



## **Oversight Procedure 51–Readiness to Enter Engineering**

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### **1.0 PURPOSE**

The purpose of this Oversight Procedure is to describe the review, analysis and recommended procedures and reporting requirements that the Federal Transit Administration (FTA) expects from the Project Management Oversight Contractor (PMOC) as regards the project’s readiness to enter Engineering.

### **2.0 BACKGROUND**

A proposed project can be considered for advancement into Engineering only if the NEPA (National Environmental Policy Act) process has been completed; a New Starts submittal has been accepted by FTA and the project is rated favorably; approval to enter Project Development was received from FTA and the design has been developed to a level described within Appendix B of this OP; a project cost estimate and detailed schedule have been developed to a level commensurate with the design; and the Project Sponsor can demonstrate adequate management capacity and capability to carry out Engineering (“design development”) for the proposed project, among other requirements. All applicable federal and FTA program requirements for Project Development and readiness to enter Engineering must have been satisfied.

FTA's approval will be based on the results of its evaluation as described in 49 CFR Sections 611.9-611.13 (Code of Federal Regulations, Title 49 – Transportation). The FTA Office of Program Management (TPM) works closely with the Office of Planning and Environment (TPE) in determining whether a Project Sponsor is ready to enter Engineering. TPM, Office of Capital Project Management (TPM-20), has a critical role in determining technical readiness to enter Engineering as opposed to TPE’s role in evaluating whether environmental and planning requirements have been satisfied.

Between Project Development and Engineering, the project is likely to be subject to an in-depth review for management capacity and capability. Whether the Project Sponsor has the necessary management approach and organizational structure, internal and external controls, and other resources available to administer a project is another important aspect of readiness to enter Engineering. The procedures for making these assessments are established in the OP for Project Sponsor Management Capacity and Capability.

Similarly, between Project Development and Engineering, project scope, schedule, and cost are subject to intensive reviews as described in separate OPs. These reviews may culminate in a risk assessment and the development of a risk and contingency management plan. The risk assessment identifies risk, assesses it, considers mitigations approaches, and develops a risk management plan to inform the Project Sponsor’s project management practices.

### **3.0 OBJECTIVES**

The objective of this review is, based on the PMOC's review of the Project Sponsor's preliminary design documents, schedule, cost estimate, and other documents, to synthesize findings, and provide input to FTA in the form of evaluations, conclusions, recommendations, and well-grounded professional opinions regarding the:

- Completeness, quality, and accuracy of the design, project schedule, and capital cost estimate at the conclusion of Project Development
- Project Sponsor's program for advancing the design, schedule, and cost estimate to the point of construction-ready bid documents for design-bid-build project delivery, or of preparing bridging documents for alternative delivery method contracts
- Project Sponsor's ability to execute design and construction (i.e., management capacity and capability) and whether the Project Sponsor has adopted a risk-based management approach to project implementation that incorporates findings of a project risk assessment
- Adequacy of the Project Sponsor's project controls and management policies and procedures to execute the project, including those for maintaining quality control/quality assurance of products and services; safety and security, construction and operation; and, acquisition of required rights-of-way, among other policies and procedures
- Overall readiness to advance to Engineering

This information, combined with findings from environmental, New Starts, financial, and other FTA-directed reviews will support FTA's determination regarding advancement of the Project Sponsor's project into the Engineering phase.

### **4.0 REFERENCES**

The following are the principal, but by no means the only, references to Federal legislation, codification, regulation and guidance with which the PMOC should review and develop a solid understanding as related to the Project Sponsor's project work being reviewed under this OP:

#### **4.1 Legislative**

- Surface Transportation and Uniform Relocation Assistance Act of 1987, P.L. 100-17
- The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, or SAFETEA-LU, Pub.L. 109-59
- Moving Ahead for Progress in the 21<sup>st</sup> Century, or MAP-21, P.L. 112-141

#### **4.2 United States Code**

- FTA enabling statutes, 49 U.S.C. Chapter 53, ( See Section (e), and 49 USC 5309(e)(6) and 5328(a)(3), Parts Sections 611.9-611.11)

#### **4.3 Regulations**

- Project Management Oversight, 49 C.F.R. Part 633
- Major Capital Investment Projects, 49 C.F.R. Part 611
- Joint FTA/FHWA regulations, Metropolitan Planning, 23 C.F.R. Part 450

- Joint FTA/FHWA regulations, Environmental Impact and Related Procedures, 23 C.F.R. Part 771
- U.S. DOT regulation, Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs, 49 C.F.R. Part 24

#### **4.4 FTA Circulars**

- C4220.1F, Third Party Contracting Requirements
- C5010.1D, Grant Management Guidelines
- FTA Master Agreement
- C5800.1, Safety and Security Management Plan
- FTA Guidance on the Application of 49 U.S.C. 5324(c) – Railroad Right-of-Way Acquisition (April 30, 2009)

### **5.0 PROJECT SPONSOR’S SUBMITTALS**

In advance of performing the review, the PMOC should obtain and study the project documents identified in Appendix B of this OP. The purpose of this checklist is to provide a categorized list of elements that are expected to be complete prior to FTA’s approval for Entry to Engineering. Each list item is followed by a brief description of the level of completion expected of that item. The PMOC should notify FTA of important discrepancies in the project information that would hinder the review. An example would be a mismatch between drawings and cost estimate in which the drawings are current and the cost estimate is two years old.

### **6.0 SCOPE OF WORK**

Appendix B provides detail of each relevant element to be assessed by the PMOC. For entry to Engineering, the Project Sponsor must have a suitable organizational structure in place to effectively manage the project. In addition, they must have made satisfactory progress in advancing the project design and the corresponding cost estimate and schedule. At a minimum, the level of design detail described in Appendix B of this OP must be provided in drawings. The supporting capital cost estimate must be based on quantities of work established in the drawings and a substantial level of cost line item detail and backup for all other costs (vehicles, equipment, real estate, professional services, unallocated and allocated contingencies, and financing costs). The master schedule should include sufficient detail to identify all significant activities, their durations, and logical ties to other activities, as described in Appendix B. In addition, it informs the PMOC as to the other information required of the Project Sponsor to demonstrate technical readiness to enter Engineering.

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

- 1) Review and analyze the pertinent information available for completeness, adequacy, consistency, and appropriate level of detail given the phase of the work.
- 2) Identify all apparent discrepancies and deficiencies.
- 3) 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 Project Sponsor along with a time frame for the performance of the work.

- 4) For major findings, provide recommendations for the Project Sponsor and/or FTA to implement that will address the issue or correct or mitigate the deficiency.
- 5) Identify action items, if any, and next steps.
- 6) 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.

It is important to note that the individual OPs describe the procedures for evaluating the reasonableness and accuracy of each review element for the project. The PMOC shall incorporate the results of these reviews into this assessment of Readiness to Enter Engineering.

## **7.0 REPORT, PRESENTATION, RECONCILIATION**

The PMOC shall provide FTA with a written report limited to 20 pages that summarizes its findings, analysis, recommendations, professional opinions, and a description of the review activities undertaken. Appendix C provides a sample Table of Contents. After FTA approval, the PMOC should share the report with the Project Sponsor. In the event that differences of opinion exist between the PMOC and the Project Sponsor regarding the PMOC's findings, the FTA may direct the PMOC to reconcile with the Project Sponsor and provide FTA with a report addendum covering the agreed modifications by the Project Sponsor and PMOC.

The PMOC's readiness report shall:

- 1) Integrate the findings and recommendations of the reviews discussed in this OP.
- 2) Include an executive summary in three pages or less that includes the following:
  - a) Synthesis of findings on scope, schedule, and cost
  - b) Characterization of significant uncertainties in terms of likelihood (probable, remote, improbable) and their consequence (catastrophic, critical, serious, moderate, marginal)
  - c) Professional opinion regarding the reliability of the project scope, schedule and cost and the ability of the project sponsor to manage the project
  - d) Statement of potential range of cost (lower, upper bound and most likely)
  - e) To reduce important uncertainties, recommendations for additional work of any kind including but not limited to investigation, planning or design work by the Project Sponsor or other party with a schedule for the performance of the work (recommend performance either before or after FTA's decision regarding project advancement or funding).
- 3) Document the assessment methodology.
- 4) Provide back-up information in appendices.

The report formatting requirements of OP 01 apply. When necessary, PMOC shall perform data analysis and develop data models that meet FTA requirements using Microsoft Office products such as Excel and Word and use FTA-templates when provided. The PMOC may add other software as required but documentation and report data shall be made available to FTA.

## APPENDIX A

### Acceptable Quality Level

|   | DESIRED OUTCOME  | PERFORMANCE REQUIREMENT  | CHECK LIST | PERFORMANCE MEASURE  | ACCEPTABLE QUALITY LEVEL   | MONITORING METHOD  |
|---|--|--|------------|--|--|--|
| 1 | The PMOC shall review and analyze project documents to determine the completeness, quality and accuracy of cost, schedule, budget and design, and the readiness of the project to enter Engineering. | <b>R1a.</b> The PMOC shall develop and document a process for review and analysis of the Project cost, schedule and design documents, Project Sponsor's ability to bring the Project to successful conclusion and the readiness of the Project to enter Engineering.   |            | <b>M1a.</b> Review of the process documentation.   | <b>Q1a.</b> PMOC provides documentation of the process.  | <b>MM1a.</b> Periodic review by FTA or its agent.                                      |
|   |  | <b>R1b.</b> The PMOC shall use its process and project management judgment to review and analyze Project documents to determine the completeness, quality and accuracy of cost, schedule, budget and design, and the readiness of the project to enter Engineering.  |            | <b>M1b.</b> Documented review and analysis of Project documents to determine the completeness, quality and accuracy of cost, schedule, budget and design, and the readiness of the project to enter Engineering.   | <b>Q1b.</b> Review must be made and the PMOC provides internal verification that the process as documented has been followed.  | <b>MM1b.</b> Periodic review by FTA or its agent and the PMOC's internal verification. |
| 2 | The PMOC shall form a professional opinion and make findings and recommendations regarding the Project's readiness to enter the Engineering phase.   | <b>R2a.</b> The PMOC shall perform a review and analysis of the completeness, quality and accuracy of the engineering design, schedule and capital cost estimate for the Project at the conclusion of Project Development and make suitable findings and recommendations.  |            | <b>M2a.</b> PMOC's review and opinion as to the completeness, quality and accuracy of the Project cost, schedule and engineering documents at conclusion of Project Development demonstrates sound management and engineering practices and professional experience. | <b>Q2a.</b> Professional opinion as to the completeness, quality and accuracy of engineering design, cost and schedule documents at conclusion of Project Development.   | <b>MM2a.</b> Periodic review by FTA or its agent.                                      |
|   |  | <b>R2b.</b> The PMOC shall, after review and analysis of the Project Sponsor's program for advancing the Project to the point of construction-ready bid documents, provide its findings and recommendations.   |            | <b>M2b.</b> PMOC's review and opinion as to the suitability of Project Sponsor's program demonstrates sound management and engineering practices and professional experience.  | <b>Q2b.</b> Professional opinion as to the suitability of the Project Sponsor's program for advancing the Project to the point of construction-ready bid documents.  | <b>MM2b.</b> Periodic review by FTA or its agent.                                      |
|   |  | <b>R2c.</b> The PMOC shall review and analyze Project Sponsor's management system approach and Project Sponsor's management capability and capacity to execute Engineering and construction of the Project, and make suitable findings and recommendations.  |            | <b>M2c.</b> PMOC's review, opinions and, if necessary, recommendations regarding management approach and management capability and capacity demonstrates sound management and engineering practices and professional experience.                                     | <b>Q2c.</b> Professional opinion and recommendations where necessary regarding the Project Sponsor's management approach and technical capability and capacity to execute Engineering and construction of the Project. | <b>MM2c.</b> Periodic review by FTA or its agent.                                      |
|   |  | <b>R2d.</b> The PMOC shall determine whether the Project Sponsor has in place necessary Project controls, management policies and procedures, including quality control/quality assurance, safety and security and right-of-way acquisition, and other necessary components to assure successful Project execution. The PMOC shall make suitable findings and recommendations. |            | <b>M2d.</b> PMOC's review, opinions and, if necessary, recommendations regarding Project Sponsor's management system and Project procedures demonstrates sound management and engineering practices and professional experience                                      | <b>Q2d.</b> Professional opinion and recommendations where necessary regarding Project Sponsor's project controls, management system and Project procedures.   | <b>MM2d.</b> Periodic review by FTA or its agent.                                      |

|   | DESIRED OUTCOME  | PERFORMANCE REQUIREMENT  | CHECK LIST | PERFORMANCE MEASURE   | ACCEPTABLE QUALITY LEVEL   | MONITORING METHOD                                |
|---|--|--|------------|---|--|--|
| 3 | The PMOC shall provide FTA with a written report of its findings, analysis, recommendations and professional opinions. | <b>R3.</b> The PMOC shall present its findings, analysis, recommendations and professional opinions to FTA in a written report and, when so directed by FTA, seek to reconcile its findings with Project Sponsor to the extent possible. A supplemental report shall be filed describing the results of reconciliation attempts. |            | <b>M3.</b> Review of the PMOC's presentation of findings, analysis, recommendations and professional opinions by the FTA. | <b>Q3.</b> Reports and presentations are professional, clear, concise, and well written. The findings and conclusions have been reconciled with other PMOC reports and have been reconciled with the Project Sponsor to the extent possible. | <b>MM3.</b> Periodic review by FTA or its agent. |

## APPENDIX B

### Checklist for Approval to Enter Engineering

The purpose of this checklist is to provide a categorized list of elements to be completed, ideally, prior to FTA's approval for Entry to Engineering. Each listed item is followed by a brief description of the level of completion expected of that item. The PMOC should note elements that need attention by the Project Sponsor and adjudge their significance to the overall project readiness to enter the engineering phase.

| Item       | Description                      | OP  | PMOC Review  | ✓ |
|------------|----------------------------------|-----|--|---|
| <b>1.0</b> | <b>PROJECT DEFINITION</b>        |     |  |   |
| <b>1.1</b> | <b>System Definition</b>         |     |  |   |
| 1.1.1      | Alignment Definition             | 32C | General alignment is defined to include the approximate horizontal and vertical alignment, approximate station locations, and length. The alignment should be developed beyond the definition contained in the LPA to describe all structures necessary for the project. Minor alternative alignments may be evaluated within the corridor, as required, to the degree they are within the LPA definition.   |   |
| 1.1.2      | Configuration Management Plan    | 20  | Configuration Management should document the process of managing the physical configurations and their supporting processes through documents, records and data. Configuration Management should demonstrate a process that accommodates changes and continually documents how a physical system is configured, ensuring that documents, records, and data remain concise and valid.   |   |
| 1.1.3      | Station requirements             | 32C | Station design characteristics including station locations and station sizing. Should identify platform lengths and support spaces for mechanical/electrical equipment.  |   |
| <b>1.2</b> | <b>Environmental Constraints</b> |     |  |   |
| 1.2.1      | NEPA                             | 32B | NEPA requirements for entry into Engineering include preparation of an EIS where effects from a proposed project are significant or a Finding of No Significant Impact (FONSI) and accompanying environmental assessment (EA) where effects are less than significant. For an EIS, FTA approves the preferred project through issuance of a Record of Decision (ROD). The ROD describes the scope of the projected and committed mitigations to reduce the effects of identified impacts.  |   |
| 1.2.2      | Third party requirements         | 20  | (1) Evaluate third-party agreement processes and current status of agreements. Where agreements are not available, Project Sponsor should provide an outline or term sheet(s). When even this information is not available, the needed agreement shall be identified and the issues and any obstacles to executing the agreements noted.<br><br>(2) Types of agreements and information to be reviewed include, but are not limited to: <ul style="list-style-type: none"> <li>▪ utility relocation agreements (public-water, sewer, etc.)</li> <li>▪ intergovernmental agreements (IGA) with local &amp; state and federal entities</li> <li>▪ agreements with railroad companies (design, construction, operating)</li> <li>▪ agreements with airport and port authorities</li> <li>▪ third-party franchise agreements (gas, telephone, cable TV, other communications,</li> </ul> |   |

| Item                               | Description                 | OP  | PMOC Review   | ✓ |
|------------------------------------|-----------------------------|-----|---|---|
|                                    |                             |     | <ul style="list-style-type: none"> <li>power);</li> <li>▪ universities, colleges, other educational institutions agreements</li> <li>▪ Private sector parties impacted, and public/private funding arrangements (including transit-oriented development - TOD)</li> <li>▪ Encroachment on Right of Ways (ROWs)</li> <li>▪ Permits and/or waiver/exceptions</li> <li>▪ Master permitting plan and schedule</li> </ul>  |   |
|                                    |                             |     | (3) The framework and content of these agreements must conform to the needs of the project. Agreements should be negotiated and completed to the extent possible prior to start of Engineering Phase; where incomplete, a defined process for achieving completion is in place.   |   |
| 1.2.3                              | Geotechnical Baseline       | 32C | Geotechnical baseline report prepared for projects involving tunnels or other underground structures, or where specific structures (e.g., major bridges, retaining walls, levees, or other facilities) will be located on material with questionable or unknown load bearing capacity.  |   |
| <b>2.0 PROJECT MANAGEMENT PLAN</b> |                             |     |   |   |
| 2.1                                | Basis of project documented | 20  | <p><i>Note: Some of the items listed are repeated below where additional review guidance is provided.</i></p> <p>(1) FTA's regulations are found in 49 CFR 633.25, which requires a Project Management Plan to contain at a minimum the following:</p> <ul style="list-style-type: none"> <li>(a) A description of adequate recipient staff organization, complete with well-defined reporting relationships, statements of functional responsibilities, job descriptions, and job qualifications;</li> <li>(b) A budget covering the project management organization, appropriate consultants, property acquisition, utility relocation, systems demonstration staff, audits, and such miscellaneous costs as the recipient may be prepared to justify (Note: budget should also address design, construction, and start-up/commissioning);</li> <li>(c) A construction schedule (Note: schedule should address entire project from design through revenue operations);</li> <li>(d) A document control procedure and recordkeeping system;</li> <li>(e) A change order procedure which includes a documented, systematic approach to the handling of construction change orders (Note: should also address change orders for all procurements);</li> <li>(f) A description of organizational structures, management skills, and staffing levels required throughout the construction phase (Note: budget should also address design, construction, and start-up/commissioning);</li> <li>(g) Quality control and quality assurance programs which define functions, procedures, and responsibilities for construction and for system installation and integration of system components (Note: QA/QC program should also address design, procurement, and start-up/commissioning);</li> <li>(h) Material testing policies and procedures;</li> <li>(i) Plan for internal reporting requirements including cost and schedule control procedures; and</li> </ul> |   |

| Item | Description | OP | PMOC Review  | ✓ |
|------|-------------|----|--|---|
|      |             |    | (j) Criteria and procedures to be used for testing the operational system or its major components;"  |   |
|      |             |    | <p>(2) Legal authority for project</p> <p>(3) The FTA or its PMOC may recommend a workshop be held to help establish roles and responsibilities and define baseline standards of performance related to the management of the project. Few, if any, Project Sponsors have all the capabilities or authorities to plan, design, and implement a major capital project by themselves. Bringing Project Sponsor staff, consultants, and relevant third parties together in a workshop early in the project life can help to shape the project management approach. Through workshop discussions, all parties can gain a better understanding of each other's requirements, responsibilities, and authorities as related to the project. The PMOC will review and summarize its findings and opinions and present recommendations with respect to the adequacy and soundness of the Project Sponsor's plans and procedures, and the successful implementation of such plans and procedures for:</p> <ul style="list-style-type: none"> <li>• NEPA coordination – The Project Sponsor's plan for managing and implementing mitigation actions should be in place and environmental mitigation work should be incorporated into the design documents, cost estimates, and schedules.</li> <li>• Design control. The Project Sponsor should implement appropriate plans and procedures for design control in all aspects. These plans and procedures should illustrate: <ul style="list-style-type: none"> <li>▪ consistency with design criteria;</li> <li>▪ coordination and change control among design disciplines for drawings and specifications;</li> <li>▪ completeness of soils testing and site surveys;</li> <li>▪ coordination with third parties; and</li> <li>▪ completeness of project documents for bidding.</li> </ul> </li> </ul> |   |
|      |             |    | <p>(4) The Project Management Plan should provide for implementation of project controls in all aspects including procedures for cost and schedule control, risk management, and dispute or conflict resolution during construction. The PMP should include procedures on cost sharing. Risk and contingency management policies and procedures should be in place and routinely used.</p> <p>(5) The PMP should confirm implementation of plans and procedures for project delivery and procurement. Specifically, it should focus on the schedule for bidding construction packages and procuring equipment and vehicles.</p> <p>(6) Labor Relations and Policies should be in development.</p> <p>(7) Development should be underway for plans and procedures regarding construction administration, construction management, construction inspection, coordinating construction work by third parties, site logistics, and construction change order and shop drawing document flow and authorities.</p> <p>(8) Development of Start-up and Revenue Operations should be underway to establish plans and procedures regarding testing/commissioning, closeout of construction contracts, and training of</p>   |   |

| Item | Description  | OP | PMOC Review   | ✓ |
|------|--|----|---|---|
|      |  |    | staff.  |   |
|      |  |    | (9) PMP Subplans should include the Quality Assurance / Quality Control Plan, Safety and Security Management Plan, Real Estate Acquisition Management Plan, and Bus and Rail Fleet Management Plans.  |   |
| 2.2  | Environmental mitigation/ assessment documented    | 20 | (1) Description of Mitigation Principles  |   |
|      |  |    | (2) Plan for Management and Implementation of Mitigation Actions  |   |
| 2.3  | Design Procurement and Control Plan                | 20 | (1) Design contracting plan for the Engineering Phase   |   |
|      |  |    | (2) Description of relationship between forecast ridership, operating plan and proposed project transit capacity in guideways, stations, support facilities   |   |
|      |  |    | (3) Design Criteria for each discipline   |   |
|      |  |    | (4) Schedule for the development of contract documents (level of development expected at each milestone for design/construction drawings, specifications, general and supplementary conditions of contracts for construction, and the Division 1) |   |
|      |  |    | (5) Plan / procedures for Design Drawings and Specifications  |   |
|      |  |    | (6) Procedures for Design Change and Configuration Control of documents during Design and Construction  |   |
|      |  |    | (7) Plan (List and schedule) for third party agreements and permits including utilities, real estate, railroads, transit-oriented development/joint development, etc.   |   |
|      |  |    | (8) Investigation and Testing Plan (List and schedule) for site surveys, geotechnical and materials investigation before/during design.   |   |
| 2.4  | Project Controls                                   | 20 | (1) Document and Records Controls   |   |
|      |  |    | (2) Internal reporting procedures   |   |
|      |  |    | (3) Cost Control Procedures   |   |
|      |  |    | (4) Schedule Control Procedures   |   |
|      |  |    | (5) Risk Control Procedures   |   |
|      |  |    | (6) Dispute / Conflict Resolution Plan (claims avoidance and claims resolution)   |   |
| 2.5  | Project construction delivery and procurement plan | 20 | (1) Procedures for Procurement  |   |
|      |  |    | (2) Procurement Plan and Schedule   |   |
|      |  |    | (3) Contracting Strategy for Transit- Oriented Development and Joint Development, if applicable   |   |
|      |  |    | (4) Identification of Disadvantaged Business Enterprises (DBE) Opportunities, Federal DBE, State/Local WBE & MBE, Plans and Goals   |   |
|      |  |    | (5) Negotiating and Approving Change Orders and Claims  |   |
|      |  |    | (6) Procedures for claims avoidance   |   |
| 2.6  | Labor relations and Policies                       | 20 | (1) Wage Rates and Classifications  |   |
|      |  |    | (2) Wage and Hour Requirements  |   |

| Item       | Description                                      | OP | PMOC Review   | ✓ |
|------------|--|----|---|---|
|            |  |    | (3) State and Local Regulations   |   |
| 2.7        | Construction Procedures for Fixed Infrastructure | 20 | (1) Construction Contract Administration  |   |
|            |  |    | (2) Construction Management   |   |
|            |  |    | (3) Construction Inspection   |   |
|            |  |    | (4) Coordination with Third Parties   |   |
|            |  |    | (5) Site Logistics Plan (materials transport and storage; temporary site facilities; maintenance of existing pedestrian ways, transit and traffic operations during construction; protection of existing utilities)   |   |
|            |  |    | (6) Processing Shop Drawings, Bulletins, and RFIs   |   |
|            |  |    | (7) Substantial Completion; Final Completion  |   |
| 2.8        | Start up and Revenue Operations                  | 20 | (1) Testing plan elements are identified and would be expanded at a later date  |   |
|            |  |    | (2) Closeout materials (warranties, testing results, O&M manuals, spare parts, etc.) to be identified to provide direction to the Engineer  |   |
|            |  |    | (3) Plan for Training of Staff to be developed later  |   |
| 2.9        | QA/QC Plan                                       | 24 | At entry to Engineering, the QAP 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. The PMOC shall also confirm that the Project Sponsor has exhibited both a Quality Assurance and Quality Control review of its PD package. |   |
| 2.10       | Safety and Security Management Plan              | 22 | In place and is in compliance with FTA guidance as provided in Circular C5800.1. Preliminary Hazard Analysis (PHA) and Threat and Vulnerability Assessment (TVA) are complete. Safety and Security Design Criteria development is underway.   |   |
| 2.11       | Real estate Acquisition and Relocation Plan      | 23 | (1) Conforms with and is expressly incorporated within the Design Drawings, Master Schedule and budget for all phases and types of work planned or anticipated. Further, the RAMP must meet all federal requirements. The Project Sponsor is to provide a complete list of all parcels with title searches on all properties to be acquired and RAMP procedures.  |   |
|            |  |    | (2) Preparation of a relocation plan to include interviews with potential displacees which stresses that displacees are not to move until project plans have been finalized.  |   |
|            |  |    | (3) Project Sponsor shall exhibit management capacity and capabilities to implement the real estate acquisition and relocation process, including organization structure and staffing plan and any consultant agreements undertaken in support of these activities.   |   |
| 2.12       | Rail and Bus Fleet Management                    | 37 | Plan demonstrates consistency with the project scope, NEPA documents, and the project's Operations Plan.  |   |
| 2.13       | Before and After Study Documentation             | 27 | Plan submitted in accordance with FTA guidance; verify that the plan has preserved the project scope and capital cost information.  |   |
| <b>3.0</b> | <b>MANAGEMENT CAPACITY AND CAPABILITY</b>        |    |   |   |
| 3.1        | Organizational charts                            | 21 | Project organization charts show the complete organization, covering all project functions and all  |   |

| Item       | Description                             | OP  | PMOC Review  | ✓ |
|------------|---|-----|--|---|
|            |   |     | project personnel, regardless of affiliation. Staffing levels should be indicated. Charts should be time-oriented to show different organizational arrangements for different phases of the project.   |   |
| 3.2        | Staff qualifications / Experience chart | 21  | Key personnel in all organizations should be identified and their principal duties, reporting relationships, job descriptions, job qualifications, and assigned responsibility and delegated authority should be defined. The size, qualifications, and availability of new and existing staff resources must be considered in relation to the human resource requirements and duration of the project. A responsibility matrix should be developed that identifies critical management activities and demonstrates the staff's ability to satisfy these requirements.   |   |
| 3.3        | Staffing plan                           | 21  | Staffing levels should be indicated. Charts should be time-oriented to show different organizational arrangements for different phases of the project. The organization chart should be supplemented with a tabular staffing plan that shows percent utilization, mobilization start date, and release date (where applicable) information.  |   |
| 3.4        | Engineering/Design Consultants          | 21  | During construction planning, careful examination of the existing labor situation has determined the impacts of DBE participation.   |   |
| 3.5        | Agency-level processes and procedures   | 21  | Should include project management policies and procedures and an adequate staff of professionals skilled in but not limited to, project controls, QA/QC, cost estimation, scheduling, procurement, change control, risk management, transit operations, and public participation.  |   |
| 3.6        | Resumes of project team members         | 21  | Resumes should be provided for both agency and consultant <b>key staff</b> . Resumes must demonstrate experience and ability to manage each of the following key project areas: <ul style="list-style-type: none"> <li>▪ Project management</li> <li>▪ Environmental assessment and mitigation leads</li> <li>▪ Operations planning, Fleet management lead</li> <li>▪ Design team leads</li> <li>▪ Quality assurance and Quality control lead</li> <li>▪ Project controls leads</li> <li>▪ Construction, permits, testing, start-up leads</li> <li>▪ Real estate lead</li> <li>▪ Safety review lead</li> </ul> |   |
| <b>4.0</b> | <b>SCOPE</b>                            |     |  |   |
| 4.1        | Scope Development                       | 32C | (1) Definition of the project (i.e., scope) contained in the project ROD/FONSI and most recent New Starts submittal agree with the scope as developed in Project Development materials, including the approved PMP and the engineering design plans and specifications. Discrepancies or unclear scope items in the plans should be noted  |   |
|            |   |     | (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   |   |

| Item | Description                      | OP  | PMOC Review   | ✓ |
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|      |                                  |     | <p>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.</p> <p>(5) Results of the hazard and threat and vulnerability analyses are incorporated in the design criteria and the scope of work.</p>   |   |
| 4.2  | Design Package                   | 32C | <p>A Basis of Design Report is required which presents the following content:</p> <p>(1) Project Sponsor accepted design standards and performance objectives including consistency with the required transit capacity.</p> <p>(2) Design, construction, system and vehicle interfaces are well known and defined. Vehicle dynamic clearance and structure clearance diagrams are prepared.</p> <p>(3) Design Reports, Concept of Operations Report, and configuration studies are adequate and complete.</p> <p>(4) Design packages and contract packages are defined and delineated.</p> <p>(5) The documents possess a level of definition, clarity, presentation and cross-referencing consistent with the scope definitions in following sections.</p> <p>(6) The project is constructible. Adequate construction access and staging areas are identified.</p> |   |
| 4.3  | Project Delivery Method Plan     | 32D | <p>Procedures for Procurement (advertising, bidding, awarding of contracts for consultants and construction contractors, procurement for equipment, etc.) are established including: Procurement Plan and Schedule (indicate project phase, durations for RFP, screening, interviews, selection, board approvals, etc.); Contracting Strategy for Transit-oriented and Joint Development; and identification of Disadvantaged Business Enterprises (DBE) Opportunities and Federal DBE and State/Local WBE &amp; MBE Plans and Goals.</p>   |   |
| 4.4  | Constructability                 | 32C | <p>Project Sponsor's construction planning of the project has sufficiently and adequately addressed the constructability of the project. An in-depth constructability review is required of the Project Sponsor. It is a critical tool for synthesizing the preliminary design work.</p>  |   |
| 4.5  | Site and Geotechnical Conditions | 32C | <p>(1) Digitized aerial photogrammetry (aerial photo background; planimetric and topographic mapping) is complete.</p> <p>(2) Photo simulations and/or schematic renderings are available for stations, samples of the alignment, and unique features of the line.</p> <p>(3) Preliminary geotechnical investigations are complete including a subsurface exploration or laboratory testing program. Requirements for additional geotechnical investigations have been defined and identification of buried structures and utilities and identification of contaminated soils and other hazardous materials are complete.</p>   |   |
| 4.6  | SCC 10 Guideway                  | 32C | <p>(1) Major or critical design decisions have been researched and decided including location and extent of elevated or underground structures, rehabilitation or reuse of any existing infrastructure, structures, facilities, or systems.</p>   |   |

| Item | Description                           | OP  | PMOC Review  | ✓ |
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|      |                                       |     | (2) The choice of track or roadway design has been made for the line. Grade crossing construction is defined and clearances established for operations, maintenance, and emergency evacuation. Guideway drainage has been defined.   |   |
|      |                                       |     | (3) Major or critical work details, structural element dimensions, design interfaces, and physical interfaces have been identified and are defined in terms of drawings, standards, criteria, specifications.  |   |
|      |                                       |     | (4) Structural systems are established. Aerial guideway is dimensioned to show number of spans, span length, substructure design, etc.   |   |
|      |                                       |     | (5) Preliminary mass balance diagrams have been developed for vertical alignments on fill or cut supported by topographic surveys and soil investigations.   |   |
|      |                                       |     | (6) Retaining walls and fills are located and dimensioned and defined in terms of drawings, standards, criteria, specifications.   |   |
|      |                                       |     | (7) Tunnels, both cut-and-cover and mined, are defined in terms of access and egress, construction access and laydown, openings for stations, passage chambers, ventilation or emergency access shafts or adits, sections, and profiles to depict and dimension major tunnel features. Tunnel design and dimensions have been cross checked to adjacent building foundations and coordinated with the vehicle's dynamic envelope, walkways and egress, tunnel lighting, and systems elements such as ventilation, communications, and traction power.                          |   |
|      |                                       |     | (8) Trackwork is advanced to a level where single line schematics of the track layout, plan and profile drawings, dimensioned layouts of turnouts and crossovers, and tabulations of track geometry (horizontal and vertical curve data) have been defined. The alignment of any tunnel structure is referenced to the center line of track and base of rail. Guideway sections, inclusive of aerial, tunnel and station cross sections, consistently show the distance from centerline of track to critical clearance points such as walls, walkways, and edges of platforms. |   |
|      |                                       |     | (9) Special trackwork is located and adequately defined.   |   |
|      |                                       |     | (10) Where used, the contact rail system is specified with typical details and required clearances provided. End ramps and anchors are located. Gaps are coordinated with the traction power supply system. Feeder and return conductor attachment are specified and typical details provided.   |   |
|      |                                       |     | (11) The need for special track construction for noise or vibration control is identified with locations and preliminary dimensions and a preliminary choice is made for the noise and vibration control design.   |   |
| 4.7  | SCC 20 Stations, Stops, and Terminals | 32C | (1) Major or critical design decisions have been researched and decided including rehabilitation or reuse of any existing structures, facilities or systems. Major or critical operational fire/life safety, and security requirements have been defined. Interfaces with other transit facilities or structures are identified and passenger and public circulation concepts defined.   |   |
|      |                                       |     | (2) Station architecture is established. The drawing package consists of site plans and, for station   |   |

| Item | Description   | OP  | PMOC Review   | ✓ |
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|      |   |     | buildings, floor plans, elevations, longitudinal and cross sections, and details illustrating typical and special architectural conditions. The finish concept should be clearly described. The location and outline of fare gates and barriers should be shown. The location of ticket vending machines, electronic passenger information displays, security systems and other platform amenities should be shown.           |   |
|      |   | 35  | (3) Within the site context, the building footprints are shown. The relationship of the building to grade and to adjacent facilities is clearly defined, as is provision for pedestrians and bicycles to access the public way from the building. Provision for motorized vehicles is also shown. Access to the platforms and buildings and within the buildings complies with ADA. Any parking lots or structures are shown. |   |
|      |   |     | (4) Building sections and elevations illustrate the relationship of the station to grade (below, on-grade, elevated structure); the building structural system has been chosen and preliminary dimensions established for clearances.   |   |
|      |   |     | (5) Station building floor plans show vertical circulation systems including stairs, elevators, escalators, and support spaces for mechanical, plumbing, electrical, and communications systems. The floor plans should show the agent area, fare gate area, retail areas, and any crew or public facilities.   |   |
|      |   | 35  | (6) Level boarding between the transit vehicle and the boarding platform complies with ADA. Documentation shows passenger level boarding design for all stations and/or satisfactory determination of infeasibility for one or more stations along with a satisfactory alternative plan for accessibility.  |   |
|      |   |     | (7) Preliminary identification of arts-in-transit integrated into station design.   |   |
|      |   |     | (8) Electrical systems should include a single line drawing including the source and distribution of power. Mechanical and electrical systems, including area drainage, piped utilities, heating ventilation and air conditioning, smoke evacuation, power, and lighting, are described and single line drawings are provided.  |   |
|      |   |     | (9) Design interfaces among disciplines are defined on drawings, in standards, design criteria, specifications and contract package scopes.   |   |
|      |   |     | (10) Parking structure design is progressed to a level consistent with station buildings as described above including vertical transportation and interface with the station buildings. Parking design is consistent with Record of Decision.   |   |
| 4.8  | SCC 30 Support Facilities: Yards, Shops, Administration Buildings | 32C | (1) Major or critical design decisions have been researched and decided including rehabilitation, reuse or expansion of any existing structures, facilities or systems. Major or critical operational fire/life safety, and security requirements have been defined.  |   |
|      |   |     | (2) An architectural space program has been prepared for all occupied buildings including for modifications to existing buildings such as Control Centers. The support facility drawings are consistent with the architectural program. Adequate employee parking is provided.  |   |
|      |   |     | (3) Based on the vehicles chosen and utilization as set out in the fleet management plans, a review has been done to determine the number of vehicle spots and facilities (jacks, wheel truing,   |   |

| Item | Description                           | OP  | PMOC Review   | ✓ |
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|      |                                       |     | etc.) required.   |   |
|      |                                       |     | (4) A preliminary industrial engineering evaluation has been prepared for all workspaces in shops showing clearances, location of utilities (water, electric outlets, hose reels, etc.), and the flow of vehicles from revenue service through servicing and into storage or maintenance and then returning to service. Adequate space should be provided for material storage both in the building and outside.  |   |
|      |                                       |     | (5) A site plan has been prepared showing vehicle (revenue, non-revenue, commercial and private) access to shop buildings, storage yard layout, track layout, and location of auxiliary buildings including pump houses, signal houses, and traction power substations. Provisions for fueling and fuel storage are located. The overall site plan (existing and proposed conditions) should include grading and drainage plans, site cross sections, utilities, and roadway and parking plans. |   |
|      |                                       |     | (6) Within the site context, the building footprints are shown. The relationship of the building to grade and to adjacent facilities is clearly defined, as is provision for vehicular and pedestrian access to new buildings. Access to the buildings and within the buildings complies with ADA.  |   |
|      |                                       |     | (7) Basic facility architecture is established including vertical circulation requirements. The drawing package consists of site plans and for buildings floor plans, elevations, longitudinal and cross sections, and details illustrating typical and special architectural conditions.   |   |
|      |                                       |     | (8) Building sections and elevations illustrate the relationship of the buildings to grade (below, on-grade, elevated structure); the building structural system has been chosen and is dimensioned for clearances.   |   |
|      |                                       |     | (9) Electrical systems should include a single line drawing including the source and distribution of power. Mechanical and electrical systems, including area drainage, piped utilities, heating ventilation and air conditioning, smoke evacuation, power, lighting, and fuel storage and dispensing are described and single line drawings are provided.  |   |
|      |                                       |     | (10) Design interfaces among disciplines are defined on drawings, in standards, design criteria, specifications and contract package scopes.  |   |
| 4.9  | SCC 40 Sitework and Special Condition | 32C | (1) Major drainage facilities, flood control, housing types, street crossings, traffic control, utilities, are defined and physical limits and interfaces identified, based upon alignment base mapping, plans, and profiles.   |   |
|      |                                       |     | (2) Major or critical design decisions are defined including rehabilitation or reuse of existing structures or facilities.  |   |
|      |                                       |     | (3) Areas requiring clearing or demolition are identified.  |   |
|      |                                       |     | (4) Utility key maps, lists of owners, symbols and notes are provided. Preliminary utility relocation plans have been developed.  |   |
|      |                                       |     | (5) Mitigation plans are progressed for environmental issues and have accepted by the authority having jurisdiction. Mitigation facilities such as wetlands, buffers, noise barriers and historic preservation requirements are identified and located.   |   |

| Item | Description    | OP  | PMOC Review   | ✓ |
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|      |                |     | (6) A survey for hazardous materials has been completed.  |   |
|      |                |     | (7) On-site and off-site mitigation plan requirements are identified and outline plans prepared.  |   |
|      |                |     | (8) Structural elements for retaining walls and other site structures are advanced in design.   |   |
|      |                |     | (9) Preliminary mass balance diagrams for vertical alignments on fill or cut are supported by topographic surveys and soil investigations.  |   |
|      |                |     | (10) Roadway modifications necessary to accommodate stations, guideway, or support facilities are defined and design is complete to a level comparable to that specified for guideway and stations. Traffic control devices or modifications have been defined.   |   |
|      |                |     | (11) The landscaping requirements, including irrigation systems, are defined on the station, support facility, and guideway plans.  |   |
|      |                |     | (12) The presence of buried structures, utilities, and contaminated soils which may have to be removed, backfilled or which would otherwise be unavailable for backfilling, has been taken into account.  |   |
|      |                |     | (13) Within the site context, the building footprints are shown. The relationship of the buildings to grade and to adjacent facilities is clearly defined, as are provisions for pedestrians and bicycles and special maintenance access. Provision for motorized vehicle access is shown. Adequate surface parking including spaces for disabled parking and facilities for bicycles is provided, where needed. Access to stations and buildings complies with ADA.  |   |
|      |                |     | (14) Adequate construction access has been considered; access and staging areas are identified.   |   |
|      |                |     | (15) Maintenance of traffic and railroad protective flagging are identified and costs estimated.  |   |
| 4.10 | SCC 50 Systems | 32C | (1) Major or critical design decisions have been researched and decided including connections to, and rehabilitation or reuse of, existing systems. Pre-construction site reconnaissance and soil resistivity surveys are complete.   |   |
|      |                |     | (2) Major or critical work details, structural element dimensions, design interfaces and physical interfaces have been identified and are defined in terms of drawings, standards, criteria, specifications and contract package scopes. Single line or functional block drawings are prepared for each system. Technologies have been chosen, evaluated for cost effectiveness, and expected performance defined. Major equipment (for the control room, substations, grade crossings, tunnel ventilation, and traction power) has been defined and identified in terms of basic specifications, outline drawings, general arrangements, and standard drawings and details.  |   |
|      |                |     | (3) Signaling and Train Control – Decisions have been made regarding those sections of alignment to be operated under visual or traffic signal control as opposed to train signal systems. Operations analysis has determined the most efficient location of interlockings based on track layout, headways, train lengths, and braking tables as well as requirements of each interlocking and its control limits. Site specific requirements are defined (for signal structural work) and locations for signal enclosures and relay rooms including sizes as well as room layouts (relay, termination, power) are identified and defined. Signal cable routing methodology as well as power supply and distribution are identified and defined. Software |   |

| Item | Description | OP | PMOC Review   | ✓ |
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|      |             |    | and interface requirements (to facilities, existing system, and other system elements) are identified and defined. The scope of construction between contractors and other operators (railroads or existing agency systems) is defined. Maintenance, testing and training requirements are identified and initially defined (factory acceptance, site acceptance, field integration, start up, etc.).   |   |
|      |             |    | <p>(4) Traffic signals - Basic coordination between train control and traffic signals or other traffic controls has been evaluated. The interaction among traffic signals in the immediate area has been coordinated with local jurisdictions. Simulations have been completed on the impact of the transit system on local traffic and the impact of signalization on transit running times. Decisions have been made regarding transit vehicle pre-emption or priority and interaction with emergency vehicle priority systems such as Opticon. Site specific requirements are defined (for structural work) and locations defined for crossing gates and signal enclosures. Related requirements for grade crossing protection, including use of four-quadrant gates or other methods to prevent vehicles from circumventing crossing gates have been identified and defined. The location of vehicle sensing elements is shown on intersection drawings. Software and interface requirements (to the train control system and other system elements) are identified and initially defined. The scope of construction between contractors and others is defined. Maintenance, testing and training requirements are identified and initially defined (factory acceptance, site acceptance, field integration, start up, etc.).</p> <p>(5) Traction Power – Traction power requirements and the location of substations is established. The basis of design including nominal project voltage and voltage limits are identified. The OCS system or contact rail layout is defined including conductor sizes relative to existing parts of system, as well as any supplementary parallel feeders to meet design requirements for substation out of service scenarios. Minimizations of voltage drop, maximization of vehicle propulsion system performance, and train regeneration issues have been initially addressed. Substation equipment requirements are identified. Single line drawings are provided. Preliminary equipment performance specifications have been developed. The source of commercial power is identified and preliminary negotiations have begun and technical interface conditions established. Substation grounding, stray current monitoring or testing, lightning arresters, and protective systems for equipment and utility system faults have been identified. Supervisory control has been defined as well as requirements for integration with central control.</p> <p>(6) Overhead Contact Systems (OCS) – OCS system type is identified and issues associated with temperature variations are addressed. Decisions have been made regarding the types of support structures or poles to be used, particularly in urban area. Tensions for the contact wire and messenger wire are defined; maximum distances between tensioning points are identified. OCS is sectionalized in coordination with the traction power supply. The basis for OCS design is established and design issues associated with overlaps, section insulators, and crossing and crossover locations are preliminarily addressed.</p> |   |

| Item | Description                                | OP  | PMOC Review  | ✓ |
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|      |  |     | (7) Communication System – Communications plans, including building or equipment locations, and provisions for station message signs, public address, emergency phones, security cameras, intrusion detection, and other system elements are defined and coordinated with station, guideway, support facility, and central control building plans. Cabling schemes are coordinated with the guideway and utilities. Preliminary specifications for the radio system have been developed and the system is coordinated with the vehicles and central control. Communication between field locations and central control is defined and coordinated with other systems.  |   |
|      |  |     | (8) Fare Collection System – The fare collection concept is defined and is accepted by all stakeholders. The number and location of fare collection equipment has been determined and is shown on the drawings. Basic equipment is specified.<br>(9) Central Control – Operations control center plan is provided, including basic layout and space allocation requirements. System interface requirements and modifications for existing central control facilities are coordinated with the systems being controlled. Provisions for security and emergency response are considered. Preliminary equipment and control system requirements are established.  |   |
| 4.11 | SCC 60 ROW, Land and existing improvements | 32C | (1) The Real Estate Acquisition and Management Plan (RAMP) is complete. Refer to the OP-23 RAMP for more information. Real estate documents and drawings identify the full takes, partial takes, temporary and permanent easements, and other rights. Any special access requirements for existing structures have been identified. Possible eminent domain actions need to be identified.<br>(2) Site surveys include property lines and identify structures for buildings, site features, utilities; and surface improvements such as streets and railroad rights-of-way, including private crossings of railroad rights-of-way.<br>(3) The real estate information and survey information is fully coordinated with drawings of structures for guideways and buildings; site features; utilities; streets, railroads, transitways; construction easements; and site access and staging areas.<br>(4) Parties to be relocated are identified and an action plan is developed.<br>(5) Hazardous material sites are identified and characterized and the responsibility and scope of remedial actions specified. |   |
| 4.12 | SCC 70 Vehicles                            | 32C | (1) Refer to OP-38 for additional information.<br>(2) Vehicle performance requirements are specified and incorporated into the Design Criteria, the Operations and Maintenance Plan, and the Bus or Rail Fleet Management Plans. Preliminary specifications must include allowable vehicle static and dynamic clearance diagrams, allowable axle weight, allowable total weight, door location, floor height, passenger capacity (seated and under heavy load conditions), and ADA accommodation. For buses, the specification must also include fuel type and turning radius. For rail, the specification must include acceleration and deceleration characteristics and expected train consist.<br>(3) System Interface Functional Descriptions have been developed and advanced to include the  |   |

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|                     |                              |     | following: definition of the subsystems that constitute the overall vehicle system; description and graphic depiction of each interface between on-board subsystems and wayside systems; and, description of how each subsystem will meet the project requirements.   |   |
|                     |                              |     | (4) Expected vehicle servicing, periodic maintenance, and component repair and replacement requirements (estimated time to repair and frequency of repair) should be compiled to support shop design (SCC 30)   |   |
|                     |                              |     | (5) Initial testing requirements have been developed to include the following: high level Test Program Plan for both production and on-site acceptance including requirements for factory inspection and testing, First Article and Pre-shipment inspections, static and dynamic testing, and conditional acceptance.   |   |
|                     |                              |     | (6) Maintenance and Training Requirements should be defined and identified including development of maintenance and training requirements for new system elements.  |   |
|                     |                              |     | (7) Preliminary requirements for special tools and equipment have been established as well as preliminary requirements for initial spare parts orders.  |   |
| 4.13                | SCC 80 Professional services | 32C | <p>(1) The roles and responsibilities of Project Sponsor’s professional consultants (design, engineering, and construction management) may be distinguished from Project Sponsor’s own professional staff. If alternative delivery systems (design-build, CM/GC) are proposed, the costs of design professionals employed by the contractor should be identified.</p> <p>(2) Costs associated with construction – building contractors’ management, labor, indirect costs, overhead, profit, construction insurance should not be included in SCC 80 but in SCC 10 through 50 as appropriate. Cost estimates should conform to this allocation of cost.</p> <p>(3) When Project Sponsor’s manual labor, equipment and facilities are used to facilitate construction or to assist in construction of the project, a Force Account Plan and cost estimate should be provided. The cost of these services should be applied to the appropriate SCC code with the exception of start-up training.</p> <p>(4) Costs associated with permits, insurance, and taxes are researched, identified, and estimated.</p> <p>(5) Costs associated with start-up training and simulated operation for operators and supervision is estimated.</p> |   |
| <b>5.0 SCHEDULE</b> |                              |     |   |   |
| 5.1                 | Basis of Schedule            | 34  | <p>(1) Includes a logical document that discreetly defines the basis for the development of the project schedule that identifies key elements, issues and special considerations (assumptions, exclusions, etc.)</p> <p>(2) Describes the planning basis, including resource planning methodology, activity identification, duration estimating, and source and methodology for determining logic and sequencing.</p> <p>(3) Identifies labor productivity adjustments, including congestion assessment, extended work hours, winter work, curfews, etc.</p> <p>(4) Documents all production rates, identifies basis for startup and sequencing requirements, and defines any owner requirements (regulatory, environmental. Quality/ inspection)</p>   |   |

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|      |                    |    | (5) Is consistent in use of the time sensitive variables in the capital cost estimate, including year of expenditure assumptions, and durations incorporated into the master schedule.  |   |
| 5.1  | Schedule Format    | 34 | Is consistent with relevant, identifiable industry or engineering practices. Software is appropriate for the size and complexity of the project.  |   |
| 5.3  | Schedule structure | 34 | (1) Work Breakdown Structure has been applied in the development of the schedule.<br>(2) WBS consistent with the analyzed plan and program for all project participants' agreed upon roles, responsibilities, capabilities and capacities.<br>(3) The project schedule is in original and SCC format.   |   |
| 5.4  | Schedule level     | 34 | The schedule shall be sufficiently developed in detail to determine the validity of the project critical path to revenue operations. It should break out, at a minimum, project milestones, FFGA related work, planning and environmental, public involvement, Project Development, value engineering, final design, right-of-way, permits, third party agreements, public and private utility relocations, safety and security, construction, trackwork, train control systems, vehicles, system integration, communications, fare collection, and startup and testing in sufficient detail to confirm the reasonableness of durations and sequencing and to estimate the probability of schedule risk   |   |
| 5.5  | Schedule elements  | 34 | (1) Schedule reflects the project scope that is described in the approved environmental document.<br>(2) Schedule includes adequate time and appropriate sequencing for: <ul style="list-style-type: none"> <li>• Reviews               <ul style="list-style-type: none"> <li>▪ Required FTA-related environmental, risk assessment, PMP reviews, readiness reviews at designated milestones, and grant approvals</li> <li>▪ Project reviews by applicable local, state and federal jurisdictions and affected third parties</li> </ul> </li> <li>• Agreements               <ul style="list-style-type: none"> <li>▪ Right-of-way acquisition; household/business relocations</li> <li>▪ Utilities relocation</li> <li>▪ Railroad purchase and/or usage</li> <li>▪ Interagency Agreements</li> <li>▪ Funding time frames and/or milestones for FTA and non-FTA sources</li> <li>▪ Procurement and manufacturing durations for equipment and vehicles, especially for Long Lead Items, are adequate and complete</li> <li>▪ Procurement of design contracts for civil/facilities, systems, and vehicles</li> <li>▪ Performance of design contracts to produce 100 percent complete documents prior to bidding</li> <li>▪ Bid and award periods reflect the required sequencing and durations for the selected project delivery method and logically tied to the proper work activities</li> <li>▪ Construction processes and durations are adequate and complete, and allow schedule contingency for potential delays, including inter-agency work, utility relocation, civil, architectural, and systems work, Project Sponsor operations and maintenance, mobilization, and integrated pre-revenue testing.</li> </ul> </li> </ul> |   |

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| 5.6                              | Resource scheduling | 34 | (1) Quantities and costs as defined in the cost estimate match the resources/costs assigned to the activities in the schedule.   |   |
|                                  |                     |    | (2) The distribution of resources and costs per specification or industry standards are reasonably associated to the activity it is assigned.  |   |
| 5.7                              | Schedule control    | 34 | Define the approach to and use of scheduling tools, such as scheduling software, Project Sponsor procedures for schedule change and update, use of a work breakdown structure, assignment of staff responsibility for schedule, cost loading, resource loading, etc.   |   |
| <b>6.0 CAPITAL COST ESTIMATE</b> |                     |    |  |   |
| 6.1                              | Basis of Estimate   | 33 | <p>(1) The Project Sponsor needs to provide a Basis of Estimate report describing its cost estimating approach. The report should be developed by the Project Sponsor as part of its initial Project Development work and updated with each subsequent estimating effort.</p> <p>(2) The Basis of Estimate outline should be as follows:</p> <ul style="list-style-type: none"> <li>• Estimating Methodology – Describe the general approach to defining and quantifying the project capital cost estimate.</li> <li>• Sources of Cost Data – Define the nature and sources for cost data used in the preparation of the estimate; <ul style="list-style-type: none"> <li>▪ Cost Estimating Assumptions</li> <li>▪ Allocated Contingency</li> <li>▪ Unallocated Contingency</li> <li>▪ Escalation</li> <li>▪ Contract packages</li> </ul> </li> <li>• Estimating Procedures – If multiple parties are estimating parts of the project, this memo should help to ensure consistency of approach.</li> <li>• Organization and Management of Cost Data (by segment elements; project-wide elements)</li> <li>• Bottom Up and Top Down Approaches (e.g. at Entry to Project Development, it could be reasonable to use Bottom Up estimating approach for Guideway, Stations, Support Facilities; and Top Down estimating approach for Sitework, Systems, ROW Land Existing Improvements, and Vehicles)</li> <li>• Facilities (Guideway, Stations, Support Facilities) Costing Procedures for typical construction methods and for construction and components unique to transit projects.</li> <li>• Estimate Limitations – Describe perceived or known uncertainties, as well as unknowns that could lead to changes in the estimate due to changes in project scope and design standards, incorrect unit cost or quantity assumptions, and unforeseen problems in implementation.</li> <li>• Tracking Costs – Describe how capital costs in the SCC format will be tracked through construction, revenue operations, etc. (e.g. provision in Division 1 requiring contractor to submit SCC update with monthly pay application). FTA requires that costs be tracked in the SCC format through construction, revenue operations and through two years post-revenue operations to document contract closeout and the “after” point for the Before and</li> </ul> |   |

| Item | Description                             | OP | PMOC Review   | ✓ |
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|      |   |    | After Study.  |   |
| 6.2  | Value Engineering (VE) report           | 33 | <p>(1) VE effort has been performed on the design completed in Project Development and a report has been prepared. Focus should be on VE recommendations approved by the Project Sponsor and incorporated into the project. The Project Sponsor should identify why recommendations were or were not approved.</p> <p>(2) The cost estimate should incorporate the accepted changes.</p>  |   |
| 6.3  | Standard Cost Categories (SCC) Workbook | 33 | <p>(1) Work Breakdown Structure formatted to conform to the FTA SCC.</p> <p>(2) Workbook includes SCC annualized worksheets.</p> <p>(3) Estimate is in general agreement with the latest SCC information contained in the Project Sponsor's most recent New Starts submission.</p>  |   |
| 6.4  | Capital cost estimate                   | 33 | <p>(1) SCC category 10-50: Fixed Construction (guideways, stations, support facilities, sitework, systems)</p> <ul style="list-style-type: none"> <li>• Construction Materials <ul style="list-style-type: none"> <li>▪ Quantities have been calculated with appropriate conservatism to accommodate development to a more advanced stage of design if appropriate</li> <li>▪ Allowances for material quantities have been included for commodities which cannot be fully quantified at the present level of design</li> <li>▪ Unit Prices have been developed using the best available local market information;</li> <li>▪ Project sales tax exemption status has been established if appropriate and incorporated in materials costs</li> <li>▪ Quotes have been obtained for specialty and price-sensitive materials</li> <li>▪ Materials costs reflect market volatility</li> </ul> </li> <li>• Construction labor <ul style="list-style-type: none"> <li>▪ Local wage rates, fringe benefits, and work rules are incorporated</li> <li>▪ Local payroll taxes and insurance rates are incorporated</li> <li>▪ Holiday / show-up / vacation pay is incorporated</li> <li>▪ Crew productivity is appropriate and conservative for the task under evaluation</li> <li>▪ Availability and variability of utility and railroad outages and "track time" have been incorporated in a conservative manner in determining the crew productivities for impacted work</li> </ul> </li> <li>• Construction equipment <ul style="list-style-type: none"> <li>▪ Local equipment rental rates and current fuel costs are incorporated</li> <li>▪ Quotes have been obtained for specialty equipment.</li> </ul> </li> <li>• Escalation for Construction Materials, Labor and Equipment <ul style="list-style-type: none"> <li>▪ Confirm that adequate escalation rates have been applied to estimates of material, labor and equipment costs. Costs to anticipate prices at the time of project bid.</li> </ul> </li> <li>• Special considerations <ul style="list-style-type: none"> <li>▪ Utility and Railroad labor, equipment, and overhead rates have been verified and</li> </ul> </li> </ul> |   |

| Item | Description | OP | PMOC Review   | ✓ |
|------|-------------|----|---|---|
|      |             |    | <p>incorporated in third party or “force account” work pricing, as well as local utility/RR work and safety rules</p> <ul style="list-style-type: none"> <li>▪ Special consideration has been given to support operations and facilities for tunneling operations, facilities to support operations in contaminated/hazardous materials, etc.</li> <li>• Construction Indirect Costs, Multipliers for Risk etc. <ul style="list-style-type: none"> <li>▪ Contractor indirect and overhead costs are advanced beyond a percent of the associated construction direct costs and should be analyzed based on field and home office indirect costs such as contract duration, appropriate levels of staffing (including project managers, engineers, safety engineers, schedulers, superintendents, QA/QC engineers, craft general foreman, labor stewards / nonproductive labor, warehousing, project trucking, survey layout, purchasing, timekeeping, etc.), mobilization / demobilization costs, equipment standby / idle time costs, reviewer office / lab / tool facilities, safety equipment, QA/QC testing equipment, temporary utilities (sanitary / power / light / heat), jobsite and public security measures, etc.</li> <li>▪ Appropriate costs have been included for payment and performance bonds and special insurance requirements (RR protective, pollution liability, etc.).</li> <li>▪ Other construction insurance costs and/or project-wide coverage (Owner Controlled Insurance Policy) has been included based on quotes from appropriate carriers.</li> <li>▪ Contractor profit / risk costs have been incorporated that reflect the proposed delivery method and expected level of competition by contract package (higher profit margin where few competitors will bid).</li> </ul> </li> </ul> |   |
|      |             |    | <p>(2) Cat. 60 - Real Estate</p> <ul style="list-style-type: none"> <li>• Includes estimated costs (acquisition costs) for the real estate and associated relocation costs. Costs for professional services, both contracted and in-house legal, appraisal, review appraisal, settlement costs, environmental site assessments, demolition, real estate and relocation consultants have been included (and not included in SCC 80). Easements, acquisitions, inspections, takings, etc. have been appraised or estimated by qualified professionals familiar with local real estate markets and practices, especially any acquisitions involving freight railroads. Includes allowance for the expected increase in costs over appraised value. Includes costs for taxes attributable to real estate acquisition.</li> </ul> <p>(3) Cat. 70 - Vehicles</p> <p>Estimates account for current purchase prices for similar vehicles or quoted prices from manufacturers. Includes costs for professional services (both contracted and in-house) for vehicle design and procurement, and not included in SCC 80. Estimates allow costs for special tools and equipment and spare parts. Requirements for non-revenue support vehicles identified and include in estimate.</p> <p>(4) Cat. 80 - Professional Services</p> <ul style="list-style-type: none"> <li>• Costs included for both contracted and in-house, for all professional, technical and management services related to the design and construction of fixed infrastructure (Cats.</li> </ul>  |   |

| Item       | Description                            | OP | PMOC Review   | ✓ |
|------------|--|----|---|---|
|            |  |    | <p>10 - 50) during the Project Development, engineering, and construction phases of the project. This includes environmental work, surveying, geotechnical investigations, design, engineering and architectural services; materials and soils testing during construction; specialty services such as safety or security analyses; value engineering, risk assessment, cost estimating, scheduling, Before and After studies, ridership modeling and analyses, auditing, legal services, administration and management, etc. by agency staff or outside consultants.</p> <ul style="list-style-type: none"> <li>• Professional liability insurance and other non-construction insurance should be included on 80.05.</li> <li>• Confirmation that cost estimates are based on realistic levels of staffing for the duration of the project through close-out of construction contracts. (The estimate should be consistent with the Project Management Plan.)</li> <li>• Confirmation that costs for permitting, agency review fees, legal fees, etc. have been included.</li> <li>• General Conditions included for design, construction, and procurement contracts.</li> <li>• If alternative delivery systems (design-build, CM/GC) are proposed, the costs of design professionals employed by the contractor should be identified.</li> </ul> |   |
| 6.5        | Contingency                            | 33 | <p>Allocated Contingency – Confirmation that adequate contingency has been allocated to each of the SCC categories based on the perceived risk inherent to each category’s estimate.</p> <p>Cat. 90 - Unallocated Contingency - Confirmation that adequate contingency has been added to the total project cost based on the perceived project risk.</p> <p>Total Contingency should be consistent with that derived in the Risk and Contingency Management Plan.</p>   |   |
| 6.6        | Cat. 100 – Finance Charges             | 33 | Finance charges included, consistent with FTA’s Financial Management Oversight Consultant’s review.   |   |
| 6.7        | Inflation                              | 33 | Confirmation that adequate inflation rates have been applied to Base Year project costs to anticipate costs at procurement or bid; the Year of Expenditure costs should be developed thoughtfully. Reference indices should include ENR Building Cost Index and Construction Cost Index or other demonstrated authoritative source.   |   |
| <b>7.0</b> | <b>RISK AND CONTINGENCY MANAGEMENT</b> |    |   |   |
| 7.1        | Risk process established               | 40 | <p>(1) Risk organization is in place, with independent reporting to executive management and roles and responsibilities defined.</p> <p>(2) Contingency management, contingency use authority, and reporting structure is established.</p>  |   |
| 7.2        | Risk identification                    | 40 | <p>(1) Risk register is developed, with risk categories and priorities.</p> <p>(2) Process is established to update risk register.</p>  |   |
| 7.3        | Risk assessment                        | 40 | <p>(1) Valuation of project cost risk by method appropriate for project</p> <p>(2) Valuation of project schedule risk by appropriate methods</p> <p>(3) Documented report demonstrating valuation method and result</p>   |   |

| Item       | Description   | OP | PMOC Review  | ✓ |
|------------|---|----|--|---|
| 7.4        | Risk Mitigation   | 40 | (1) Mitigation process in-place with documented responsibilities.  |   |
|            |   |    | (2) Established insurance plan   |   |
|            |   |    | (3) Contingency amounts identified and tied to risk assessment   |   |
|            |   |    | (4) Requirements risks clearly identified and mostly resolved; plans in place for unresolved requirements risks  |   |
|            |   |    | (5) Secondary mitigation plan defined and documented   |   |
| 7.5        | Risk management   | 40 | (1) Plans for amendment of the risk register during the course of the work, to both succinctly catalogue additional significant issues that arise, as well as to identify closure of issues as they become resolved to the satisfaction of the Project Sponsor and the FTA.  |   |
|            |   |    | (2) Plans and timing for systematically updating the RCMP.   |   |
| <b>8.0</b> | <b>CERTIFICATIONS, REPORTS, AND ADMINISTRATIVE REQUIREMENTS</b> |    |  |   |
| <b>8.1</b> | <b>Administrative requirements</b>                              |    |  |   |
| 8.1.1      | Legal Authority to implement transit mode project               |    | The Project Sponsor must perform a review of existing statutes to gain a full understanding of the Project Sponsor's authority and any legal constraints that may affect the project. The purpose should be to identify requirements and constraints in an orderly and timely manner and to deal with them as the project advances. Failure to recognize and accommodate legal requirements may jeopardize the entire project and, at the very least, severely impact the subsequent grant approval process and project schedule, as well as project costs. The project sponsor must be diligent in maintaining cognizance of changes in the legislative/regulatory environment which may impose future constraints on a project. This legal authority must be reviewed to confirm that it addresses all forms of project delivery that may be considered. |   |
| 8.1.2      | Legal Authority to use alternative project delivery method      |    | Provide evidence of authority under non-Design-Bid-Build format.   |   |

## APPENDIX C

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