of a project's "Estimated Cost to Complete" vs. "Remaining Budget".

As part of its monitoring activities, the PMOC shall routinely assess and evaluate supporting documentation from the Grantee including, but are not limited to:

- Timely management decisions
- Delegations of authority
- Management of project scope
- Internal controls
- Schedule analysis
- Cost estimates and trends, including forecasting
- Delivery of a quality product
- Project security/safety
- Continuing technical capacity
- Risk assessment and contingency management.

Periodic monitoring to be conducted by the PMOC includes, but is not limited to:

- Contract packaging and sequencing
- Third party agreements (railroads)
- Utility relocation
- Constructability reviews
- Financial plans
- Schedule, cost, and reporting
- Quality assurance
- System safety

- Risk management
- Value engineering
- Environmental monitoring
- Right-of-way acquisition and relocation.
- Fleet management planning and major fleet procurement
- Staffing and training
- System start-up
- Claims avoidance/management
- Change orders/cost recovery
- Buy America compliance

The PMOC shall perform routine project management oversight monitoring through on-site reviews and document reviews off-site. Periodic reports shall be submitted to FTA documenting project status, activities, and open issues. Other project elements such as project management, quality control and assurance, system operations, and staffing shall also be addressed. The PMOC shall provide technical consultation to the FTA Task Order Manager (TOM) prior to and during monthly and quarterly review meetings, in addition to preparing documentation for all Quarterly Progress Meetings, trips, reviews, and project status meetings. This documentation shall be distributed to FTA, the PMOC team, and the Grantee when applicable. The primary documentation medium shall be electronic via an internet website to be specified by FTA.

## **2. Final Monitoring Report**

The PMOC shall provide services or deliver products upon completion of the effective period of performance for either the task order or contract in the form of a final monitoring report. In producing the final monitoring report, the PMOC shall review the Grantee's grant requirements such as contained in the FFGA other terms and conditions and Project Management Plan, and measure the plan against the project completed by the Grantee and report any variances. This report shall include a summary of significant project events and accomplishments; any unresolved project issues, PMOC recommendations and a full assessment of the effectiveness of the Grantee's project management. The final monitoring report shall provide FTA with a factually-based, evaluation of the project as-built analysis, and an assessment of project management to support FTA's final determination of whether the project has been completed in compliance with the FFGA or other grant agreement terms and conditions. Also, if the PMOC is transition out of a task order, the PMOC shall report on the transitioning efforts, including any unresolved issues and/or key issues that the new PMOC will need to immediately address.

**3. Lessons Learned Report**

The PMOC shall also provide services and deliver products for FTA's Lessons Learned Program. The purpose of such lessons learned is to increase the effectiveness of transit capital expenditures through a sharing of experiences and associated lessons learned by FTA's Grantees on major capital projects.

**C. PMO Information Management Support and Products**

The PMOC may be required to develop or purchase software code, integrate data and products from other FTA contractors, FTA Grantees, or third parties for the purpose of URL or FTP based web hosting, CD-ROM, wireless, or other similar technology for the delivery of services and products.

FTA may also require the PMOC to develop or purchase software code that allows the delivery and integration of such third party contractor or FTA Grantee data to designated software applications such as Microsoft Office (including Microsoft Project) or Internet Explorer, or FTA's in-house programs such as TEAM, Fastrack, etc. The PMOC may be required to develop applications, produce output data, products or services in the form of either a single, integrated, secure, reliable website, commercial off the shelf (COTS) data file, or a single, integrated, relational data source.

The PMOC shall allow authorized FTA users and authorized third parties to navigate the application or site, to upload data, submit forms, query, or extract data from such a source on a daily or continuous basis using PMOC furnished software applications.

***CLIN 0003 – Technical Review Services***

**A. Scope, Cost, and Schedule Characterization Reviews**

**1. Project Scope/Capacity Review**

The PMOC shall perform scope reviews to assist FTA in assessing and evaluating the Grantee's project using TCRP's industry guidelines, Transit Capacity and Quality of Service, Report 100, 2nd edition (2003), Rail Capacity Manual and its procedures, or a modified procedure, with respect to the capacity of its individual rail transit system features or functions. The PMOC shall also assess and evaluate the proposed level of service using the same TCRP manual, or modified procedure. The capacity sections of the manual provide both planning and more detailed operations analysis procedures for assessing capacity for rail transit modes, and transit stops, stations, and terminals. A building-block approach to capacity analysis is presented, initially addressing the capacity characteristics of individual transit stops and station components, and then expand the concepts to address the capacity of broader transit services, facilities, and systems. Such reviews and analyses may include:

- a. “Line capacity” or theoretical capacity of the project as defined by TRB MP100 as the maximum number of trains that can be operated over a section of track in a given period of time, typically peak hour boardings]. The factor providing the lowest capacity—the weakest link—will constrain the capacity of a given section of a line. As TRB notes, normally, the combination of the train signaling system being used and the station with the longest dwell time will control the line capacity. However, under less-than-ideal conditions, the PMOC shall analyze other factors that may control line capacity. These include:
- (1) Line capacity and vehicle capacity, both relating to the number of trains that can be operated per hour, are equivalent terms for rail.
  - (2) Station dwell time and the minimum train separation produced by the signaling system.
  - (3) Signaling systems designed for the minimum planned train headway, rather than maximum capacity.
  - (4) Speed restrictions due to sharp curves or steep downgrades on the approach to the station with the longest dwell time.
  - (5) Line crossings and merges, particularly at-grade track junctions.
  - (6) Time required to turn back a train at a terminal station, and
  - (7) Mode-specific issues, such as light rail trains operating in mixed traffic or commuter rail trains sharing tracks with freight trains.
  - (8) Traction power substation type and characteristics, DC distribution systems including the OCS, DC feeders, and return rails, and the power characteristics of the vehicles to be used on the system.
  - (9) Person capacity after adjustments to line capacity.
  - (10) Capacity modeling shall develop static and dynamic elements for traffic operations and other guideway elements such as vertical and horizontal curvature and line of sight restrictions.
  - (11) Capacity of the project’s maintenance infrastructure (as-built) such as shops, yards, secondary maintenance, component rebuilds or capital inventory requirements using a structured and methodical approach that makes maximum use of previous TRB work and other existing engineering data.
- b. Capacity of the LRT project as required to meet the passenger load requirements forecasted for the revenue operations date (peak hour passenger boardings) and TCRP’s recommended “mature capacity” (ref. Page 5-49).
- c. Address the engineering economy issues associated with determining what project elements were to be constructed at what time.

- d. "Step the project forward" through the ridership forecasted at a series of future milestones such as those envisioned in the rail fleet management plan.
  - (1) The PMOC shall determine a cost effective "build out" approach for the transit project from the ROD out to a future-planning horizon such as 20-50 years into the future depending upon the useful economic life of project components.
  - (2) PMOC shall estimate useful economic life for major project elements (using FTA's Standard Cost Categories as defined in the Annual New Starts reporting requirements).
  - (3) These recommendations will account for the time value of money as well as the costs associated with various construction approaches.

## **2. Capital Cost Estimate Review**

The PMOC shall perform cost reviews to assist FTA in assessing the consistency of such data provided by the Grantee, understand its characteristics and descriptions as well as the correlation between the quantity data in the estimates and the data established in the design deliverables and review whether the Grantee cost data is truly reflective of the scope indicated on the design drawings, i.e. correct estimate quantities.

To accomplish this, the PMOC shall perform cost characterization of the Grantee cost data inclusive of the project estimate. The PMOC shall also assess the integration and traceability of that estimate into the defined scope of the project for purposes of "baselining" the project estimate as the costs, scope issues, and project become more fully defined and developed through progression of project definition.

Lastly, given the importance of certain contract package elements (such as Construction General Conditions) on project implementation and risk in general, FTA seeks to have these elements independently estimated in more detail as part of the appropriate OP.

During the implementation of the project, the Grantee will receive bids/offers that have a significant impact on the Full Funding Grant Agreement (FFGA) budget and the accomplishment of FTA's 5 percent Core Accountability. The PMOC shall provide products and deliver services that analyze the results and provide context for FTA's programmatic decisions such as triggering event based mitigation.

Subject to the issuance of individual work orders, FTA may require the PMOC to perform the following subtasks as part of the products or services delivered under the Work Order.

- Parametric project cost estimate review

- Definitive project cost estimate review
- Assessment and evaluation of grantee project cost forecasts
- Structural analysis of grantee project cost data using FTA data
- Market conditions adjustment

### 3. Project Schedule Review

The contractor will perform schedule reviews and analyses to assist FTA in determining whether the Grantee's project schedule is sufficiently developed to establish the validity of the longest path of the project (leading to the Revenue Operations Date) and that critical areas such as right-of-way acquisition, utility relocation, wetland mitigation and construction are sufficiently detailed to confirm if the schedule is reasonable and to estimate a probability of schedule slippage.

The PMOC shall validate the usefulness of the schedule as a project management tool, identify problems, provide technical assistance, and actively solve schedule problems with the Grantee. In a report to FTA and the Grantee, the PMOC shall document its findings, professional opinions and recommendations and reconcile these with the Grantee.

The list of items below indicates minimum requirements, to be supplemented by the PMOC's experience and as appropriate for project and phase. The PMOC shall assess and evaluate Grantee's scheduling procedures and information in accordance with the following.

#### a. Technical review

- (1) Consistent with relevant, identifiable industry or engineering practices,
- (2) Mechanically correct and complete,
- (3) Free of any material inaccuracies or incomplete data,
- (4) Appropriate level of detail given the project phase,
- (5) Phasing structure is logical and appropriately detailed with tasks,
- (6) Level of detail is uniformly applied by phase,
- (7) Fully identified activities and durations,
- (8) Design and construction activities and relationships are adequately identified,
- (9) Top-level summary included to facilitate understanding of detailed schedules,
- (10) Schedule detail beneath the 'hammock' or summary level is task based,
- (11) Sequencing, through the use of predecessors and successors, is identified for all material tasks,
- (12) Sufficient development to determine the validity and stability of the project critical path,
- (13) Float is identifiable and reasonable,

- (14) Schedule control methods are adequately described,
- (15) Approach to and use of additional scheduling tools, such as work breakdown structure, responsibility, cost loading, resource loading, etc.

**b. Project Activities and Constraints**

- (1) Schedule follows an expected work sequence.
- (2) Complexity of sequential relationships is consistent with phase of project,
- (3) Activities and durations are consistent with the project scope adopted in the Record of Decision or NEPA documents as applicable and the proposed Revenue Operations Date,
- (4) Contract procurement processes and durations are adequate and complete as well as fully integrated with associated design and construction activities,
- (5) Lead times and durations for equipment and material manufacturing and delivery are adequate and complete,
- (6) Logic for the physical construction constraints, such as transportation or access point restrictions, and temporary construction have been considered and are reasonable,
- (7) Seasonal weather variations are accounted for,
- (8) Labor and material availability have been factored into construction durations,
- (9) Work efforts of similar nature that occur concurrently are identified and reasonably sequenced in the schedule to assure similar work activities can be accomplished with available labor and materials,
- (10) Phasing due to planned right-of-way acquisition provides sufficient work area(s) for efficient use of resources,
- (11) Adequately and completely reflects Grantee procurements, schedule and cost forecasts, and construction change orders,
- (12) The PMOC shall assess and evaluate the proposed schedule duration to at least three other similar projects from the FTA database and analyze the variances down the Standard Cost Category (SCC) level.

**c. External Activities and Constraints**

- (1) Schedule contains a full range of activities including FTA related approvals (Draft Environmental Impact Statement (DEIS), Final Environmental Impact Statement (FEIS), Letter of No Prejudice (LONP), Full Funding Grant Agreement (FFGA)); procurement and performance of civil/facilities and systems final design; right-of-way acquisition;

wetland mitigation; utility/agency agreements; utility relocation; civil and systems contract procurement; civil and systems construction; agency operations and maintenance mobilization; and integrated pre-revenue testing,

- (2) Activity durations include adequate time for project reviews by applicable local, state and federal jurisdictions and affected third parties,
  - (3) FTA review periods, including milestones and activities leading to the FFGA such as development of Risk Management Plans, Safety and Security Management Plans, Project Development and Execution Plans, etc.
  - (4) Funding milestones from non-FTA sources.
- d. Risk Identification
- (1) Embedded schedule contingencies are identified and assessed as adequate relative to project duration,
  - (2) Identify and separately list risks discovered in the schedule review and evaluate the potential impact of these risks on the schedule, scope, and cost,
  - (3) Estimate a probability of schedule slippage for critical path activities.

## **B. Rolling Stock Reviews**

### **1. Fleet Management Plan Review**

The PMOC shall assist FTA in performing fleet management review to verify as a minimum, that the fleet management plan submitted in support of a New Starts project reflects a 15-year time frame. Logically, the historical and empirical data compiled through past and current operations of a fleet will set the starting point for certain portions of the plan. A fleet management plan should address in detail the composition of the fleet, operating conditions, maintenance, facilities, passenger load factor, peak vehicle demand, and spare ratio.

The role of the PMOC in this process shall evaluate, based on the experience and knowledge of the qualified evaluator(s), the extent to which the Grantee has met the intent of the requirement to have a Fleet Management Plan, as well as the Grantee's ability to carry out the Plan. The evaluator should first examine whether all of the required factors have been included in the Plan, and then provide opinions on whether the Plan is: (1) feasible, based on the resources immediately available to the Grantee, (2) sustainable, based on the long term infrastructure and resources anticipated to be available to the Grantee, and (3) comprehensive, based in its consideration of the required factors to properly maintain and operate the new or refurbished vehicles contemplated.

The PMOC may be asked to:

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- Share its knowledge of fleet management practices with the Grantee;
- Assist in identifying materials that are crucial to the successful development of a Fleet Management Plan;
- Provide plans that have been found complete and reasonable as models of "best practices" among Grantees;
- Provide further outlines of the elements in a Fleet Management Plan that makes it comprehensive and acceptable to the Grantee's operation;
- Participate in the review of the Fleet Management Plan to ensure the plan is comprehensive and complete in its analysis of the rail operations;
- Serve as a resource by lending its experience and knowledge of other plans that are completed or viewed as exhibiting "best practices" in the industry.

From time to time, FTA may require the PMOC to provide services or deliver products during project development that continuously review and evaluate various Grantee Fleet Management Plans, processes or products as an ongoing activity in order to report findings and make recommendations as to the accuracy, adequacy and reasonableness of the Grantee's Fleet Management Plan and supporting data, plans and documentation.

FTA may require the PMOC to conduct on-site inspections of equipment, related facilities, data, documentation, or records to evaluate the Grantee's effectiveness in implementing the Fleet Management Plan in conformance with the grant agreement, sound operating or engineering practices, or other statutory and administrative requirements. Inspection visits may be made, for example, to follow up on information received from the Grantee about an event with significant impact on the project, or to determine whether the Grantee has adequately implemented the Fleet Management Plan.

The PMOC as directed in the specific work order shall review Grantee documentation, perform its own technical review and physical inspections, characterize the Grantee's Fleet Management Plan and validate the Grantee's plan and operating assumptions in conformance with these procedures. The PMOC shall evaluate and assess the accuracy, adequacy and reasonableness of the Grantee's Fleet Management Plan and its supporting plans and documentation using the following criteria.

- a. The Grantee's existing transit service in terms of level of service, operating costs, reliability, quality and support functions, will not be degraded as a consequence of the design, the manufacture of the equipment, or construction of the project; and that the Grantee will be able to provide adequate service to meet the transit demand for the years leading up to and following either the delivery of the equipment/facility or construction of the project.

- b. Fleet operations (present and future) as described in the plan are substantially consistent with that adopted in the Record of Decision (if applicable), sufficiently complete in detail and analysis (Fleet plan or supporting documentation) to readily demonstrate Grantee's ability to maintain or improve the current level, and quality of operating costs, and reliability and quality of service for the years leading up to and following construction of the project. The plan also provides details of existing and planned vehicle procurements as well as any overhaul/rebuild programs that extend the life expectancy of the equipment.
- c. The Grantee has selected a sufficient time frame, (at a minimum 15-year time frame) and compiled sufficient historical and empirical data from past and current fleet operations.
- d. The Grantee can properly plan for and execute the overall management of its entire fleet of vehicles and related support functions and equipment, addressing all of the reasonably foreseeable factors that are relevant to the determination of current and future equipment needs. Foreseeable factors could include, but not be limited to:
  - Additional maintenance facility requirements
  - Accommodations for future growth
  - Contingency for short term changes in ridership
  - Rail vehicle life cycle maintenance
- e. The Grantee's management is competent and capable of providing leadership and direction on Fleet planning and operating matters including all aspects of Fleet Management Plan requirements.
- f. The Grantee's information system reliably provides needed operating and financial data such as current estimates of maintenance facilities and vehicle operating costs, reliability and life expectancy, for decision-making and performance review.
- g. Grantee in its selection and specification of vehicle equipment and systems has matched the appropriate technology with the planned transit applications for the best performance at the lowest cost.
- h. Grantee estimates of costs, service levels, quality, or reliability are mechanically correct and complete, consistent with the Grantee-defined methodologies and free of any material inaccuracies or omissions.
- i. Grantee forecasts and schedule are mechanically correct and complete, and are consistent with the plan scope and project scope adopted in the Record of Decision.

The PMOC will report its findings in a written statement which summarizes the overall findings, and characterizes, for the FTA, the acceptability of the Fleet Management Plan. The statement will include the PMOC opinion as to the completeness of the Plan.

**2. Rail and Bus Vehicle Technical Reviews**

The PMOC shall assist FTA in overseeing Grantees' procurement of road and rail vehicles to help achieve FTA's goals of economy in vehicle procurements.

The PMOC shall:

- a. Report on the completeness and accuracy of Grantee's deliverables, including but not limited to the following:
  - (1) Contract Data Requirements List (CDRL): The PMOC shall review the list of contractual deliverable documents to determine whether the documents will address all of the characteristics to be demonstrated through analysis and test.
  - (2) Design Documentation: In reviewing design documents the PMOC shall assure the following:
    - There is a properly sequenced plan of design that will assure compliance at the earliest possible moment, mitigating the costs of rework and dangers to the overall program schedule;
    - Each document addresses the intended issues;
    - Assumptions made in each document are valid and proven;
    - Analytical methods used meet current professional standards;
    - The grantee's review is by people competent in the field who are capable of detecting and commenting on analytical errors;
    - Drawing and Configuration Control is designed to assure consistency throughout the fleet, including option orders;
    - The supplier's QA program and the Grantees oversight will assure delivery of the vehicle "as designed"
  - (3) Quality Control/Quality Assurance Plans: The PMOC shall review the Grantee's QA plan to assure the supplier's QA will be performed under adequate surveillance, and will pay particular attention to assure the following:
    - The Grantee has qualified inspector(s) on site while production is underway;

- Both the Grantee's and the Supplier's inspection services are independent enough of production and program management to assure issues are not suppressed;
  - Protocols are in place for dealing with discrepant materials and the grantee's inspector has a voice in disposal of discrepant materials;
  - The Grantee's requested delivery schedule provides sufficient time to assure supplier delays will not compromise vehicle quality.
- (4) Test Program Plan: The PMOC shall review the Test Program Plan to assure the plan is integrated with the CDRL. The PMOC must assure that, between test and analysis, the supplier will demonstrate full compliance with the Sponsor's design specification. Specifically, the PMOC shall assure the following:
- Critical specified performance criteria are demonstrated by test, by acceptable analysis, or prior agency certified test;
  - Acceptance tests are sufficient to demonstrate that each vehicle is compliant through testing of representative criteria;
  - The test program is valid for the vehicle and the intended infrastructure. For instance, new vehicles on new infrastructure will require different approaches, such as full system testing; while existing vehicle designs previously tested on the existing infrastructure might only require vehicle testing to assure satisfactory interfacing with the existing infrastructure;
  - Waivers for existing designs are evaluated fully to assure that the waiver is soundly based upon proven in-service technology used in demonstrably similar systems.
  - Test procedures accurately reference applicable sections of the specification to be proven under test;
  - Test procedures are up-to-date and reflect the latest design configurations.
- b. Identify when the Grantee's actual and stated needs are in conflict. In addition to the reviews of submittals indicated above, as part of its monthly report, the PMOC shall, as necessary, include recommendations for action by the FTA to take corrective action with the Grantee.
- (1) Before making such a report, the PMOC shall discuss any noted or observed issues and possible corrective action with the Grantee, and report the issues and intended corrective action concurrently to the FTA.
  - (2) The PMOC shall pay special attention to the following key issues. This section might include a list of specific conditions that would require

recommendation for corrective actions to the FTA. Such conditions might include:

- Schedule, issues potentially impacting schedule, and issues actually impacting schedule;
  - Vehicle safety issues;
  - Vehicle reliability, availability and maintainability issues;
  - Issues impacting vehicle operability;
  - Faulty or unreliable vehicle designs or systems;
  - Known component or material deficiencies and availability of replacement parts;
  - Other, such as payments to vendors (slow or no payments);
- c. Assure timely intervention when there are indications that the vehicle will not satisfy the Grantee's actual needs.

### **C. Risk Assessments and Contingency Review**

The PMOC shall assist FTA in implementing and maintaining a continuous risk planning and monitoring process within the framework of interlocking project strategies that are embedded into the Grantee Project Management Plan. These products and PMOC/FTA services support FTA in making programmatic decisions under uncertainty, for projects using traditional or alternative project delivery methods. The results and products of Risk Management assessments are then used in downstream applications for developing risk management framework, Project Development Plans, and Project Execution Plans.

Risk assessment for a capital project in concept deals with a base condition for cost and time for known elements (e.g. design quantities, unit costs, duration), a risk condition for cost and time for unknown or uncertain elements, and a combined base and risk condition.

In risk analysis, uncertain elements of a cost estimate are expressed in terms of random variables that range considerably in value, reflecting the potentially wide-ranging impacts of unanticipated events when they actually occur. These uncertain elements, or risks, when added to the base cost give an approximation of the total project cost that also ranges in value, i.e., follows a probability distribution. The schedule conditions can be modeled similarly, with a base duration and a number of uncertain elements with variable durations, together yielding a probabilistic distribution for total project duration.

Risk assessment can be conducted during any phase of the project but may be most informative and fruitful in late preliminary engineering and early final design. Depending on the project, it may be useful at some point to focus the risk assessment and mitigation work only on schedule or only on a particular component of the project. Through collaborative interactive workshops and intensive study of the project, the risk work feeds back information to support subsequent project

decisions. The process can be applied to projects using traditional design-bid-build procurement as well as alternative project delivery methods.

In FTA's current practice, risk assessment has two component parts or methodologies:

- Risk Register Model (bottom-up method): The bottom-up approach, through interactive workshops, includes development of a list of discrete risks including a description of each risk or uncertainty, characterization of how likely the project item is to occur, and the magnitude of the impact if the project item did occur.
- Beta Factor Model (top-down method): The top-down approach serves as a back check to the Risk Register Model. It can validate the estimate of cost and schedule are "in the ballpark" to achieve construction completion and contract closeout with an 80 percent chance of success. Using this method, ranges of cost are developed for entire categories of costs, e.g. guideway, rather than one or more separately identified risks within a category.

The following work shall be performed by the PMOC in accordance with the applicable Oversight Procedure (OP).

#### **1. Preparatory Work**

The PMOC shall perform the following risk assessment preparatory work.

a. Establish Base Year Dollars:

From the project Standard Cost Category (SCC) worksheets, begin with base year dollar costs as if the entire project were planned, designed and constructed in one base year. Costs in a single base year dollar do not include costs related to inflation (the rate of increase in the general price level of all goods and services over time.) Note that if project cost estimates were developed with costs from different base years, it is important to normalize or adjust these costs so that the risk assessment work starts with all project costs in one base year dollar.

b. Establish Year of Expenditure Dollars:

After establishing a single base year for the base year dollars, calculate the year-of-expenditure (YOE) costs.

c. Remove Contingencies and Finance Charges:

Establish the project base cost and schedule by removing cost contingencies and float in the schedule that are not specifically assigned allowances to known but unquantified project elements.

d. Adjust this YOE cost:

Using the findings from the foundational reviews (Grantee technical capacity, project scope, capital cost, and schedule) insert additions or deductions to account for errors, omissions or other necessary modifications so that the cost is as correct as possible.

**2. Risk Register Model**

The PMOC shall develop the risk model through a collaborative process involving the Grantee as follows:

An unbiased facilitator ideally leads the risk assessment process. Participants include FTA staff, FTA's PMOC, the Grantee and its consultants and construction contractors, and selected consulting experts. The consultants should have expertise in implementation and management of projects of comparable scale. The disciplines of civil, geotechnical, structural, architectural, mechanical, electrical, cost estimating, scheduling, real estate acquisition, permitting, financing, etc. should be represented to consider risks to those portions of the project. The PMOC and consulting experts should bring independence and lack of bias to the risk assessment process while the Grantee and its design team bring specific project knowledge and the motivation to see the project through to a successful conclusion. The maximum benefit using the Risk Register Model is obtained through collaboration on and conversation about the project.

As risk assessment begins, consideration should be given to the many possible sources of risks associated with capital transit projects. Some risks are not under direct control of the Grantee and are referred to as *external risks*. Examples are risks due to the socio-political context, financing, weather, and global market conditions. Risks that are largely under the control of, or can be influenced by, actions of the Grantee are referred to as *internal risks*, for example, risks in the planning, engineering, construction, and direct management of projects.

Considering each project component, major activity and contract unit, the PMOC shall develop a comprehensive list of possible risks and opportunities to the project. Opportunities represent actions or measures that could reduce costs and delays as opposed to risks that increase costs and delays. Develop this list, i.e. the risk register, in a collaborative workshop setting. Items to be considered during the development of a risk register should include:

- Design and Construction
  - Project Program and concept definition
  - Design standards
  - Conditions of construction
  - Real estate acquisition and relocation

- Completeness of documents (errors, omissions, failure to consider factors)
- The Project Context
  - Political
  - Institutional
  - Project Management
- Project Procurement
  - Bid climate
  - Contracting method
  - Contract packaging
  - Payment schedule
- Schedule
  - Amount and ownership of float
- Cost
  - Cost estimating methodology/escalation/inflation
  - Contingency
  - Funding Sources / Financing Mechanisms

### **3. Beta Factor Model**

The PMOC shall develop the beta model in a manner similar to the Risk Register Model as follows:

The Beta Factor Model serves as a back check that costs and schedules are “in the ballpark” based on existing FTA data and lays out a program level risk model based on historical knowledge, i.e. a “knowledge model.” It works not with specific risks but with whole project categories, for example, guideway, stations, systems, etc. Based on the issues and risks identified in the foundational scope, schedule and cost reviews, consideration of historical costs, and the project’s level of development, the Beta Factor Model applies multipliers or beta factors to the estimate to arrive at an estimate with an 80 or 90 percent likelihood of being achieved at project completion. As the project passes through phases, milestones are met, design is complete, real estate is purchased, etc., related risk is reduced and the beta factors are reduced accordingly.

Like the Risk Register Model, the Beta Factor Model usually utilizes the FTA Standard Cost Categories (SCC). More detailed analysis, using the same steps, can be performed with other types of breakdowns such as contract packages. The choice to work with few or many depends on the level of complexity of the project and the time available to do the study.

The same preparatory work as for the Risk Register Model is required: Establish base year dollars, YOY dollars, remove cost contingencies, float in the schedule, and finance charges. As before, adjust this YOY cost using the findings from the foundational reviews (Grantee technical capacity, project scope, capital cost, and

schedule). Insert additions or deductions to account for errors, omissions or other necessary modifications so that this cost is as correct as possible given the information available.

The “adjusted” YOE cost is considered the “best case” cost scenario for the project. It is assigned a 10 percent likelihood of being achieved i.e., this cost has a 90 percent chance of being exceeded by the actual price. The assignment of 10 percent is intentionally conservative based on observed optimism in cost estimating.

- Based upon the aforementioned observational and historical data, professional judgment, and intermediate analysis, the PMOC shall translate those data reduction findings and related information into inferences about probability distributions that in turn become an empirically established, random variable(s) model whose parameters shall be estimated statistically in conformance with these procedures.
- The PMOC shall apply decision theoretic concepts such as EVPI (expected value of perfect information) or EVII (expected value of imperfect information) to simulate the effects of totally effective grantee mitigation, or “perfect mitigation” (EVTEM, EVPM) throughout the project implementation.

Upon completion of both methodologies, the PMOC shall synthesize the risk assessment findings and provide FTA and the Grantee with well-grounded professional opinions as to the reliability of the project scope, cost, and schedule of the project, describe uncertainties, and make a statement of the potential cost range as follows:

- lower or optimistic cost at 10% likelihood
- mid-level cost at 50% likelihood
- target cost at 80% likelihood
- upper or pessimistic cost at 90% likelihood

The PMOC shall also synthesize the risk mitigation plan and monitor its implementation. For areas of significant uncertainty, the risk mitigation plan includes recommendations for additional work by the Grantee or other party along with a stipulated time frame for accomplishing the work. It also establishes contingency amounts to cover project uncertainties.

#### **D. Readiness Reviews**

Some of the following reviews, required at different project development phases, should not be interpreted as duplicative efforts for the same products but instead a complete listing of the requirements for the given stage. In such cases, the previous delivered products shall be used, to the extent applicable, to complete the analysis or review.

1. Locally Preferred Alternative (LPA) Review and Readiness to Enter Preliminary Engineering (PE)

With intense competition for limited Federal New Starts funding, project admittance into the New Starts pipeline is carefully considered. Grantee submittals must undergo a thorough review to ensure that projects entered into preliminary engineering are meritorious and have a high likelihood of successful completion. This review helps FTA to make these determinations.

The PMOC shall synthesize the findings of its review, describe the project, provide FTA with a well-grounded professional opinion as to the reliability of the scope, cost, and schedule of the LPA, describe uncertainties, and make a statement of the potential cost range (lower/upper bound). For areas of significant uncertainties, the PMOC shall recommend additional investigation, planning or design work by the Grantee. The Grantee's technical capacity and capability to succeed during Preliminary Engineering (PE) should be assessed and deficiencies with recommended remedies shall be provided by the PMOC.

The PMOC shall form a competent team of subject matter experts with prior experience to fulfill the requirements below:

a. Setting the Groundwork

The PMOC shall coordinate with the Regional Office to make the initial interview, project discussion and site visit with the Grantee and to obtain from the Grantee the materials to be reviewed.

The PMOC shall verify that the Final Alternative Analysis Report (AA) indicates that the Grantee has considered all reasonable alternatives. In particular, the PMOC shall verify that a transit mode was not overlooked leaving the LPA open to later challenge.

The PMOC shall verify that the Notice of Intent for the environmental review has been issued. If an environmental document has been produced, a Draft Environmental Impact Statement (DEIS) or Environmental Assessment (EA), the PMOC shall verify that impacted third parties have been notified of the project and provided with an opportunity to review and comment. For each impacted third party, the PMOC shall coordinate with FTA's Regional Office that the correct representative has been identified and the correct address has been used.

b. Project Scope

The PMOC shall review the project scope in relation to the Draft Environmental Document, Operating Plan, Design Criteria, Schedule and Budget including an evaluation of the mitigation measures as follows:

- (1) Assess the Grantee's fundamental reasons for the project and for selecting this alternative from the alternatives considered. Confirm that

all reasonable modes were considered by the Grantee in its alternatives analysis. Comment on the project assumptions that have led to scope decisions (relationship between the transit project and existing or future residential/commercial development, ridership in the forecast year, operating plan, infrastructure and vehicle capacities, project implementation schedule, and life cycle considerations, etc.)

- (2) Through a site visit, perform an on-the-ground check of physical conditions. Verify project fit with local conditions through study of project planning diagrams, jurisdictional zoning and transit-oriented development maps, and concept design drawings.
- (3) Study and evaluate the project documents (narratives, design criteria, planning diagrams, plans and profile drawings, aerial photos, and environmental studies) for completeness including:
  - Spatial and functional aspects of the project
  - Compliance with applicable statutes, regulations, guidance and policies, including but not limited to, the level boarding provisions of the Americans with Disabilities Act
  - Appropriateness of the proposed infrastructure, systems and vehicles for the transit application to achieve stated performance levels
  - Identification of perceived gaps, omissions, and/or inconsistencies
  - Consideration of possible alternative approaches or value engineering options
  - Identification of uncertainties in the project scope, schedule or cost and their potential impacts
- (4) If adequate graphic or written scope description is not available, recommend additional work by the Grantee, and a time frame for completion.

c. Project Design Capacity

The PMOC shall assess the capacity of the project to operate and accommodate ridership in the twenty to twenty-five year forecast, based on the requirements of the operating plan. As a minimum, consider the Grantee's fleet size, station platform lengths, track configurations, signal, power, communications systems, and maintenance facilities.

d. Project Management Plan (PMP)

The PMOC shall evaluate the Grantee's PMP to assure it complies with FTA's guidelines. The PMP at this stage of project development must have detailed sections of project organization and staffing, project budget and schedule, quality assurance/quality control, risk management, and project controls, with

supporting procedures as necessary. These procedures include Document Control Procedures, Change Order Procedures, Material Testing Procedures, Internal Reporting Procedures, and Operational Testing Procedures. Other sections related to the construction phase may not require the same level of detail, unless, the Grantee anticipates receiving early construction packages, through use of the Letter of No Prejudice (LONP).

e. Grantee's Technical Capacity and Capability

The PMOC shall evaluate the Grantee's capacity and capability to undertake and successfully complete the PE Phase, through review of the Project Management Plan, relevant project documents, and interviews with key project team members and stakeholders. The capacity areas to be evaluated are: management structure; community, political and institutional support; staff and consultant organization; along with professional skills and experience to effectively implement the proposed project, in conformance with sound engineering and project management practices. In particular, review and assess the qualifications of the staff and consultants that have prepared the documents submitted to date, including conceptual design, cost and schedule.

d. Project Capital Cost

The PMOC shall review and assess the project cost estimate accuracy, in comparison to similar projects completed in recent years, and industry accepted indices and benchmarks as follows:

(1) Preparation

- Review the estimate in its original format and in Standard Cost Category format (SCC)
- Include the names of the firm(s) that prepared the estimate
- From the SCC Main Worksheet, provide the date shown; verify that the "base year" reflects the current year
- On the Inflation Worksheet, verify that a supportable rate of inflation is inserted for each project year

(2) In base year dollar terms

- Describe the methodologies of developing the cost information, and assess the appropriateness of the methods. The following are examples of possible methods which could be utilized:
  - Parametric estimating (Using aggregated unit costs based on similar past projects)
  - Establishing Cost Estimating Relationships (CERs are costs established as a percentage of another cost. This other cost, or the basis, is identified.)

- Identification of typical construction conditions (such as typical cross-section) as a basis for estimating, and applying aggregated unit costs (cost per linear foot of cross-section) based on similar local projects in the recent past.
  - Costing as products of discrete unit costs and quantities
  - Lump sum costing
- Review the cost estimate for:
    - Consistency with project scope and material quantities, as verified against the drawings
    - Validity of the unit costs, as verified against recent similar construction bids
    - Completeness and mechanical correctness (does it add up)
    - Adequacy of the allocated contingency for specific line items, and the unallocated contingency relative to total project cost
    - Adequacy of the total of the allocated and unallocated contingencies, as a percentage of the total base year dollars, based on the risks outlined in the Grantee's Risk Register and the PMOC's assessment
  - Assess the reasonableness of the assumptions for construction escalation (materials, commodity and labor pricing), and inflation, both of which cannot be accurately forecast, and are beyond the staff's control.
- (3) In year-of-expenditure dollar terms
- As translated into the inflation rate for each year of the project (refer to Inflation Worksheet), and the year-of-expenditure costs, assess the reasonableness of the assumptions for 1) construction escalation (materials, commodity and labor pricing) and 2) inflation.
  - Identify uncertainties that have been introduced through the development of the Year of Expenditure (YOE) cost estimate. Estimate the cost and time impact of these uncertainties.
- (4) In conducting the review above, consider the following:
- The political, institutional and project management context of the project, with the understanding that these will most likely change during the duration of the project.
  - Unresolved issues or agreements for shared responsibility or joint use
  - Restrictive schedule or mobilization requirements

- Geotechnical and environmental - level of site investigations performed
- Real Estate and Right of Way takings and anticipated relocations
- Possible procurement scenarios, contracting methodologies, and anticipated bid climate
- Perceived biases in the cost estimate
- Potential costs due to the availability of commodities or labor, and escalation factors used
- Potential costs due to change in the inflation rate, and inflation factors used
- Any other project risks

d. Project Operating and Maintenance Costs

The PMOC shall review the Grantee's estimates of and assumptions used in developing the project's operating and maintenance costs. Estimates should be analyzed in comparison with existing recently completed projects of similar size.

e. Project Schedule

The PMOC shall assess the accuracy of the schedule in form and substance. Consider the durations and logic of the activities in relation to those of other Grantee's, and the Grantee's track record for implementing similar projects with FTA finding. Identify sources of uncertainty or missing activities on the schedule, and their potential impact on the schedule. Evaluate the adequacy of the scheduling software for this stage of the project. Identify the potential cost impacts of the schedule risks.

f. Project Risk

The PMOC shall review the Grantee's Risk Register and Management Plan, and will independently identify potential risks due to optimistic assumptions, or value engineering. The PMOC shall identify sources of uncertainty and their potential impact on the schedule and cost, especially in relation to contingency. Uncertainties may include, but are not limited to, unresolved issues, changes or inadequate project definition associated with the design, mitigation measures and construction scope; the political, institutional and project management context of the project; third party and real estate acquisition issues, procurement conditions, contracting methodology, bid climate; methodology of developing the capital cost estimate itself; perceived biases in the estimate; availability of and changes in funding sources / financing mechanisms; cost of inflation or change in the value of the dollar over time.

**2. Readiness to Enter Final Design**

FTA desires the PMOC's professional and well reasoned findings and recommendations regarding the readiness of the Grantee to enter and complete the final design phase. Findings and recommendations shall pertain to:

- The completeness, quality, and accuracy of engineering design, the project schedule, and the project capital cost estimate at the conclusion of PE.
- The Grantee's program for advancing the design, schedule, and cost estimate to the point of having available construction-ready bid documents.
- The Grantee's ability to execute final design and construction (i.e., technical capacity and capability) and whether the Grantee has adopted a risk-based management approach to project implementation that incorporates findings of a project risk assessment.
- Whether the Grantee has in place other project controls and management policies and procedures to execute the project, including those for maintaining quality control/quality assurance of products and services; the safety and security of project design, construction and operation; and, acquisition of required rights-of-way, among other policies and procedures.
- Satisfied other FTA requirements for readiness to advance to final design.

This information, combined with findings from environmental, New Starts, financial, and other FTA-directed reviews will support FTA's determination on whether or not to approve Grantee entry into the final design phase of project development.

The PMOC's assessment of Grantee technical readiness to enter final design will be initiated by a task order (TO) or work order (WO) from FTA. The TO/WO may expand upon the general scope of services described in this section. For example, FTA may request further detail in conjunction with analyses that are critical to FTA's readiness determination or needed to fill in gaps in Grantee submittals. This assessment may be performed in conjunction with other oversight activities. In many ways this assessment is a process of integrating findings and recommendations of other reviews.

In general, for each work item listed in this section, the PMOC will follow a similar analytical approach:

- Review and analyze the pertinent information available for completeness, adequacy, consistency, and appropriate level of detail given the phase of the work.
- Identify all apparent discrepancies and deficiencies.

- State findings in descending order of importance (most likely, largest consequences, least likely, moderate/minor consequences) and make recommendations for modifications or additional work by the Grantee along with a time frame for the performance of the work.
- For major findings, provide recommendations for the Grantee and/or FTA to implement that will address the issue or correct or mitigate the deficiency.
- Identify action items, if any, and next steps.
- Document the assessment, including objectives, approach/methodology, findings, and recommendations and provide back-up information in appendices or attachments to the main body of any report.

a. NEPA Overview and New Starts Status

The PMOC shall verify that the

- (1) Definition of the project (i.e., scope) contained in the project Record of Decision (ROD)/ Finding of No Significant Impact (FONSI) and most recent New Starts submittal agree with the scope as developed in PE materials, including the approved PMP and the engineering design plans and specifications.
- (2) Basic quantities, such as number and locations of facilities, peak and total vehicles, etc., identified in the environmental document and ROD/FONSI are the same as assumed in the current project definition.
- (3) The current project design satisfies the capacity and operational objectives established in the approved environmental document.
- (4) Mitigations committed to in the ROD (or project mitigation plans), when involving a physical or operational feature of the project, are incorporated—or in the process of being incorporated—into the engineering design, proposed construction program, and/or other implementation plans. Mitigations could include changes in design, use of different types of material, modified traffic control, restricted construction activities, etc
- (5) Environmental and related early permits and approvals for project development have been executed or are in the approval process.

Assuming a Project Scope Review has been completed the results should be incorporated into this Readiness to Enter FD analysis. Consistency between the project as planned and as reflected in engineering design is important.

b. PE Plans, Master Schedule, Budget (Cost Estimate)

- (1) Engineering Design

The PMOC shall examine the Grantee's PE plans for clarity, accuracy, and level of detail for a project ready to enter the FD phase.

Plans should reflect the project scope established during the NEPA process and as described in the ROD or FONSI. Discrepancies or unclear scope items in the plans should be noted.

(2) Schedule

- The PMOC shall examine the Grantee's latest project schedule and verify that it is in general agreement with the most recent New Starts report.
- The PMOC shall determine whether the level of detail (number of activities) and logic (activity interrelationships) are reasonable and sufficient for project ready to enter the FD phase. Assessment will be made of major activity and overall project durations, leading to a conclusion on whether the project can be completed as planned.
- Risks to the schedule will be identified and areas requiring clarification and/or additional detail described.
- Consistency between the time sensitive variables in the capital cost estimate, including year of expenditure assumptions, and durations incorporated into the master schedule shall be examined.

(3) Budget

- The PMOC, with assistance from FTA's financial oversight contractor, shall review the Grantee's most recently adopted capital program budget to ensure that the proposed project is accurately reflected in the budget and Grantee's Project Finance Plan and to ascertain that the Finance Plan supports execution of the project.
- The PMOC shall evaluate the project cost estimate and verify that it is in general agreement with the latest Standard Cost Category cost information contained in the Grantee's most recent New Starts submission.
- The PMOC shall determine whether the cost estimate is consistent with the project scope as defined at the completion of PE.
- The PMOC shall assess whether the estimate includes sufficient detail to establish a reasonably accurate cost for project development through construction and start-up. If based on quantities/activities and unit costs, are the quantities/activities

adequately defined? What prices are lump sums versus based on market research or quotes from potential suppliers/vendors?

- Allocated and unallocated contingencies shall be identified and a professional judgment offered as to the adequacy of contingencies, given project risks, complexity, and other factors.

c. Technical Capacity and Capability and Other Readiness Reviews

- (1) The PMOC shall meet with the Grantee to review and discuss the Grantee's latest approved PMP.
  - The PMOC shall compare the PMP to the Grantee's current and proposed organizational structure.
  - The Grantee shall provide the PMOC with the agency's organization chart and job descriptions for the key positions in responsible charge of the final design process.
  - The PMOC shall evaluate whether sufficient breadth and depth are contained in the proposed organization to successfully execute final design.
  - The PMOC shall evaluate technical capacity based on the complexity of the scope of the project, detail/number of activities and activity interrelations described in the project master schedule, the size of the project budget and also the contracting approach to the project.
  - Additionally, the PMOC will consider other resources available to the project, including from project partners, consultant support, and other non-sponsor agency resources.
- (2) The PMOC shall examine the Quality Assurance/Quality Control Plan and verify that it is in compliance with FTA guidance documents, including *Project and Construction Management Guidelines* and *FTA QA/QC Guidelines* (latest updates). At entry to final design, the QA/QC Plan shall fully address all elements governing project activities through the design phase. It should also contain, at least in outline form and to the level of detail possible, information relative to the upcoming construction phase.
- (3) The PMOC shall examine the Safety and Security Management Plan (SSMP) and verify that it is in compliance with FTA guidance as provided in FTA Circular C5800.1.
- (4) The PMOC shall verify that the Real Estate Acquisition Management Plan (RAMP) meets federal requirements and is in agreement with the project schedule and budget.

- (5) The PMOC shall examine the Rail Fleet Management Plan (RFMP) and/or the Bus Fleet Management Plan (BFMP), and verify consistency with the project scope, NEPA documents, and the project's Operations Plan.
- (6) The PMOC shall examine all available third-party agreements deemed necessary to implement the project.
- (7) The PMOC shall assess the reasonableness and applicability of Value Engineering (VE) studies. The focus should be on VE recommendations approved by the Grantee and incorporated into the project. The Grantee should identify why recommendations were or were not approved.
- (8) The PMOC shall assess the constructability of the project as defined in the PE design documents.
- (9) PMOC shall obtain results of completed risk assessments to evaluate the Grantee's predicted adherence to the proposed project budget and schedule; risks and opportunities facing the project that should be addressed during the final design phase; the Grantee's risk management plan and whether it is being implemented as planned; the Grantee's Project Development Plan; and whether the Grantee has incorporated a risk-based management approach to project development.
- (10) The PMOC shall evaluate the content and adequacy of other readiness documents such as the project operations plan, project implementation (contracting) plan, Document Control Plan, Configuration Management Plan, and Change Control Plan. Consistency of these plans with the current scope (engineering plans), schedule and budget is to be confirmed.

**3. Readiness to Execute or Amend FFGA**

The PMOC shall assist FTA in reviewing a Grantee's request for a Full Funding Grant Agreement (FFGA) or amendment to help determine the grantee's state of readiness by confirming that:

- All technical aspects of the FFGA are complete and accurate, including:
- All required plans and analysis have been satisfactorily prepared and implemented to the extent necessary, including:

a. General

With the exception of the FFGA attachments, all of the Grantee submittals should have been previously reviewed prior to final preparation for the FFGA, and any deficiencies noted to the Grantee and corrected. The scope of this procedure is to confirm that all of the documentation and analysis remains satisfactory and that there is consistency between the project documents and the proposed FFGA.

b. Process for Establishing Readiness

Confirm that Grantee plans and analysis are consistent with the plans and analysis that were previously reviewed and accepted by FTA. If any of the documents are revised, review the revisions and confirm that the revisions are improvements, and that there have been no material changes to project circumstances. Any last minute revisions should be highlighted to FTA.

Review and confirm that FFGA supporting attachments are complete, accurate, and consistent with other project documentation. The FFGA attachments are likely to go through many iterations; review of each version will be required.

4. **Readiness to Bid the Work for Construction**

The PMOC shall assist FTA by confirming that the Grantee's bid packages and supporting documentation are complete, accurate, and consistent with project management plans, and to confirm that the Grantee is prepared to successfully manage the procurement and construction processes.

This task has three elements:

- Confirmation of the readiness for bidding of the complete bid package, including plans, specifications, and contract provisions,
- Confirmation that the bid package is consistent with project management plans with respect to scope, schedule, and budget, and
- Confirmation of the readiness of the sponsoring organization with respect to having in place the necessary qualified project staff; consistent project management plans, procurement and construction management procedures; needed interagency, third party, and real estate agreements; and required financial resources.

The accuracy of the review will rely in large part on the perception and judgment of the PMOCs. Ideally the PMOCs should be senior technical managers, qualified to perform the actual work that they are reviewing. Because transit projects are quite complex and interdisciplinary in nature, this means that the reviewing organization requires a broad range of capabilities -- structural plans should be reviewed by structural engineers, signaling plans should be reviewed by signaling engineers, etc.

Work to be performed under this task includes:

- a. To confirm the Grantee's readiness for bidding of the complete bid package is accomplished, the PMOC shall perform the following specific reviews:

- (1) Grantee's Construction Plans and Specifications: Confirm that the Plans and Specifications completely and clearly define the required work
  - (2) Grantee's Construction Contract: Confirm that the Construction Contract completely and clearly defines the terms and conditions under which the work will be performed
  - (3) Quality assurance records: Confirm that quality assurance checks and reviews have been performed in accordance with the approved Quality Assurance Plan
  - (4) Construction Cost Estimate: Confirm that the estimate prepared is consistent with the Plans, Specifications, and Contract General and Special Conditions, and that it is based upon contemporary cost information
- b. The PMOC shall perform the following reviews and comparisons to provide confirmation that the Bid Package is consistent with the Environmental Documents and previously accepted project management plans.
- (1) Plans, specifications, and special contract conditions with respect to Environmental Documents: Confirm compliance of the Work to be constructed with the Environmental Documents
  - (2) Plans, specifications, and special contract conditions with respect to Contract Packaging Plan: Help ensure consistency between the Bid package and the Contract Packaging Plan.
  - (3) Plans, specifications, and special contract conditions with respect to Project Master Schedule: Help ensure consistency between the Bid package and the Project Master Schedule.
  - (4) Construction Cost Estimate with respect to Project Budget: Confirm that the Construction Cost Estimate, plus appropriate contingencies, is affordable within the overall Project Budget
- c. The PMOC shall review the following and provide confirmation that the Grantee has completed all the necessary precursors to construction, and is ready to enter the construction phase of the project.
- (1) Third Party Agreements: Confirm that necessary third party agreements are in place to support the construction.
  - (2) Real Estate Management Plan: Confirm that all required real estate will be available when required without impacting construction.
  - (3) Procurement Policies and Procedures: Help ensure Procurement Policies and Procedures are in place that are in compliance with federal policies, ensure a fair bidding environment, and are able to efficiently resolve issues and disputes that may arise during the course of the Construction Contract.

- (4) Project Staffing Plan: Help ensure that the Grantee has adequately implemented a project staffing plan that ensures the necessary qualified staff will be available to manage and support the work that is being bid.
- (5) Financing Plan: Help ensure that money will be available to pay the Contractor for the work on a timely basis.

**5. Readiness for Revenue Operations**

The PMOC shall assist FTA in determining a Grantee's readiness for revenue operations by performing the following general tasks:

- Verify that all systems, subsystems, components, equipment, and materials furnished and installed conform to the requirements of the contract documents.
- Verify that the entire transit system, with all interfaces, operates as indicated in the contract documents as an integrated whole and is capable of functioning effectively to provide dependable service.

Systems to be verified and tests to be confirmed for each, as applicable, include but are not limited to the following:

a. Systems

- (1) Vehicles
- (2) Traction Power System (Substations, Contact Rails, Catenary)
- (3) Train Control System
- (4) Signaling System
- (5) Communications System
- (6) Operations Control Center
- (7) Fare Collection System
- (8) Tracks
- (9) Stations
- (10) Yards and Shops

b. Tests

- (1) Design Tests
- (2) Production Tests
- (3) Field Tests
- (4) Individual System Tests
- (5) Integrated Tests
- (6) Static Test
- (7) Dynamic Test

## E. Small Starts Review

The PMOC shall perform Small Starts project reviews, on an as approved basis by the COTR, to support FTA in the technical evaluation of Small Starts projects. This is to ensure projects meet Small Starts requirements (e.g., are under the total cost threshold); that planning and design have been completed to a level commensurate with the current phase of the proposed project (e.g., entry into Project Development or award of a Project Construction Grant Agreement); that the scope of the project indicated in the engineering design and cost estimate is consistent with the purpose and need established during the environmental review phase; and that the Grantee has in place policies, procedures and other project management programs to deliver a quality project within budget and on schedule.

FTA will define the scope of PMOC services to be performed through the task order/work order (TO/WO) process. The following is a list of tasks, some or all of which the PMOC may be directed to perform in support of FTA's monitoring of a Small Starts project.

In advance of performing a task, the PMOC may be requested to meet with the Grantee and its staff and consultants, discuss the purpose of the review, and obtain necessary information.

### 1. Entry into Project Development or Award of (Project Construction Grant Agreement) PCGA

At approval for entry to Project Development and at approval for a PCGA:

- a. Describe and evaluate the Grantee's technical capacity and capability to undertake and successfully complete the project, including its management structure, staff and consultant organization and experience, professional skills and project experience.

Evaluate the Grantee's project management plan (PMP) for compliance with FTA requirements and best management practices. This includes the adequacy of the Grantee's strategy to deliver the project within budget and on schedule and project controls necessary to design, construct, test and start up a quality system that assures the safety and security of the riding public.

- b. Obtain an understanding of the project and evaluate the reliability of the project scope.
  - (1) If directed by FTA, through a site visit perform an on-the-ground check of physical conditions. Verify project fit with local conditions through study of project planning diagrams, jurisdictional zoning and transit-oriented development maps, and concept design drawings.

- (2) Review and characterize the systems and vehicles to confirm the appropriateness for the transit application to achieve stated performance levels (i.e., system capacity requirements versus design capacity).
  - (3) For projects requesting approval to enter Project Development, perform a consistency check of the engineering design and capital cost estimate relative to project information presented in the environmental document or comparable project background information provided by the Grantee. Normally, approval to enter Project Development would occur with preparation and circulation of the draft environmental document. (To receive approval to enter Project Development, a project must have completed Alternatives Analysis and NEPA scoping, adopted a Locally Preferred Alternative (LPA), with the LPA included in the local MPO's long range plan, and received a medium or better rating from FTA.) At the completion of the environmental review process (approval of ROD, FONSI or Categorical Exclusion) a consistency check of the engineering design and capital cost estimate may also be warranted.
- c. Review the Grantee's engineering design for clarity, accuracy, and level of detail for a project at the current phase of project development. Review findings of value engineering and risk assessments if any have been performed.
- d. Evaluate the reliability of the project cost estimate.
- (1) Review the estimate in its original format and in Standard Cost Category (SCC) format
    - Describe the estimating methodology briefly (structure of the cost estimate, assumptions, precedents, reference points; the approach to cost information development). Documentation of the review should note considerations important to the estimate, such as characteristics of the physical environment of the project alignment, design issues, institutional constraints, contracting and procurement plans, schedule issues, etc.
    - Verify the "base year" of the estimate and assumptions about cost escalation.
  - (2) Evaluate the capital cost estimate in relation to the scope. Make recommendations where additional detail or other information is needed.
    - Check the estimate's internal consistency (does it add up).
    - Spot check estimated quantities and unit costs.
    - Check the reasonableness of pricing escalation for commodities
    - Identify sources of uncertainty and related potential for cost increases.

- Check the adequacy of the allocated contingency for specific line items.
  - Check the adequacy of the unallocated contingency.
  - For costs in Year of Expenditure (YOE), verify the fit between the YOE assumptions and the project schedule.
- e. Evaluate the completeness, level of detail, and reasonableness of the project schedule. This will include number of activities, logic and logic ties, the critical path, general internal consistency of the schedule, and the scheduling assumptions adopted by the Grantee. The analysis should include the durations for each phase of work in relation to the completion of similar work by other agencies, if known, and the Grantee's track record for implementing similar projects. Sources of uncertainty and their likely effects on the schedule should be described.

Specifically, at approval to enter into a PCGA, verification should be made that the Grantee has:

- (1) Updated the PMP through the construction and start-up phases and incorporated elements of the risk management plan.
- (2) Completed drawings, specifications, and bid documents as required by the project design and method of procurement.
- (3) Resolved and received FTA's agreement to right-of-way acquisition and relocation agreements, and other agreements with third parties such as freight railroads, Amtrak, utility companies, and other governmental agencies.
- (4) Assessed safety and security issues and compliance with FTA regulations. For instance, does the Grantee have a written Safety and Security Management Plan (SSMP) or System Safety Program Plan (SSPP).
- (5) Determined the funding sources and local share contribution.
- (6) Demonstrated financial capacity to operate and maintain the project once built. This assessment is normally made by others, with the PMOC responsible for incorporating findings into its evaluations.
- (7) Analyzed remaining uncertainties and proposed potential mitigations and provided coverage of third party interfaces
  - For real estate in conformance with the Uniform Relocation Assistance and Real Estate Acquisition Policies Act
  - With utility companies, freight railroads, Amtrak, etc.

## **2. Construction**

During construction at intervals requested by FTA:

- Evaluate the progress and quality of construction and testing against the scope, schedule and cost estimate.
- Note construction issues that could affect within-budget and on-schedule project completion. The PMOC shall assist FTA and the Grantee in developing and implementing project recovery plans in the event performance is significantly below targets.

**3. Other**

FTA may direct the PMOC to perform certain of these tasks at other milestones during project implementation. For instance, on larger Small Starts projects, FTA evaluates the features and Small Starts qualifications of the Grantee's locally preferred alternative (LPA). This occurs prior to entry into Project Development. When requested, the PMOC will assist FTA in technical aspects of the review, such as the relationship of the LPA scope to conceptual designs, preliminary cost estimates, project risks, and other issues.