U.S. DOT Federal Railroad Administration
Office of Passenger and Freight Programs
Monitoring Procedures (MP)

FRA Monitoring Procedures (MP)			
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U.S. DOT Federal Railroad Administration
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Monitoring Procedure 01 - MTAC Administrative Conditions and Requirements

1.0 PURPOSE

The purpose of this Monitoring Procedure (MP) is to describe the administrative conditions and requirements associated with the performance of oversight by the Monitoring and Technical Assistance Contractors (MTAC) for the Federal Railroad Administration.

2.0 BACKGROUND

The Federal Railroad Administration (FRA) provides Federal grants and loans to assist in financing intercity passenger rail and freight rail projects. FRA, therefore, is responsible for administering the grants and loans, and ensuring projects are delivered successfully, provide public benefits, and meet Federal requirements.[1]

FRA performs oversight using a mix of staff and contractors. Some FRA-administered programs are appropriated funding (administrative takedown) to help fund contractor services, while others do not receive an appropriation. Although the Monitoring Procedures (MP) are meant to instruct both Federal staff and contractors, the MTAC will have a significant role in conducting oversight of FRA's largest programs. Therefore, the MPs refer to the reviewer as the MTAC.

2.1 MTAC Program Underpinnings

FRA currently provides stewardship of taxpayers' dollars and conducts due diligence as a federal grants-making agency. FRA administers grant and loan programs to assist States and other eligible entities in the planning, acquisition, design, construction, and readiness for operations of high-speed and intercity passenger rail projects and freight rail projects. The number and amount of grants and loans administered by the FRA have dramatically increased over the last several years. FRA currently has a grant and loan portfolio comprised of over $20 billion worth of investments for more than 350 grants and loans distributed across multiple programs for projects located throughout the entire United States.

For FRA's oversight of major capital rail projects, the Monitoring and Technical Assistance Program (MTAP) will bring significant additional contractor resources, more technical expertise, and greater consistency of approach to projects across the FRA regions.

FRA's goals for MTAP are at three levels:

- Projects - To proactively identify and mitigate risks, foster good solutions to challenges/issues, and ensure projects move successfully into revenue operations
- Program - To develop an ongoing FRA oversight program with knowledge sharing and partnering
- Industry - To elevate the knowledge and level of practice of the U.S. rail industry

[1] See References in Appendices below.

The predominant activity in MTAP is assisting FRA with project oversight. Characterized by a high level of proactive engagement, dialogue and problem solving with the Grantee and Federal team, MTAC contractors performing oversight, fully understand the projects, consider project content and approach, advise and recommend approaches, and evaluate risks. They support FRA involvement in the Grantees' projects, and make positive contributions to the overall endeavor. Oversight is typically done by the "resident" MTAC and its consultants, supported by Federal staff.

Another activity in MTAP is Technical Assistance. Special Tasks/Technical Assistance go further than oversight -- into the realm of teaching, training, tutoring, special studies, presentations on identified topics. Technical assistance needs are identified through oversight and may be customized to one Grantee or to a national audience depending on the issue. Either way, the work should further these FRA goals: Elevate the knowledge base in the industry; improve FRA's oversight capabilities; and achieve higher-quality projects.

Technical Assistance can be done by the "resident" MTAC and its consultants, supported by Federal staff. However it can and frequently does include other grantees, MTAC, and staff, as shown in these examples:

- Because of the particular expertise of the "resident" MTAC for the Northeast, this MTAC is asked to consult on a thorny issue in the Midwest.
- A peer review workshop is held to assist a grantee in the Midwest with value engineering of a project. The peer review group includes grantees and MTACs from the Northeast.

FRA wants to help develop a sense of community and partnership to encourage learning. For this purpose, as part of Special Tasks/Technical Assistance, regularly scheduled large national meetings will be held so that case studies, lessons learned, and best practices can be shared among the Grantees, MTAC contractors, and the Federal team.

Note that neither MTAC oversight nor technical assistance in any way relieves the Grantee of its responsibility for the project.

3.0 MTAC SCOPE OF WORK

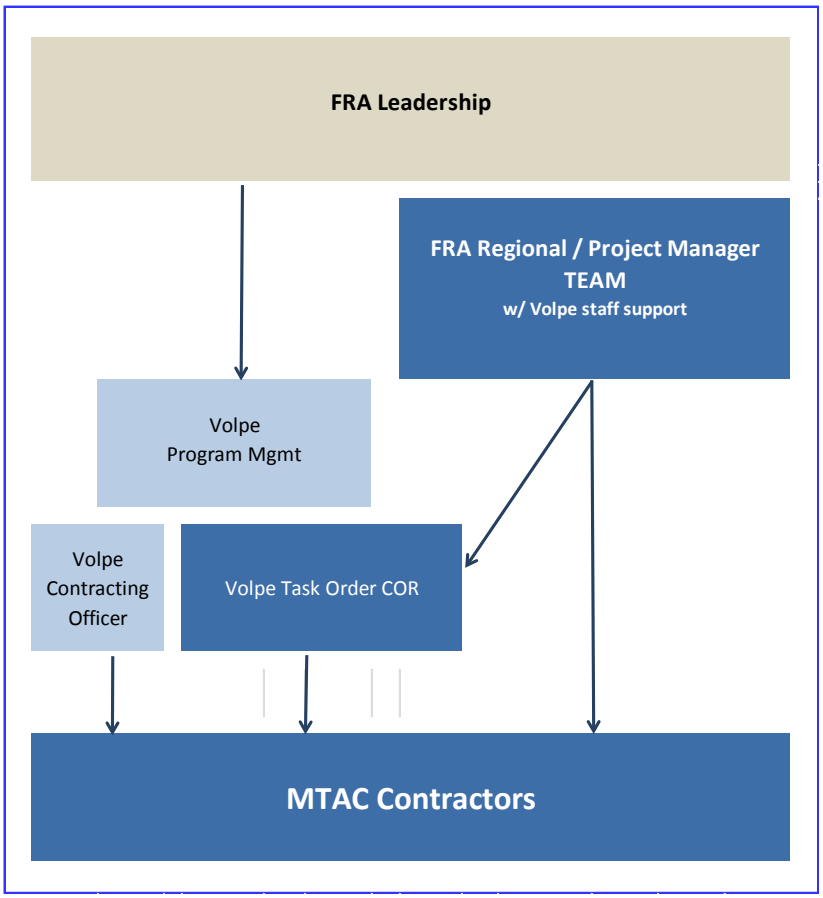
3.1 Projects Covered

At present, MTAP covers HSIPR (High-speed / Intercity Passenger Rail), TIGER (Transportation Investment Generating Economic Recovery), and AMTRAK projects, since MTAP is funded through HSIPR, TIGER, and AMTRAK. However, MTAP is designed to support FRA capital projects from any grant or loan program. Should FRA receive other sources of oversight funding available, MTAP may be used for projects in FRA's other programs, such as RRIF, Rail Line Relocation and Improvement, and/or future funding programs.

MTAP covers projects funded through grants and cooperative agreements. HSIPR projects are funded typically through cooperative agreements between FRA and the Grantees; TIGER projects are funded typically through grants. FRA's grant and cooperative agreement authority is contained in 49 U.S.C. 103(i).

3.2 Roles and Responsibilities

FRA engaged the Volpe Center to support MTAP. Contract management and issuance of MTAC contracts, task orders, and job orders is through the Volpe Center. FRA's regionally-based multi-disciplinary teams are led by Regional Managers (RM) and on-location Project Managers (PM), who are responsible for shepherding grantees' projects to successful completion. The RM/PM team members are FRA staff engineers, planners, environmental protection specialists, grant managers, financial analysts, attorneys, rail safety specialists, and a Volpe staff member. MTACs should discuss their work on a day-to-day basis with the RM/PM and their team members (the Federal Team).



In general, the MTACs are to exercise their professional expertise, professional judgment, and communicate well with all parties. The MTACs are to develop and regularly maintain contact with the Federal team; based on direction from the Federal team, develop and regularly maintain contact with a Grantee's organization with key personnel in multiple departments; avoid relying on only one source for information; coordinate with other MTACs covering the same Grantee (if applicable).

The MTACs are to report. (Refer to Appendix A below).

The MTACs are to do the following:

- Investigate and study the projects -- the project scope, schedule, budget, and FRA terms and conditions, in sufficient detail to evaluate and track the progress, project management approach, challenges, issues, and risks;
- Engage, discuss, and consider options and alternatives, for all topics including the Grantees' technical capacity and capability to manage the projects, to meet goals during all phases;
- Identify problems and uncertainties in a timely manner; discussing findings, conclusions and recommendations with the Grantee and Federal team – recommendations for courses of action for the Grantee and others to take. The FRA takes the recommendation into account when deciding how to proceed.
- Draw conclusions, and provide professional opinions on the Grantee's work to the Federal team;
- Proactively help to solve problems with the Grantee and FRA.

3.3 Monitoring Procedures (MP)

Having a clear oversight structure is critically important for the Federal team, the Grantees, and the MTACs. The MPs provide that structure, standards for good practice, and they help establish consistency in application of the standards. The MPs are organized into Sections:

- Program Support
- Project Management Reviews
- Monitoring and Reporting
- Technical Reviews
- Technical Assistance

The MPs are Technical Direction to the MTAC contractors but they may also be of interest to Grantees, FRA staff, third party stakeholders, the railroads, Congressional oversight entities, and auditors. The MPs will be modified and improved over time. The current version will be posted to FRA's website.

3.4 Task Orders, Job Orders, Implementation Plans, MTAC Status Reports and Invoices

Task Orders: Task Orders are structured around the FRA Regions, with an additional one for rolling stock/vehicles. Barring a conflict of interest (COI) or capacity constraint, one MTAC will oversee all of the projects in a region. In the case of COI or if the projects are too many or too large for one MTAC, the work will be divided.

Job Orders: Activities performed under task orders will be authorized through Job Orders, developed by the Federal team and issued by the Volpe Center. A Job Order is a supplementary contracting document issued under an approved task order with a defined scope of work, and a limited period of performance. Job Orders are subject to the approval of the COR or ACOR, who is responsible for ensuring the Job Orders do not exceed the scope, cost, and performance period of the task order.

In MTAP, Job Orders will be structured by calendar year (January to January). They may also be structured by geographic area and/or by project phase; for example, under the Midwest Task Order, one Job Order includes all projects in Michigan; in the Southwest, one Job Order includes all PE NEPA projects. This approach minimizes paperwork, allows for greater work efficiency by MTAC professional

staff, and greater overall consistency for Grantees and FRA. The Job Order includes a list of hours by MP Section -- Program Support, Project Management Reviews, Monitoring and Reporting, Technical Reviews, and Technical Assistance – as well as a schedule for the reviews within the calendar year, and the agreed cost.

Implementation Plan: The MTAC is required to submit a Task Order Implementation Plan, outlining the proposed approach, identifying oversight and technical assistance activities to be performed, with a related schedule and cost breakdown. The Implementation Plan contains more detailed information than the Job Order, as it shows the oversight efforts by MP, by project, by calendar month.

MTAC Status Reports and Invoices: Typically monthly, MTAC Status Reports and Invoices are required to be submitted. Both documents should track estimated versus actual costs for oversight for each Job Order, and then as a summary, for the Task Order. The MTAC Status Reports should reflect proper management by MTACs of their activities, time, and costs. The reports are for the Federal team's use only. This information combined with similar information from the Volpe Center on Volpe staff activities, allows FRA to monitor its entire oversight program. The MTAC Status Reports should include:

- Narrative regarding major completed tasks, and significant events in the next 90 days
- Graph and table of cost and hours, planned and actual showing three month
- Reasons for variances between planned and actuals for hours and costs; changes to the Implementation Plan, if any; a proposed reconciliation of variances, and a plan for future expenditure rates.
- Draft Lessons Learned / Best Practices

MTAC Reports on Grantees' Projects

To support the MTAC oversight and technical assistance work, reports are typically required (for most MPs.)

General guidelines for reports:

- Content: Provide current information; cite sources; present information without taking it out of context. Provide focused, clear, concise, coherent, accurate, complete, objective and unbiased reports. Use "MTAC" vs "contractor" to distinguish from construction contractors. Use photos, tables, and other graphics to aid understanding

- Style: Refer back to original text instead of repeating text. Avoid long narratives.

- Distribution: Send draft documents to the Federal team; after approval from the Federal team, share the drafts with the Grantee for concurrence on the facts. Then finalize the report.

Scope, Capital Cost, Schedule Reviews

Task Order 5
Job Order 2

Eleven Projects in Michigan
MO Dept. of Transportation

May 1, 2014
May 22, 2014, Rev. 1

MTAC firm name
MTAC lead's email, phone number

- Format: For a generic outline, see below. For a detailed outline, see MP 25. Use appendices for supporting or backup information. Use bold or underline for emphasis. Use Calibri 11 point font.

- Report Outline

1) Cover page (use 12 point font)
    a) Title of Report
    b) Task Order No. and Name
    c) Job Order No. and Name
    d) Date and Revision Date if necessary
    e) MTAC Firm Name, MTAC Lead's email, phone number
2) Executive Summary (3 pages max) - most important findings, professional opinions, conclusions, and recommendations
3) Table of Contents
4) Body of Report – By topic
    a) Findings
    b) Analysis
    c) Professional opinions regarding status
    d) Recommendations for action
5) Appendices
    a) Acronyms used
    b) Supporting checklists, tables, spreadsheets, photos, etc.
    c) MTAC team – list personnel, qualifications for performing the review

APPENDIX B References

The following are the principal, but by no means only, references to Federal regulations and guidance relating to the work performed under the MPs. The MTAC should be familiar with these.

ADA

Final Rule for the Transportation for Individuals with Disabilities at Intercity, Commuter, and High Speed Passenger Railroad Station Platforms. The U.S. Department of Transportation issued the Final Rule on September 19, 2011 (available at http://www.gpo.gov/fdsys/pkg/FR-2011-09-19/html/2011-23576.htm).

Final Rule for the Transportation for Individuals With Disabilities; Adoption of New Accessibility Standards. The Department of Transportation issued this rule on October 30, 2006 (available at http://www.fra.dot.gov/eLib/Details/L03333). This Final Rule establishes that the Department of Transportation amended the ADA regulations to adopt, as its regulatory ADA standards, the new Americans with Disabilities Act Accessibility Guidelines (ADAAG) issued by the United States Access Board.

U.S. DOT Guidance: What Accessibility Standards Apply to Passenger Rail Cars When Specific Design Standards Are Not Provided In 49 CFR Part 38? December 2012 (available at http://www.fra.dot.gov/Page/P0175).

Questions and Answers on the 49 CFR Part 37 Revision - Transportation Services for Individuals with Disabilities (ADA) (available at http://www.fra.dot.gov/Page/P0175).

The ADA Standards for Transportation Facilities. (http://www.access-board.gov/guidelines-and-standards/transportation/facilities/ada-standards-for-transportation-facilities).

36 CFR Part 1191. Americans with Disabilities Act (ADA) Guidelines for Buildings and Facilities – 36 CFR Part 1191. Available at http://www.gpo.gov/fdsys/granule/CFR-2011-title36-vol3/CFR-2011-title36-vol3-part1191/content-detail.html

36 CFR Parts 1192 Subpart H -- High-Speed Rail Cars, Monorails and Systems. The Access Board provides technical guidance on ADAAG for high-speed rail cars, monorails, and systems. (http://www.access-board.gov/guidelines-and-standards/transportation/vehicles/technical-assistance-manuals-on-adaag-for-transportation-vehicles/subpart-h-high-speed-rail-cars,-monorails-and-systems).

49 CFR Part 27. Nondiscrimination on the Basis of Disability in Programs or Activities Receiving Federal Financial Assistance available at http://www.gpo.gov/fdsys/pkg/CFR-2011-title49-vol1/pdf/CFR-2011-title49-vol1-part27.pdf).

49 CFR Part 37. Transportation Services for Individuals with Disabilities (ADA) available at http://www.gpo.gov/fdsys/pkg/CFR-2011-title49-vol1/pdf/CFR-2011-title49-vol1-part37.pdf.

49 CFR Part 38. Americans With Disabilities Act (ADA) Accessibility Specifications for Transportation Vehicles – Subpart H – Other Vehicles and Systems – 49 CFR Part 38 §175 – High-

Speed Rail Cars, Monorails, and Systems available at http://www.gpo.gov/fdsys/pkg/CFR-2011-title49-vol1/pdf/CFR-2011-title49-vol1-part38.pdf.

ANNUAL REVIEW

FRA's Office of Passenger and Freight Programs Monitoring Manual, available from FRA; this is the primary guide for the annual review.

BUY AMERICA/N

49 U.S.C § 24405 (a) (available at http://www.gpo.gov/fdsys/pkg/USCODE-2011-title49/html/USCODE-2011-title49-subtitleV-partC-chap244-sec24405.htm)

4949 U.S.C § 8302 (available at http://uscodebeta.house.gov/view.xhtml?req=(title:%20section:8302%20edition:prelim)%20OR%20(granuleid:USC-prelim-titlesection8302)&f=treesort&edition=prelim&num=0&jumpTo=true

FRA Buy America Guidance - including Frequently Asked Questions (available at http://www.fra.dot.gov/Page/P0185

ENVIRONMENTAL REVIEW

2010 NOFA: Appendix 2.2 Environmental Documentation. Federal Register Vol. 75, No. 126, Thursday, July 1, 2010. Notices USDOT, FRA, HSIPR Program; ACTION: Notice of funding availability for Individual Projects; issuance of interim program guidance, http://www.fra.dot.gov/eLib/details/L03701

Notice of Updated Environmental Assessment Procedures. Federal Register Vol. 64, No. 101, Wednesday, May 26, 1999. Notices page 28545, USDOT, FRA, ACTION; Notice of Updated Environmental Assessment Procedures, http://www.fra.dot.gov/eLib/details/L02561

National Environmental Policy Act (NEPA), Compliance and Enforcement, Basic Information, available at http://www.epa.gov/compliance/basics/nepa.html

GRANTS and COOPERATIVE AGREEMENTS

OMB Circular A-102, Grants and Cooperative Agreements with State and Local Governments, available at http://www.whitehouse.gov/omb/circulars_a102/

49 CFR Part 18, Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments, available at http://www.gpo.gov/fdsys/pkg/CFR-2009-title49-vol1/xml/CFR-2009-title49-vol1-part18.xml

OMB Circular A-128, Audits of State and Local Governments, available at http://www.whitehouse.gov/sites/default/files/omb/assets/a133/a133_revised_2007.pdf

PLANNING AND DESIGN

Railroad Corridor Transportation Plans: A Guidance Manual, July 8, 2005, available at http://www.fra.dot.gov/eLib/Details/L04161

USDOT, FRA HSIPR Program. Notice of funding availability for Service Development Programs; issuance of interim program guidance; pg. 38344, Federal Register / Vol. 75, No. 126 / Thursday, July 1, 2010 / Notices, available on FRA website

FRA's State Rail Plans Guidance, September 2013, http://www.fra.dot.gov/eLib/Details/L04760

FRA's "Station Area Planning for High-Speed and Intercity Passenger Rail," June 2011, http://www.fra.dot.gov/eLib/Details/L03759

Transportation Research Board. (2003). *Transit Capacity and Quality of Service Manual, 2nd edition.* TCRP Report 100. Transportation Research Board, Washington DC, 2003.

The American Railway Engineering and Maintenance-of-Way Association (AREMA) publications, available at https://www.arema.org/publications/pgre/index.aspx

- Manual for Railway Engineering
- Practical Guide to Railway Engineering

PMP

Project Management Oversight - 49 USC 24403, available at http://www.gpo.gov/fdsys/granule/USCODE-2011-title49/USCODE-2011-title49-subtitleV-partC-chap244-sec24403/content-detail.html

REAL ESTATE

Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act), available at http://www.fhwa.dot.gov/real_estate/practitioners/uniform_act/

Uniform Act Regulations (49 CFR Part 24), available at http://www.fhwa.dot.gov/real_estate/practitioners/uniform_act/legs_regs/

SAFETY and SECURITY

49 CFR Parts 213 and 238 Final Rule on Vehicle / Track Interaction Safety Standards; High-Speed and High Cant Deficiency Operations. USDOT, FRA 49 CFR Parts 213 and 238, Federal Register / Vol. 78, No. 49 / Wednesday, March 13, 2013 / Rules and Regulations

FRA Office of Safety Website, http://www.fra.dot.gov/Page/P0010, including references to:

- 49 CFR 213-Track Safety Standards
- 49 CFR 214-Railroad Workplace Safety (Roadway worker protection)
- 49 CFR 228-Hours of service railroad employees
- 49 CFR 233-Signal systems reporting requirements
- 49 CFR 234-Grade crossing signal system safety and State action plans
- 49 CFT 235-Instructions governing applications for approval of a discontinuance or material modification of a signal system or relief from the requirements of part 236
- 49 CFR 236-Rules, standards, and instructions governing the installation, inspection, maintenance, and repair of signal and train control systems, devices, and appliances

- 49 CFR 237-Bridge Safety Standards
- 49 CFR 238-Passenger Equipment Safety Standards
- 49 CFR 239-Passenger Train Emergency Preparedness

Amtrak Station Program and Planning Guidelines, safety in site planning, station and platform design -- http://www.greatamericanstations.com/docs/amtrak-station-planning-and-program-guidelines

Amtrak Emergency Management and Corporate Security

- Design Guidance, Practices and Recommendations for: Video Surveillance Systems, Physical Security, Intrusion Detection Systems, and Physical Access Control Systems. 2013, Rev. 4. Obtain from Amtrak.

NFPA 130: Standard for Fixed Guideway Transit and Passenger Rail Systems

- http://www.nfpa.org/codes-and-standards/document-information-pages?mode=code&code=130 Topics covered include stations, trainways, emergency ventilation systems, vehicles, emergency procedures, communications, control systems, and vehicle storage areas. Provisions pertain to stations accommodating only passengers and employees of the fixed guideway transit and passenger rail systems and incidental occupancies in the stations.

Schachenmayr, M.P. *Application Guidelines for the Egress Element of the Fire Protection Standard for Fixed Guideway Transit Systems.* Parsons, Brinckerhoff, Quade & Douglas, 1998.

STATIONS

FRA's "Station Area Planning for High-Speed and Intercity Passenger Rail," June 2011, http://www.fra.dot.gov/eLib/Details/L03759

Amtrak Station Program and Planning Guidelines, http://www.greatamericanstations.com/planning-development/station-planning-guidelines

Fruin, J. J. *Pedestrian Planning and Design, Revised Edition.* Elevator World, Inc., Mobile, Alabama, 1987.

VALUE ENGINEERING

Value Methodology Standard and Body of Knowledge, June 2007 (or the latest edition) published by SAVE International, http://www.value-eng.org/pdf_docs/monographs/vmstd.pdf

VEHICLES

305 Committee Railcar Specifications, http://www.highspeed-rail.org/Pages/DocsSpecs.aspx, Passenger Rail Investment and Improvement Act of 2008 (PRIIA) 305 Next-Generation Equipment Committee (NGEC)

APTA Standards and Recommended Practices relevant to railcar design

Federal Safety Regulatory requirements (49 CFR Part 229, 238, 239) as applicable

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Monitoring Procedure 02 – MTAC Implementation and Transition Planning

1.0 PURPOSE

This Monitoring Procedure (MP) describes FRA requirements for the Monitoring and Technical Assistance Contractors (MTAC) when developing Implementation and Transition Plans.

2.0 KEY PRINCIPLES

FRA requires MTACs to demonstrate management accountability; responsibility for quality, timely performance and productivity; compliance with laws and ethics guidelines; cost control; and recommendation of useful mitigations to minimize adverse impacts to the project from internal and external forces. The plans produced under this MP shall help the MTAC to achieve these ends. In addition, implementation plans shall show adequate and comprehensive oversight. Transition plans help to maintain continuity in the performance of oversight during a change in MTAC assignment.

3.0 SCOPE OF WORK

3.1 Implementation Plan

The Implementation Plan shall summarize the oversight work for the task order. The Implementation Plan serves as the MTAC's representation that the work load, hours, and staffing are realistic and doable.

The Implementation Plan should demonstrate that the MTAC understands FRA's purposes with respect to oversight, as well as the scope and nature of the work to be performed. It should define the nature, quantity, and quality of the MTAC's intended services, products, and deliverables, and demonstrate readiness to perform them. The Implementation Plan details the summary information found in the Job Orders. It shows the oversight efforts by MP, by project, by calendar month, with reports and other deliverables noted.

After FRA accepts this Plan, unless otherwise directed, MTAC work should be performed in conformance with the Implementation Plan. If changes are necessary, they should be documented in the MTAC Status Report. Typically it is not necessary to update the Implementation Plan.

Incoming MTACs are responsible for the following:

1. Becoming familiar with the project
   a. Establishing key contacts among the personnel of the outgoing oversight contractor, the grantee and its team, and FRA and Volpe; scheduling, coordinating, and integrating services and work products with the current oversight contractor
   b. Gathering current documents to understand the project, such as:
      i. Baseline cost estimates and schedules

ii. Project drawings and analyses
iii. Grantee management plans, e.g. Project Management Plan, QA/QC plan
iv. Oversight reports by outgoing contractor

2. Preparing and participating in the initial meetings, interviews, site tours, conference calls, and follow-up meetings:
   a. Conducting sufficient pre-meetings between FRA and the outgoing contractor; conducting an adequate number of site visits, meetings, tours, or grantee personnel interviews to cost effectively bring the new team up to speed
   b. Making every effort to understand project conditions, including taking photos during site visits; quickly gaining knowledge of project content and sensitive issues; listening carefully for key issues that could impact project progress
   c. Achieving a sufficient level of knowledge about the outgoing contractor's oversight activities and maintaining traceability on key information and assessments
   d. Promoting a "partnership" relationship with all parties to minimize impact of the transition on the grantee

3. Developing the Implementation Plan including the following elements.
   a. Description of the MTAC scope of work and period of performance (one page)
   b. By Job Order, a table listing the projects, MPs (review efforts), yearly schedule in months, staff assigned, labor hours, hourly rates, expenses, and total cost
   c. MTAC organization chart with labor categories, and resumes for each person
   d. Communications and document control:
      i. MTAC approach to communications with the Grantee and FRA, including frequency and how documented, coordinated, and reported, both formally and informally.
      ii. MTAC approach to controlling correspondence to and from FRA; file control
   e. Cost control, invoicing, and financial administration:
      i. Compensation limits: Identify relevant compensation sub-limits or fixed price work
      ii. Timekeeping: Describe how employees record daily project time charges, how the charges are accumulated into the corporate accounting system
      iii. Invoicing: State how the MTAC intends to comply with FRA's invoicing instructions including frequency, prime and subcontractor information

3.2 Transition Plan

During the contract period, changes in MTAC Task Order assignment may occur to avoid conflicts of interest or for other reasons. At the beginning of this contract, a transition from FRA's existing A/E contracts will occur.

The FRA Regional Manager/Project Manager will notify the Grantee of a pending change in a timely fashion – ideally two months before the actual turn over. FRA will set up a transition schedule that fits with previously arranged meetings wherever possible; arrange for the incoming MTAC to be introduced to the Grantee's staff and consultant team; give the incoming MTAC a project tour; familiarize the MTAC with project documents, administrative matters such as invoicing and performance evaluations.

Outgoing oversight contractors are responsible for preparing Transition Plans, covering the following:

1. Coordinating with and integrating the work of the incoming MTAC
   a. Providing the incoming MTAC with a general orientation to the project to minimize the loss of knowledge during the transition
   b. Facilitating introductions to the grantee as well as supporting the incoming MTAC's readiness to assume oversight responsibilities; providing a sufficient number of and qualified personnel to participate in conference calls and meetings during the transition
   c. Identifying transition elements and developing a schedule and milestones; assisting the new MTAC in locating the information
   d. Helping to maintain traceability of oversight information and assessments
2. Preparing contract "close-out" including:
   a. A Final Report for use by FRA and the incoming MTAC covering project facts, status, characteristics, major issues, and other information
   b. Close out / transition schedule
   c. Lessons learned / Best Practices
   d. Transfer of documents to incoming MTAC

3.3 Timeframe for Implementation and Transition Plans

1. Unless otherwise indicated, the MTAC will deliver plans in accordance with the following timeline:

	Calendar Days after Request by FRA
Draft plan or revision of previous plan	15-21
Final plan	30
Readiness for meetings	30
Readiness to assume oversight responsibilities (transitions)	60

U.S. DOT Federal Railroad Administration
Office of Passenger and Freight Programs

Monitoring Procedure 03 – Special Tasks and Technical Assistance

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1.0 PURPOSE

This Monitoring Procedure (MP) describes the performance and deliverables FRA expects from the Monitoring and Technical Assistance Contractor (MTAC) for special tasks and technical assistance activities. By definition, special tasks and technical assistance are other than, and in addition to, standard oversight activities performed under other MPs.

2.0 KEY PRINCIPLES

As unique and specific assignments to MTAC contractors, when warranted by program or project circumstances, MTAC contractors may be asked to perform Special Tasks and/or Technical Assistance work. This work requires MTAC contractors to demonstrate initiative, creativity, and subject matter expertise. Regardless of the scope or scale of the assignment, the work should be performed with the following broad goals in mind:

1. Advancing the knowledge base among Grantees
2. Advancing the state-of-the-practice in the industry
3. Improving FRA's oversight capabilities for major capital rail projects
4. Achieving higher-quality projects that meet goals, budgets, and schedules

3.0 REQUIRED DOCUMENTS

Before performing the review, the MTAC should obtain relevant documents, some of which may be identified by FRA.

4.0 SCOPE OF WORK

Technical assistance can help Grantees overcome obstacles and problems that arise during project execution. Typically, when an MTAC perceives (through monitoring reviews of the Grantee) a key benefit that could be obtained or a deficiency in knowledge or approach that could be remedied, the MTAC recommends technical assistance. FRA wants to encourage a culture of learning and sharing of knowledge among its rail program participants. Providing technical assistance can accelerate learning without relieving Grantees of their project responsibilities.

As an example, the MTAC assigned to Region 1 Northeast is authorized through a job order to provide railroad signaling and communications technical assistance to a Grantee in Region 6 Central. The Grantee, within its authority and responsibility for the project, decides how to proceed while taking into account the instruction given.

While the MTAC's near-term focus is the Grantee in Region 6, the technical assistance may be of interest to many FRA rail program participants and the industry in general. During preparation of materials, the MTAC should bear this wider audience in mind.

The MTAC may participate in FRA-sponsored or authorized venues with Grantees in any region of the country, or with groups at national or regional conferences or local meetings. Special tasks and technical assistance activities may include preparation, attendance, participation in discussions, presentation of materials, and representation of FRA. Presentations or teaching, training, and tutoring may be in the following formats:

1. Structured sessions, similar to a teacher-student dynamic, such as:
    a. With a single Grantee and its team
    b. With groups in day-long or multi-day courses, teleconferences, or webinars
2. Group or peer review workshops focused on a specific project
3. Presentation in conferences or meetings, sponsored by FRA or others such as legislative staff, other executive branch offices, industry associations, community groups, or professional organizations

The MTAC may develop materials such briefings, agendas, papers, presentations, analyses, and other documents, and submit materials to FRA for its use and possible publication. Sample topics include:

1. Capital program oversight, including improvements to the MTAC Oversight Program
2. Edits and additions to the Monitoring Procedures (MP)
3. Oversight methods, including the following examples:
    a. Cost estimating
    b. Scheduling
    c. Assessing and managing risk
    d. Railroad operations modeling
4. Case studies of capital projects on strategies and best practices for project development and delivery, including the following examples:
    a. Infrastructure and service planning
    b. Organizations of leadership and project teams
    c. Environmental reviews
    d. Real estate management
    e. Risk assessments
    f. Vehicle design and acquisition
    g. Positive train control, signaling, and communications
    h. Railroad safety
    i. Railroad and station design
    j. Construction phasing and staging
    k. Testing before operations
5. Analyses of trends in the following example areas:
    a. Industry (agency or industry histories and practices)
    b. Projects (costs, cost increases, schedule, risks, etc.)
    c. Technology (vehicles, signaling, communications, etc.)

U.S. DOT Federal Railroad Administration
Office of Passenger and Freight Programs

Monitoring Procedure 20 - Project Management Plan (PMP) Review

1.0 PURPOSE

FRA expects the Grantee to develop and complete its rail project(s) using sound project management strategies. The Monitoring and Technical Assistance Contract (MTAC's) PMP review will help FRA determine whether the Grantee's legal, administrative, management, technical capacities, and capabilities are adequate to effectively and efficiently carry out all aspects of the project, and will identify where improvements may be made.

2.0 KEY PRINCIPLES

The PMP is the Grantee's overarching project implementation plan that spans the entire project period. It should be a guide for action. The PMP should describe the Grantee's authority, capacity, policies, practices, and procedures related to all phases of the project, and should set forth the specific action plan for implementing the project, and managing the scope, cost, schedule, quality, and associated risks.

The expectations set forth in this Monitoring Procedure mirror the following requirements:

49 U.S.C., United States Code, 2011 Edition.
Title 49 – TRANSPORTATION, SUBTITLE V - RAIL PROGRAMS
PART C - PASSENGER TRANSPORTATION, CHAPTER 244 - INTERCITY PASSENGER RAIL SERVICE CORRIDOR CAPITAL ASSISTANCE Sec. 24403 - Project management oversight

(a) Project Management Plan Requirements.—To receive Federal financial assistance for a major capital project under this chapter, an applicant must prepare and carry out a project management plan approved by the Secretary of Transportation. The plan should provide for—

(1) adequate recipient staff organization with well-defined reporting relationships, statements of functional responsibilities, job descriptions, and job qualifications;
(2) a budget covering the project management organization, appropriate consultants, property acquisition, utility relocation, systems demonstration staff, audits, and miscellaneous payments the recipient may be prepared to justify;
(3) a construction schedule for the project;
(4) a document control procedure and recordkeeping system;
(5) a change order procedure that includes a documented, systematic approach to handling the construction change orders;
(6) organizational structures, management skills, and staffing levels required throughout the construction phase;
(7) quality control and quality assurance functions, procedures, and responsibilities for construction, system installation, and integration of system components;
(8) material testing policies and procedures;
(9) internal plan implementation and reporting requirements;
(10) criteria and procedures to be used for testing the operational system or its major components;
(11) periodic updates of the plan, especially related to project budget and project schedule, financing, and ridership estimates; and
(12) the recipient's commitment to submit periodically a project budget and project schedule to the Secretary.

3.0 REQUIRED DOCUMENTS

The MTAC will review the Grantee's PMP and PMP sub-plans such as Management Technical Capacity and Capability Plan; Safety and Security Management Plan; Real Estate Acquisition and Management Plan, etc.

4.0 SCOPE OF WORK

The MTAC should review the Grantee's PMP submittal, typically provided once per project phase, although interim submittals may be required for particularly long phases or gaps between phases; changes in policies, procedures, or procurement methods; changes in organization leadership or responsibilities; and program, logistics, or scope changes.

Appendix A below includes a PMP Table of Contents (TOC). Using this TOC as a guide, the Grantee should provide FRA with a PMP developed to the level of completeness shown for each phase. Also, the Grantee should appropriately scale the PMP to the complexity and size of the project.

The PMP should demonstrate the Grantee's technical capacity and ability to:

1. Effectively and efficiently manage the proposed project
2. Recognize and cooperate with project oversight activities by FRA/MTAC
3. Provide directly or by contract:
    a. Adequate professional and technical expertise for project design and construction
    b. Qualified services for testing and start-up work
    c. Qualified services for construction inspection and supervision
4. Ensure the project conforms with:
    a. Grant agreements
    b. Applicable statutes
    c. Regulations, codes, and ordinances
    d. Safety standards
5. Establish and maintain adequate internal controls for:
    a. Scope, cost, schedule, risk, as related to design and construction
    b. System operations and service schedules
    c. Financial planning and reporting for capital and operations

For Grantee PMP submissions during each phase, the MTAC will characterize and assess it; provide findings; conduct analyses as required; provide professional opinions and recommendations for improvement, considering the following:

1. Usefulness as an overarching project implementation plan
2. Adequacy and soundness of PMP elements and sub-plans
3. Level of completeness for current phase, and readiness for the next phase
4. Indication of PMP elements and sub-plans recommended for acceptance or revision

For each phase below, the MTAC should review and summarize its findings, professional opinions, and recommendations for improvement, considering the adequacy and soundness of the Grantee's PMP for this phase and readiness for the next phase. The MTAC should provide suggestions and recommendations to the Grantee to help resolve issues that arise.

4.1 Cursory Review

After receiving the Grantee's PMP submission, the MTAC will quickly scrutinize the PMP for adequacy and completeness. If the PMP is unsatisfactory the MTAC will notify the appropriate FRA Regional Manager in the Office of Passenger and Freight Programs with recommendations for improvement. If directed, the MTAC will provide technical assistance to the Grantee. The Grantee will then complete necessary revisions and resubmit.

4.2 Planning and Conceptual Design

1. Early Workshop:
   a. FRA or its MTAC may recommend that the Grantee conduct a PMP workshop to establish an atmosphere of partnership and collaboration and help define baseline standards of performance for project management. Collaboration among the Grantee's leadership and project teams, FRA, host railroads, other transportation agencies, and other relevant third parties early in the project life increase understanding of requirements, responsibilities, and authorities. Vital project implementation topics can also be fully explored. FRA can share Federal requirements for a major capital project and explain the oversight process. Discussion topics may include:
      - Elements and sub-plans of the PMP
      - Agreements required
      - Real estate requirements; eminent domain authority and protocols
      - Service planning methods
      - Environmental process, and permitting requirements and protocols
      - Delivery methods, authorities, and protocols
2. The MTAC should review the PMP for the Grantee's description of its intended management approach to:
   a. Planning and concept design (**see MP 32A**)
      - Establishment of project rationale, goals, objectives, and desired outcomes
      - Establishment of the range of alternatives; screening and selection; Alternatives Analysis Report
      - Service planning criteria and analysis; Service Development Plan
      - Agreements among project stakeholders
      - Ridership analysis
      - Criteria for station location, infrastructure design
      - Environmental analysis; Tier I NEPA, Service NEPA
      - Public participation
      - Financial planning
   b. Roles and responsibilities and the interaction of various project participants

4.3 Agreements among Project Stakeholders

The MTAC should discuss with FRA the expectations for agreements within individual projects and then proceed with monitoring and technical assistance accordingly. Agreements are required to be complete and approved by FRA prior to start of final design and/or construction or the related expenditure of funds for final design and/or construction.

- Construction and Maintenance Agreements
  These agreements set the terms for the construction of the project including all appropriate Federal flow down requirements, commitment to construct the project, and terms for long term maintenance. The agreements are between the Grantee/Rail Project Sponsor and Host Railroad or any railroad owning property on which the Project is to be undertaken.

- Any Agreements necessary to Operate Service over the infrastructure improved with FRA grant funding (e.g. Operating Agreement between the Passenger Train Operator and the Host Railroad).

- Service Outcome Agreements (SOA), as required at the direction of FRA, are for a 20-year term for quantified performance benefits such as additional daily round trips, improved on-time performance or fewer minutes of delay, reduced scheduled trip times, and increased capacity. The agreements include provisions on enforcement and dispute resolution, the term of the agreement, modification procedures, and, at a high-level, maintenance and operations commitments related to the project. Each Service Outcome Agreement (SOA) is uniquely tailored to the parties and project conditions, however all SOA contain enforceable written commitments made by project stakeholders to ensure the successful improvement of passenger rail service through an FRA-funded project. Usual signatories include the Grantee, the service operator, and the host railroad or owner of the rail line.

4.4 Preliminary Engineering / NEPA (refer also to MP 39)

1. The MTAC should assess the Grantee's project management approach PE (**see MP 21**). The PMP should demonstrate a well-conceived plan for the design process and project controls.
2. The MTAC should review the adequacy and soundness of the Grantee's PMP for:
   a. Demonstration of Technical Capability and Capacity to perform the work of this phase and adequately prepare for the next, including leadership and sufficient professional expertise to complete the work.
   b. National Environmental Policy Act Coordination: Verify that the Grantee's environmental review is consistent with FRA policy, and that plans for managing and implementing environmental mitigations are incorporated into design documents, cost estimates, and schedules.
   c. Design Control:
      - Confirm the Grantee's plans and procedures are appropriate for design control, including establishment of design criteria; reviews for consistency with the service plan goals; value engineering; life-cycle cost; and safety/security considerations.
      - Confirm procedures for incorporating comments/changes to drawings and specs
      - For Design Bid Build or Design Build, confirm the PMP stipulates an appropriate level of completion of drawings and specifications
   d. Project Control:
      - Review the Grantee's control procedures for documents, cost, and schedule with the project team and third parties and assess how well they are followed
      - Review the Grantee's baselines for the capital cost estimate and schedule

- Verify that a risk assessment has been conducted before PE completion, including risk identification, assessment, mitigation, and development of adequate contingency amounts for cost and schedule at project hold points

e. Project Delivery and Procurement:
   - Review the Grantee's plan for selecting the project delivery and procurement methods; verify the selected methods are reflected in project schedules and cost estimates; for Design Build, confirm that Grantee is implementing appropriate plans and procedures for project delivery and procurement.
   - Evaluate the Grantee's proposed approach to construction management, bidding/awarding contracts, and procuring materials, equipment and vehicles

f. Review PMP sub-plans for adequacy and soundness. Sub-plans include:
   - Grantee Technical Capacity and Capability (MP 21)
   - Quality Assurance/Quality Control (MP 24)
   - Safety and Security Management (MP22)
   - Real Estate Acquisition and Management (MP23), esp. as related to ROW and utilities; consistency with The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act)
   - Vehicle Acquisition and Management (MP 38)
   - Finance Plan (MP 49) review for funding sources and cash flow relative to schedule

4.5 Final Design Review

1. The MTAC should assess whether the Grantee's project management approach is suitable to carry the project through bid, award, construction, and into revenue operations. For Design Bid Build, the Grantee's design team will conduct final design (**see MP 39**).
2. The MTAC should review and summarize its findings and opinions, and provide recommendations on the adequacy and soundness of the Grantee's PMP for:
   a. Demonstration of Technical Capability and Capacity to perform the work of this phase and adequately prepare for the next, including adequate leadership and sufficient professional expertise to complete schematic design/design development for track, structures, signals, and stations.
   b. National Environmental Policy Act (NEPA) Coordination - Verify Grantee incorporates mitigation work into the design documents, cost estimates, and schedules
   c. Design Control - Confirm that the Grantee has implemented appropriate plans and procedures for design control. In particular, confirm that:
      - Plans and procedures are consistent with design criteria
      - Coordination and change control procedures are in place across design disciplines
      - Soil testing and site surveys are complete and adequate
      - Coordination with third parties is adequate
      - For Design Bid Build, project documents for bidding are complete
   d. Project Controls - Confirm that Grantee is implementing project controls in all aspects, including procedures for:
      - Cost and schedule control

- Risk management (see that a risk assessment "refresh" is conducted during Final Design, including risk identification, assessment and mitigation, and development of adequate contingency amounts for cost and schedule at project hold points)
- Dispute resolution during construction

e. Project Delivery and Procurement: (refer to MP 32D)
   - Confirm Grantee's plans and procedures for project delivery and procurement.
   - Review Grantee's schedule for bidding construction/procuring vehicles.
   - Review division of labor between railroad forces (Force Account) and contractors

f. Labor Agreements, Labor Policies

g. Review the following PMP sub-plans as noted for PE above

h. Assess plans and procedures for readiness to start construction of fixed infrastructure:
   - Construction administration
   - Construction management
   - Construction inspection
   - Coordinating construction work by third parties
   - Construction phasing plans – sequencing the work
   - Staging plans - site logistics
   - Construction change order and shop drawing document flow

i. Assess the Grantee's plan for readiness for Startup and Operations, including:
   - Testing of systems and equipment
   - Coordination with other transportation entities
   - Training of train engineers and crews, station attendants, personnel for maintenance facilities, track, signaling, and roads
   - Commissioning of stations, maintenance facilities
   - Closeout of construction contracts

4.6 Construction

1. The MTAC should review the construction portions of the PMP in final design, as noted above, at 40 percent bid (mid-stream to allow course correction if needed), and at 50 percent constructed (again mid-stream to allow course correction if needed).
2. The MTAC should update its evaluation of the Grantee's application of the following:
   a. Technical capability and capacity to perform the work of the construction phase and adequately prepare for operations; including evaluation of adequacy of railroad force account work – scheduling of crews, types and numbers of crews
   b. Implementation of environmental mitigation measures as part of construction
   c. Implementation of its procedures for configuration and control during construction of contract documents / shop drawings / change documents
   d. Use of project controls - for documents, cost, schedule, risk, and dispute resolution
   e. Adequacy of construction inspection and administration
   f. Compliance with labor agreements and related policies
   g. Use of construction management and administration procedures
   h. Follow through on plans and procedures in PMP sub-plans

5.0 REFERENCES - SEE MP 01

APPENDIX A

PMP Table of Contents

KEY
P – Preliminary or draft
C – Required to be complete
M – Modification is required

PMP Table of Contents					
	Elements	Planning	PE	Final Design	Construction
1.0	**Introduction**				
	Purpose of the Project Management Plan	C	M		
	Project History	C			
	Project Scope	P	C		
	Schedule	P	C	M	M
	Budget	P	C	M	M
	Finance Plan (see Sub-Plan below)	P	C	M	M
	Delivery Strategies	P	C		
2.0	**Project Leadership and Team Organization**	P	C		
	Grantee Leadership Organization Chart, roles/responsibilities	C			
	Project Team Organization Chart, roles/responsibilities	C	M	M	M
	Contact information for all project personnel	C	M	M	M
	Plan to provide Technical Capacity and Capability (see Sub-plan below)	P	C	M	
3.0	**Government/Community/Labor Relations and Railroad Agreements and other Third Party Agreements**	C			
	Plan for management of: • Legislative and government relations • Intergovernmental and utility agreements • Stakeholder communications, public participation • Agreements with host railroads and other transp entities • Labor relations including project labor agreements, establishment of wage rates and classifications, wage and hour requirements, and adherence to state and local requirements, etc.	P	C	M	M
4.0	**Planning/Concept Design**				
	Plan for management of Alternatives Analysis including: • establishment of project rationale • identification and selection of alternatives • management of development of infrastructure and service plans • management of process to achieve service outcome agreement	C			

APPENDIX A

PMP Table of Contents

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PMP Table of Contents					
	Elements	Planning	PE	Final Design	Construction
5.0	**Environmental Analysis**	P	C		
	Description of approach to environmental analysis including: • development and management of alternatives • management of resource agency permit acquisition • management and implementation of mitigation actions	P	C	M	
6.0	**Design Control**				
a	Description of relationship between service plans and infrastructure -- capacity, operations, stations, support facilities; • plan for management of service outcome agreement • plan for management of other agreements related to service and operations	P	C	M	
b	Plan for Design Standards and Criteria	P	C	M	
c	Plan for investigation and testing including site surveys, geotechnical and materials investigation before and during design, and during construction	P	C	M	M
d	Plan for Preliminary Engineering	P	C		
e	Plan for development and management of Final Design		P	C	
f	Plan for safety and security (see Sub-plan below)	P			
g	Plan for QA QC (see Sub-plan below)	P	C		
h	Plan for real estate RAMP (see Sub-plan below)	P	C		
i	Plan for vehicles (see Sub-plan below)	P	C		
j	Plan to manage changes, config control for design/const	P	C	M	M
k	Plan for management of design reviews including: • Value Engineering • Coordination Reviews • Constructability Reviews • Reviews for Operations and Maintenance • Other peer or industry reviews	P	C	M	

APPENDIX A

PMP Table of Contents

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PMP Table of Contents					
	Elements	Planning	PE	Final Design	Construction
7.0	**Management and Project Controls**				
a	Scope Control and Configuration - approach to mgmt	P	P	C	
b	Budget and Cost Control - approach to mgmt including descriptions of cost estimating methodologies and assumptions	P	P	C	
c	Schedule Control - approach to management including descriptions of scheduling methodologies and assumptions	P	P	C	
d	Risk Control - approach including risk identification, evaluation, management; including contingency control,	P	P	C	M
e	Overall Project Tracking and Reporting	P	C	M	
f	Document Control and Records Management including approach to review, track changes, distribution, storage	P	C	M	
g	Dispute / Conflict Resolution Plan	P	P	C	
8.0	**Project Delivery, Procurement, Contract Administration**				
	Contracting Authority	C			
	Procurement Strategy - selection of delivery methods	P	C		
	Procurement Procedures (for design, legal, const contracts)	P	C		
9.0	**Construction Management**				
	Construction Management Plan including: • Independent Verification and Validation • Construction Inspection including Materials Testing Procedures • Site Logistics Plan incl Maint. of Traffic/Ops • Coord w Third Parties affected by construction		P	C	M
	Construction Contract Administration including plan for: • Processing shop drawings, bulletins, RFIs • Negotiating and approving change orders and claims • Establishing substantial completion and final completion • Coordination with Third Parties interested in construction			C	M
10.0	**Start Up, Revenue Operations, Construction Close Out**		P	M	C
	Plan for testing and start-up			C	M
	Plan for training of staff, train operators, others			C	M
	Construction contract closeout, including obtaining warranties, testing results, O&M manuals, spare parts, etc.			C	M
	Administrative closeout			C	M

APPENDIX A

PMP Table of Contents

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P – Preliminary or draft
C – Required to be complete
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PMP Table of Contents					
	PMP SUB-PLANS	Planning	PE	Final Design	Construction
11.0	**Management and Technical Capacity /Capability Plan (MP 21)**	P	C	M	
12.0	**Quality Assurance, Quality Control Plan (MP 24)**	P	C	M	
13.0	**Safety and Security Management Plan (MP 22)**	P	C	M	
14.0	**Real Estate Acquisition and Management Plan (MP 23)**	P	C	M	
15.0	**Vehicle Acquisition and Management Plan (MP 38)**	P	C	M	
16.0	**Risk and Contingency Management Plan (RCMP) (MP-40)**	P	C	M	M
17.0	**Finance Plan (MP 49)**	P	C	M	M

Monitoring Procedure 21 – Management & Technical Capacity/Capability (MTCC)

1.0 PURPOSE

This Monitoring Procedure (MP) describes FRA expectations for the Monitoring and Technical Assistance Contractor (MTAC) on how to evaluate the Grantee's management, organization, and capability to effectively and efficiently plan, develop, manage, and complete a major federally-assisted capital rail project.

2.0 KEY PRINCIPLES

A high level of management expertise and technical capacity and capability to conduct the work are fundamental building blocks for project success.

MTAC areas of focus on the Grantee:

1. The MTAC evaluation will cover the Grantee's "extended team" -- executive leadership, project team, host railroads, consultants and contractors on the Grantee's team, other partners, and third-party contributors.
   a. Organization
   b. Personnel qualifications and experience
   c. Team members' understanding of their project roles and the project's critical issues
2. Grantee's overall approach to the work
   a. Policies and procedures
   b. Use of project control methods
      i. developing and updating cost estimates and schedules
      ii. collecting costs and measuring against WBS; forecasting cost-to-complete
      iii. identifying, managing, and mitigating risks; identifying variances
      iv. developing recovery plans

3.0 REQUIRED DOCUMENTS

In addition to the conduct of interviews, the MTAC will obtain and review the following documents from the Grantee:

1. Management & Technical Capacity and Capability Plan (MTCC)
   a. MTCC is the PMP Sub-Plan that is the subject of this Monitoring Procedure. The MTCC document or plan is prepared by the Grantee before each project phase begins, or at least, very early in each project phase. See MTCC Table of Contents in Appendix A.
   b. Grantee's agreement(s) / draft agreements with FRA, contracts with consultants and contractors, railroads and other parties.
2. Project Management Plan (PMP) and other Sub-plans
   a. To provide context, these plans are necessary for the MTAC's evaluation of the Grantee's management and technical capacity and capability.

4.0 SCOPE OF WORK

If the MTAC determines that the Grantee is inadequate or weak because of its organization, personnel qualifications, and experience, or approach or ability to perform the work, the MTAC should make recommendations for corrective action and a time frame for the action.

4.1 Description of Grantee's Approach to Project

Evaluate the Grantee's approach to the following:

1. Management of professional staff and construction contractors to progress the work
2. Management of third-party contracts in compliance with Federal requirements
3. Compliance with FRA grant provision and reporting requirements
    i. Compliance with federal grant provisions, for example:
    ii. Title VI of Civil Rights Act of 1964, Disadvantaged Business Enterprise (DBE)
    iii. Americans With Disabilities Act
    iv. Uniform Property Acquisition and Relocation Act of 1970
    v. Construction program assurances as described in SF424-d
    vi. Requirement for matching funds and related intergovernmental/local agreement
4. Management and technical capacity and capability to perform specific aspects of the work, such as:
    a. Conducting planning analyses for corridor and train capacity, operations, ridership, infrastructure
    b. Designing and engineering the project
    c. Developing/delivering the project so that it meets goals, objectives, and outcomes
    d. Responding in a timely manner to RFIs from Congress, FRA, MTAC, etc.
    e. Developing/implementing a sound community relations program
    f. Accounting for real estate acquisitions and relocations; maintenance of a project property inventory
    g. Developing/implementing safety and security measures
    h. Cost estimating and scheduling

4.2 Organization, Personnel Qualifications, and Experience

1. Evaluate the completeness of the organizational information provided and assess whether the organizational structures are conducive to effective and efficient project implementation.
2. Evaluate the roles, responsibilities, and interfaces among the Grantee's team.
    a. Assess the effectiveness of the lines of authority and responsibility between the executive leadership and the project team, and between the project team and partners and third-parties. Include the:
        i. Executive leadership
        ii. Project team of staff, consultants, and contractors
        iii. Partners including host railroads, other transportation entities, as well as state, regional, and local jurisdictions
        iv. Third party contributors to the project program

b. Evaluate the staff qualifications and experience (see Appendix B of this MP for a sample) and assess whether the Grantee possesses the appropriately qualified staff and/or third-party consultants to:
    i. Obtain support and incorporate requirements from jurisdictions through which the project passes; from third parties including railroads, utility companies, and adjacent parcel owners
    ii. Secure and administer the required local funding
    iii. Conduct planning, feasibility studies, alternatives analyses, as well as environmental reviews
    iv. Design, and manage the project construction using appropriate delivery method(s), e.g. design/bid/build, design/build, construction management/general contractor (CM/GC), etc.
    v. Maintain operations on the existing rail system at the same time as adding infrastructure and service
    vi. Acquire and commission vehicles
3. Assess the agency's history of performance, financial stability, adequacy of management systems, and conformance with the terms of previous awards, etc.
4. Review the Grantee's agreements / draft agreements with FRA, as well as its contracts, and agreements with railroads, and other parties.
5. Evaluate the Labor Hour Distribution and Staffing Plan over the project life (see Appendix C and Appendix D for examples), and assess the adequacy of staffing and project budget for staffing.
6. Evaluate the adequacy of the Grantee's physical resources to effectively advance the project, such as office space, equipment, and furnishings.

4.3 Description of Management Processes and Procedures

Evaluate the Grantee's processes and procedures related to:

1. Agency board decision-making authority
2. Agency and Project leadership and executive staff decision-making authority
3. Legal services
4. Procurement services
5. Financial planning and management such as developing budgets for capital projects and operations; securing matching funds; managing cash flow
6. Community outreach

4.4 Resumes of Project Team Members

1. Evaluate the resumes of project team members.
2. Conduct personal interviews of Grantee leadership and key staff (See Appendix E for Sample Questionnaire)

5.0 REFERENCES – SEE MP 01

APPENDIX A

Management & Technical Capacity/Capability (MTCC) Table of Contents

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KEY

C – COMPLETE for each phase. Unlike other PMP Sub-plans in which a preliminary or draft document is further developed in subsequent phases, the items below must be fully provided for the current phase and, to the extent possible, be provided for the subsequent phase as well.

Management & Technical Capacity/Capability - Table of Contents					
	Elements	Planning	PE	Final Design	Construction
1.0	**Approach to the Project**				
	Description of Grantee's Approach to Project covering: • Planning / Concept Design • Preliminary Engineering • Final Design • Bidding through Construction, Testing, Startup, RevOperations	C	C	C	C
2.0	**Organizational Charts**				
	Organizational Charts for: • Grantee's executive leadership • Its project team of staff, consultants, and contractors; • Its partners in the effort including host railroads, other transportation entities, as well as state, regional, and local jurisdictions; • Third party contributors to the project program	C	C	C	C
	Staff Qualifications and Experience Chart	C	C	C	C
	Description of roles, responsibilities, interfaces among key project team members through responsibility matrix	C	C	C	C
	Staffing Plan - Labor Hour Distribution over Life of Project	C	C	C	C
	Copies of Relevant RFPs / Contracts / Agreements	C	C	C	C
3.0	**Description of Management Processes and Procedures**				
	Agency Board decision-making authority	C	C	C	C
	Agency Leadership and Executive Staff decision-making authority	C	C	C	C
	Project Leadership and Executive Staff decision-making authority	C	C	C	C
	Legal services for contracts, ADR	C	C	C	C
	Financial Management, funding approval processes/authorities	C	C	C	C
	Procurement services	C	C	C	C
	Community outreach and relations, interface with State and Local Agencies and Media; Public Hearings	C	C	C	C
4.0	**Resumes of project team members**	C	C	C	C

APPENDIX B

Sample Summary of Staff Qualifications/Experience

Staff Qualifications and Experience																													
Discipline	Specialty	Person's Name	Title	Organization	Years of Exper.	Years w/ Organization	Years w/ Current Project	Quals		Experience (Mark with "X")												Current Time (%)	Proposed Time on Project (%)				
								Education	Prof Reg.	Service Planning	Infrastructure Planning and Design	Safety & Security	Real Estate	Environmental Analysis	Financial Planning	Project Controls	Systems & Vehicles	Testing for Rev Ops	Procurement & Contracting for Construction	Construction Mgmt		PE	FD	CON	Start Up	Ops

APPENDIX C

Labor Hour Distribution over the Life of Project

Agency Staff - Project Labor Distribution (FTE)

Position	Person's Name	2014	2014 (one year only shown for example)											
			Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Executive Director		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Deputy Executive Director		-	-	-	-	-	-	-	-	-	-	-	-	-
Administrative Specialist		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Administrative Assistant/Reception		-	-	-	-	-	-	-	-	-	-	-	-	-
Civil Systems Integration Manager		0.2	0	0	0	0	0	0	0.4	0.4	0.4	0.4	0.4	0.4
Chief of Staff		1	1	1	1	1	1	1	1	1	1	1	1	1
Electrical Engineer		0.5	0	0	0	0	0	0.5	0.5	1	1	1	1	1
Senior Civil/Structural Engineer		-	-	-	-	-	-	-	-	-	-	-	-	-
Administrative Assistant		-	-	-	-	-	-		-	-	-	-	-	-
Director's Office FTE Total		**24**	**1.3**	**1.3**	**1.3**	**1.3**	**1.3**	**1.8**	**2.2**	**2.7**	**2.7**	**2.7**	**2.7**	**2.7**
Program Manager		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Project Development Coordinator		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Project Manager		0.2	0	0	0	0	0	0	0.4	0.4	0.4	0.4	0.4	0.4
Project Development Manager		1	1	1	1	1	1	1	1	1	1	1	1	1
Project Development Coordinator		0.5	0	0	0	0	0	0.5	0.5	1	1	1	1	1
Administrative Assistant		-	-	-	-	-	-	-	-	-	-	-	-	-
Project Development FTE Total		**24**	**1.3**	**1.3**	**1.3**	**1.3**	**1.3**	**1.8**	**2.2**	**2.7**	**2.7**	**2.7**	**2.7**	**2.7**
Civil Engineering Manager														
Senior Civil Engineer														
Senior Architect														
Architect														
Civil Engineer														
Permits Administrator														
Permit Assistant														
Senior Civil Engineer														
Civil Engineer														
Right of Way Assistant														
Administrative Assistant														
CADD Operator														
Civil Engineering FTE Total														
Systems Engineering Manager														
Engineering Systems Inspector														
Senior Systems Engineer														
Systems Engineer														
Systems Engineer														
Senior Systems Engineer														
Senior Systems Engineer														
Administrative Assistant														
Systems Engineering FTE Total														
etc														
Project Controls FTE Total														
etc														
Construction Management FTE Total														
etc														
Environmental FTE Total														
etc														
Real Estate FTE Total														
TOTAL AGENCY FTE		**48**	**2.6**	**2.6**	**2.6**	**2.6**	**2.6**	**3.6**	**4.4**	**5.4**	**5.4**	**5.4**	**5.4**	**5.4**

APPENDIX C

Labor Hour Distribution over the Life of Project

Consultant - Project Labor Distribution (Hours/FTE)

Position	Person's Name	2014	2014 (one year only shown for example)											
			Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Project Management and Control		669		54	77	61	80	61	64		54	77	61	80
Project Manager		779	40	50	96	61	80	61	64	40	50	96	61	80
Project Controls Mgr		168	40	8	10	8	10	8	8	40	8	10	8	10
Project Controls		876	8	80	96	76	100	76	80	8	80	96	76	100
Administrative Support		393	40	48	58	15	20	15	16	40	48	58	15	20
QA Manager		171		16	19	15	20	15	16		16	19	15	20
Service Planning Manager		172		16	19	15	20	16	16		16	19	15	20
Environmental Analysis Manager		0												
Systems Integration Mgr		520		48	58	46	60	48	48		48	58	46	60
Design Integration Engineer		689		64	77	61	80	61	64		64	77	61	80
Vehicle Manager		0												
Electrification System Mgr		940	40	80	96	76	100	76	80	40	80	96	76	100
Utilities Coordination		171	0	16	19	15	20	15	16	0	16	19	15	20
QC Manager		0	0	0	0	0	0	0	0	0	0	0	0	0
Quality Control		0	0	0	0	0	0	0	0	0	0	0	0	0
Systemwide Electrical		0												
Systemwide Electrical Mgr		940	40	80	96	76	100	76	80	40	80	96	76	100
Systemwide Electrical		174	0	16	19	16	20	16	16	0	16	19	16	20
Quality Control		72	0	0	0	0	20	16	16	0	0	0	0	20
Signal System Mgr		623	48	58	48	60	46	48	55	48	58	48	60	46
Civil Coordination		623	48	58	48	60	46	48	55	48	58	48	60	46
Quality Control		0	0	0	0	0	0	0	0	0	0	0	0	0
Communications System		0												
Communications System Mgr														
etc														
etc														
etc														
etc														
etc														
etc														
Total Hours		7980	304	692	836	661	822	656	694	304	692	836	661	822
Total FTE's based on 160hrs/month		**49.875**	**1.9**	**4.33**	**5.23**	**4.13**	**5.14**	**4.1**	**4.34**	**1.9**	**4.33**	**5.23**	**4.13**	**5.14**

Total Project Labor Distribution (FTE)

Position	Person's Name	2014	2014 (one year only shown for example)											
			Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Total Agency FTE		48	2.6	2.6	2.6	2.6	2.6	3.6	4.4	5.4	5.4	5.4	5.4	5.4
Total Consultant FTE		49.9	1.9	4.3	5.2	4.1	5.1	4.1	4.3	1.9	4.3	5.2	4.1	5.1
Total		97.9	4.5	6.9	7.8	6.7	7.7	7.7	8.7	7.3	9.7	10.6	9.5	10.5

APPENDIX D

Sample Staffing Plan

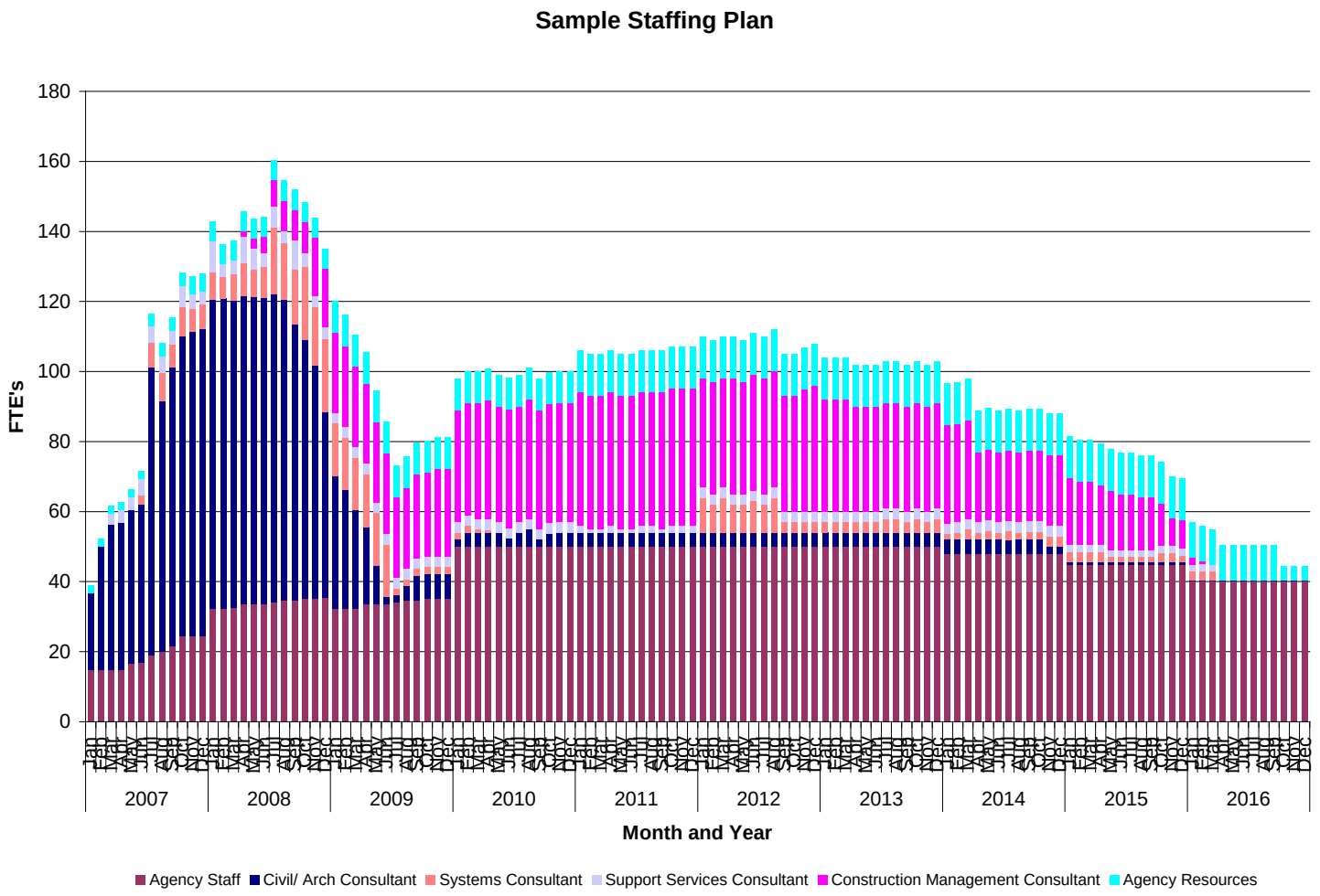

Figure 1. Sample Staffing Plan Over Project Life

APPENDIX E

Sample Questionnaire for Interviews

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1. Organizational Experience- AGENCY Project History
   Agency to describe all projects in the last 5 years with a construction cost of $100M or more - provide description, cost, schedule, project delivery methods, issues, personnel, etc.
2. Questions for Key Individuals within AGENCY and on Project Team – note that the questions are tailored to the position within the organization.

<u>AGENCY EXECUTIVE DIRECTOR and other AGENCY LEADERSHIP</u>
Similar to below.

<u>VP / DIRECTOR OF CAPITAL PROJECTS</u>

1. What is your educational background? Do you have a copy of your resume?
2. Briefly describe your work experience prior to coming to AGENCY, especially on rail projects. On projects of comparable dollar volume. On projects in similar municipalities.
3. Describe AGENCY experience on large dollar projects in the last 5 years. Budget performance. Schedule performance.
4. How long have you worked with AGENCY and what positions have you held?
5. Briefly describe your role and responsibilities as VP/Director of Capital Projects as they relate to the AGENCY's Project.
6. Describe actions taken by you to complete other similar sized projects on budget and schedule. What actions would you take if you saw the project overrunning the project budget and schedule?
7. Describe your working relationship with other AGENCY Departments. What resources, if any are available for this project from the AGENCY's Capital Projects Group?
8. What level of personal involvement do you anticipate in the following project activities?
   a) Project management
   b) Financial management
   c) Design and engineering
   d) Environmental monitoring and reporting
   e) ROW acquisition
   f) Grants administration
   g) Project Controls
   h) QA/QC
   i) Safety and security
   j) Change order negotiation
   k) Dispute resolution
   l) Final acceptance
9. Who do you report to and how do you interface with your boss? Did you work with your boss prior to this project?
10. Who reports to you, what are their responsibilities and how do you interface with each? Did you work with them prior to this project?
11. Who has the authority to make personnel changes on this project?

12. What additional AGENCY staff will be required beyond that described in PMP dated _____ (or the current staffing plan)? When do you plan to bring on the additional staff?
13. Please describe your interface with:
    a) Project Director (AGENCY)
    b) Chief Operating Officer (AGENCY)
    c) Manager of Project QA QC and Safety (AGENCY)
    d) Dep. Director Project Development (AGENCY)
    e) Dep. Director Design (AGENCY)
    f) Dep. Director Construction (AGENCY)
    g) Manager of Rail Communications (AGENCY)
    h) Dep. Director Project Finance (AGENCY)
    i) Contracting Officer (AGENCY)
    j) Project Manager
    k) Other parties as required
14. What do you see as the main challenges to completing the project on schedule and within budget?
15. What do you see as the greatest engineering challenge and how would you address it?
16. What do you see as the greatest construction challenge and how would you address it?
17. What is your role in addressing those challenges?
18. Describe AGENCY management approach to limit scope increase changes to the project. How will scope issues (scope creep) generated by Third Parties or Operating Entity review/technical support involvement be managed?
19. If you had to start over again, what would you do differently?

PROJECT DIRECTOR

1. What is your educational background? Do you have a copy of your resume?
2. Briefly describe your work experience prior to coming to AGENCY, especially on rail projects. On projects of comparable dollar volume.
3. How long have you worked with AGENCY and what positions have you held?
4. Briefly describe your role and responsibilities as Project Director.
5. Describe your prior project experience that gave you the skills to perform the duties of project director on a project of this size.
6. Do you have a copy of the PMP? Do you have any concerns about assigned responsibilities?
7. What are your personal responsibilities and what AGENCY resources are available to assist you to fulfill your assigned responsibilities in following areas?
8. What key support staff are assigned to assist in specific disciplines.
    a) Design and engineering
    b) Environmental monitoring and reporting
    c) IGA interpretation/compliance
    d) Third Party coordination (treat these individually)
    e) ROW acquisition
    f) Grants administration
    g) PMP updating

h) Project Controls (AGENCY staff)
i) Contract administration
j) Estimating
k) CO/Claims
l) Consultant oversight
m) DBE monitoring
n) Document control
o) Reporting

9. Who do you report to and how do you interface with your boss? Did you work with your boss prior to this project?
10. Who reports to you, what are their responsibilities and how do you interface with each? Did you work with them prior to this project?
11. Describe your working relationship with the AGENCY Operations? Engineering? Procurement?
12. Do you envision AGENCY staff beyond that described in PMP (or current staffing plan)? Will this be adequate?
13. Please describe your interface with: (go up a level and down two levels on org chart)
14. What do you see as the main challenges to completing the project on schedule and within budget?
15. What is your role in addressing those challenges?
16. Describe role of Operating Agency or Other Third Party Agency in submittal review/approval process. How will scope issues (scope creep) generated by them, review/technical support involvement be managed?
17. What do you see as the greatest engineering challenge and how would you address it?
18. What is your role in addressing those challenges?
19. What do you see as the greatest construction challenge and how would you address it?
20. What is your role in addressing those challenges?
21. Were you involved in the development of the Quality Assurance Program Plan? If so what was your responsibility?
22. If you had to start over again, what would you do differently?

<u>PROJECT QA/QC MANAGER</u>

1. What is your educational background? Do you have a copy of your resume?
2. Briefly describe your work experience prior to coming to AGENCY, especially on rail projects. What is your experience on projects of comparable dollar volume?
3. How long have you worked with AGENCY, and what positions have you held?
4. Briefly describe your role and responsibilities as Project QA/QC & Safety Manager.
5. What AGENCY resources are available to assist you to fulfill your assigned responsibilities in following areas?
    a) Preparation of AGENCY Quality Program Plan (QPP)
    b) Implementing and maintaining QPP
    c) Preparation of AGENCY Safety and Security Management Plan (SSMP)
    d) Implementing and maintaining SSMP

e) Review of DESIGNER OR CONSTRUCTION CONTRACTOR OR DESIGN BUILD CONTRACTOR System Safety/Security Certification Management Plan
f) DESIGNER OR CONSTRUCTION CONTRACTOR OR DESIGN BUILD CONTRACTOR Environmental, Safety and Health Plan
g) DESIGNER OR CONSTRUCTION CONTRACTOR OR DESIGN BUILD CONTRACTOR procedures related to system and construction safety
h) Audits/reviews of AGENCY and consultants

6. Whom do you report to, and how do you interface with them? Did you work with this individual prior to this project?
7. Who reports to you, what are their responsibilities and how do you interface with each other? Did you work with them prior to this project?
8. When will the Project QA/QC Supervisor and Project Safety Supervisor be hired?
9. Do you envision the need for additional AGENCY staff beyond that described in PMP? Or do you believe staffing is adequately addressed?
10. Please describe your interface with: VP/Director of Capital Projects, Project Director, all Deputy Directors
11. What do you see as the main challenges to completing the project on schedule and within budget?
12. What do you see as the greatest engineering challenge and how would you address it?
13. What do you see as the greatest construction challenge and how would you address it?
14. What was your responsibility in the development of the Quality Program Plan (QPP)?
15. Were you involved in the development of the PMP? Does it reflect the appropriate QPP commitments?
16. Are you satisfied with the consultants and AGENCY Quality Plans? What improvements would you like to see?
17. Have you prepared a safety certification checklist and schedule? How is it updated?
18. Audits
    a) Who is audited?
    b) Construction safety?
    c) Frequency?
    d) Who assists?
    e) Follow up on findings?
    f) Does AGENCY management support this process?
    g) Are you satisfied with the audit process?
    h) How can the process be improved?
19. What do you see as the main challenges to obtaining safety certification?
20. How do you interface with the Operating Agency on this issue?
21. What is your recruitment plan for the “QA Specialist” and “Project Safety Supervisor”?
22. Describe the process you envision to interface with the Contractor’s Safety and Security Manager.
23. Has AGENCY provided training to AGENCY and consultant staff on the Project’s QPP and AGENCY’s Project Management Procedures in accordance with the QPP? If so, is there documentation of training sessions (attendee sign-in sheets, training agenda and materials, etc.)?

24. Has the QPP been distributed to all personnel assigned to the Project (AGENCY, THE OPERATING AGENCY, CONSULTANTS, etc.)? Is there documentation for which Project staff members have received the QPP?
25. Have the Project Management Procedures established for this Project been distributed to all assigned project personnel (AGENCY, THE OPERATING AGENCY, CONSULTANTS, etc.)? Is there documentation of which Project staff members have received the procedures?

PROJECT SAFETY AND SECURITY MANAGER

1. What is your educational background? Do you have a copy of your resume?
2. Briefly describe your work experience prior to coming to AGENCY, especially on rail projects. What is your experience on projects of comparable dollar volume?
3. How long have you worked with AGENCY, and what positions have you held?
4. Briefly describe your role and responsibilities as Project Safety & Security Manager.
5. What AGENCY resources are available to assist you to fulfill your assigned responsibilities in following areas?
    a) Preparing AGENCY Safety and Security Program Plan (SSPP)
    b) Implementing and maintaining SSPPP
    c) Preparing AGENCY Safety and Security Management Plan (SSMP)
    d) Implementing and maintaining SSMP
    e) Reviewing DESIGNER OR CONSTRUCTION CONTRACTOR OR DESIGN BUILD CONTRACTOR System Safety/Security Certification Management Plan
    f) DESIGNER OR CONSTRUCTION CONTRACTOR OR DESIGN BUILD CONTRACTOR Environmental, Safety and Health Plan
    g) DESIGNER OR CONSTRUCTION CONTRACTOR OR DESIGN BUILD CONTRACTOR procedures related to system and construction safety
    h) Audits/ reviews of AGENCY and consultants
6. Whom do you report to and how do you interface with them? Did you work with this individual prior to this project?
7. Who reports to you, what are their responsibilities and how do you interface with each other? Did you work with them prior to this project?
8. When will Project Safety & Security Supervisor be hired?
9. Do you envision the need for additional AGENCY staff beyond that described in PMP? Or do you believe staffing is adequately addressed?
10. Please describe your interface with: VP/Director of Capital Projects, Project Director, all Deputy Directors
11. What do you see as the main challenges to completing the project safely and securely?
12. What do you see as the greatest engineering challenge and how would you address it?
13. What do you see as the greatest construction challenge and how would you address it?
14. What was your responsibility in the development of the SSPP and SSMP?
15. Were you involved in the development of the PMP? Does it reflect the appropriate SSPP and SSMP commitments?
16. Are you satisfied with the consultants and AGENCY SSPP and SSMP? What improvements would you like to see?

17. Have you prepared a safety certification checklist and schedule? How is it updated?
18. Audits
    a) Who is audited?
    b) Construction safety?
    c) Frequency?
    d) Who assists?
    e) Follow up on findings?
    f) Does AGENCY management support this process?
    g) Are you satisfied with the audit process?
    h) How can the process be improved?
19. What do you see as the main challenges to obtaining safety certification?
20. How do you interface with the Operating Agency on this issue?
21. What is your recruitment plan for the "Project Safety Supervisor"?
22. Describe the process you envision to interface with the Contractor's Safety and Security Manager.
23. Has AGENCY provided training to AGENCY and consultant staff on the Project's SSPP and SSMP and AGENCY's Project Management Procedures in accordance with the SSPP and SSMP? If so, is there documentation of training sessions (attendee sign-in sheets, training agenda and materials, etc.)?
26. Have the SSPP and SSMP been distributed to all personnel assigned to the Project (AGENCY, THE OPERATING AGENCY, CONSULTANTS, etc.)? Is there documentation of which Project staff members have received the SSPP and SSMP?

<u>DEPUTY DIRECTOR OF PROJECT FINANCE</u>

1. What is your educational background? Do you have a copy of your resume?
2. Briefly describe your work experience prior to coming to AGENCY, especially on rail projects. In addition, what is your experience on projects of comparable dollar volume?
3. How long have you worked with AGENCY, and what positions have you held?
4. Briefly describe your role and responsibilities as Deputy Director Project Finance. Are you assigned to the Project full time?
5. Do you have a copy of PMP? Do you have any concerns about assigned responsibilities?
6. What are your personal job responsibilities and what AGENCY resources are available to assist you to fulfill your assigned responsibilities in following areas?
    a) Development of detailed financial plan
    b) Development of financial documentation in support of New Starts submittal
    c) Development of financial documentation in support of FFGA
    d) Development of project funding agreements
    e) Maintaining cash flow requirements based on contract need
    f) Management of capital funding sources to ensure funding matches construction draw down schedule
    g) Coordination with AGENCY Financial Management Division on finance and accounting support
    h) Coordination with funding partners to identify funding and support debt issuances

7. Whom do you report to, and how do you interface with them (AGENCY VP of Finance)? Did you work with this individual prior to this project?
8. Explain your indirect reporting relationship with the Project Director. Do you foresee any problems arising due to this relationship structure? If so, please explain.
9. Who reports to you, what are their responsibilities and how do you interface with each other? Did you work with them prior to this project?
10. Do you envision the need for additional AGENCY staff beyond that described in PMP, or is it adequate?
11. Please describe your interface with: VP/Director of Capital Projects, Project Director, all Deputy Directors, etc.
12. What do you see as the main challenges to completing the project on schedule and within budget?
13. Describe the process of obtaining funding for THE OPERATING AGENCY or local municipality imposed preferential (out of scope) changes.
14. Describe the process of obtaining funding required beyond the budget.
15. Describe how the financial reporting/aspects of the project can be improved.

MANAGER OF PUBLIC AFFAIRS & COMMUNICATIONS

1. What is your educational background? Do you have a copy of your resume?
2. Briefly describe your work experience prior to coming to AGENCY, especially on rail projects, as well as, on projects of comparable dollar volume.
3. How long have you worked with AGENCY and what positions have you held?
4. Briefly describe your role and responsibilities as Manager of Rail Communications.
5. Do you have a copy of PMP dated ___? Do you have any concerns about assigned responsibilities?
6. What are your personal responsibilities and what AGENCY resources are available to assist you to fulfill your assigned responsibilities in following areas?
    a) Press Releases
    b) News Conferences
    c) Ground breaking events
    d) Town meetings
    e) Management of Arts In Transit Program
    f) Communications with public officials
    g) Communication of traffic impacts (planned and unplanned)
    h) Media relationships
    i) Online communications
7. Whom do you report to and how do you interface with them? Did you work with your boss prior to this project?
8. Who provides you with the approval and/or direction to share information with the public?
9. How do you ensure that a consistent message is sent to community/media from the Project team?
10. Who reports to you, what are their responsibilities, and how do you interface with each other? Did you work with them prior to this project?
11. Do you envision the need for additional AGENCY staff beyond that described in PMP? Or is this adequate?

12. Please describe your interface with: VP/Director of Capital Projects, Project Director , all Dep. Directors
13. What do you see as the greatest community impact and how will you address it?
14. Do you have a copy of the Communications and Outreach Plan? Have you reviewed it?
    a) Has this Plan been shared with the Project team (AGENCY, CONSULTANTS, etc.)? How often will this Plan be updated?
    b) Who is the individual responsible for the oversight and execution of this Plan?
15. How often is the Project's website updated? Who is responsible for ensuring the content on the website is accurate and up-to-date?
16. What is the protocol for responding to a media inquiry concerning the Project?
17. Are there strategies/protocols for emergency situations (i.e., construction accident requiring closure of a major roadway)? If so, where can they be found, and is the Project Team (AGENCY, CONSULTANTS, etc.) aware of these protocols?

<u>DEPUTY DIRECTOR OF PROJECT DEVELOPMENT</u>

1. What is your educational background? Do you have a copy of your resume?
2. Briefly describe your work experience prior to coming to AGENCY, especially on rail projects. On projects of comparable dollar volume. On projects in same municipalities.
3. How long have you worked with AGENCY and what positions have you held?
4. Briefly describe your role and responsibilities as Deputy Director of Project Development. How much time do you expect to devote to this project?
5. Do you have a copy of the PMP? Do you have any concerns about your assigned responsibilities?
6. Describe your prior project experience that gave you the skills to perform the duties of Deputy Director Project Development on a project of this size.
7. At the current stage of the project, please describe the different responsibilities of Project Development and Project Design?
8. What are your personal responsibilities and what AGENCY resources are available to assist you to fulfill your assigned responsibilities in following areas?
    a) Development of planning analyses, PE and FD drawings and specifications, cost estimates, schedules, and risk assessments
    b) Management of environmental mitigation compliance during design and construction
    c) Management of coordination with local, state and federal agencies.
    d) Management of ROW acquisitions and relocations; identify personnel to assist you.
    e) Management of "Before and After Study."
    f) Development and execution of project agreements. Identify major agreements that you would be responsible for developing and executing.
    g) Coordination with state transportation plans, state rail plans, multi-state rail network plans. What are your responsibilities in this area?
    h) Coordination with other active Federal, State, and county projects.
    i) Coordination of permit applications including environmental.
9. Who do you report to and how do you interface with your boss? Did you work with your boss prior to this project?

APPENDIX E

Sample Questionnaire for Interviews

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10. Who reports to you, what are their responsibilities, and how do you interface with each? Did you work with them prior to this project?
11. Describe your working relationship with the AGENCY Engineering Dept.
12. Do you envision AGENCY staff beyond that described in PMP? Is this adequate?
13. Please describe your interface with Project Director, all Dep. Directors, the Operating Agency, other third parties.
14. What do you see as the main challenges to completing the project on schedule and within budget?
15. What is your role in addressing those challenges?
16. Describe role of THE OPERATING AGENCY in submittal review/approval process. How will scope issues (scope creep) generated by THE OPERATING AGENCY review/technical support involvement be managed?
17. What do you see as the greatest engineering challenge and how would you address it?
18. What do you see as the greatest construction challenge and how would you address it?
19. Were you involved in the development of the Quality Assurance Program Plan? If so what was your responsibility?
20. If you had to start over again, what would you do differently?

For all of the following positions, ask similarly tailored questions:

- Deputy Director Design/Engineering
- Deputy Director of Construction
- Contracting Officer
- Manager of Real Estate

U.S. DOT Federal Railroad Administration
Office of Passenger and Freight Programs

Monitoring Procedure 22 – Safety and Security Management Plan (SSMP)

1.0 PURPOSE

This Monitoring Procedure describes the Monitoring and Technical Assistance Contractor's (MTAC) review and analysis of the Grantee's implementation of Federal requirements for safety and security management.

2.0 KEY PRINCIPLES

Safety and security should be considered as a top priority and incorporated into the work of planning, design, construction, and testing of rail projects, so that during operation, safety and security risks are reduced and safe transport of passengers and freight is ensured.

3.0 REQUIRED DOCUMENTS

The MTAC will obtain and review the documents listed in 3.0 of the following MPs as applicable to the Grantee's project under review:

- MP 20 Project Management Plan (referencing Safety and Security Management Plan)
- MP 32A Planning and Concept Design
- MP 32C Scope
- MP 38 Vehicle Acquisition and Management
- MP39 Preliminary Engineering and Final Design

In addition, the MTAC will access and apply the following:

- FRA Passenger Startup Hazard Analysis Manual

- Grantee's Annual Self-Assessment for Safety and Security

- FRA safety regulations from the FRA Office of Safety, at http://www.fra.dot.gov/Page/P0010, some of which are listed:
  - 49 CFR Parts 213 and 238 Final Rule on Vehicle / Track Interaction Safety Standards; High-Speed and High Cant Deficiency Operations. USDOT, FRA 49 CFR Parts 213 and 238, Federal Register / Vol. 78, No. 49 / Wednesday, March 13, 2013 / Rules and Regulations
  - 49 CFR 213-Track Safety Standards
  - 49 CFR 214-Railroad Workplace Safety (Roadway worker protection)
  - 49 CFR 228-Hours of service railroad employees
  - 49 CFR 233-Signal systems reporting requirements
  - 49 CFR 234-Grade crossing signal system safety and State action plans
  - 49 CFT 235-Instructions governing applications for approval of a discontinuance or material modification of a signal system or relief from the requirements of part 236

- 49 CFR 236-Rules, standards, and instructions governing the installation, inspection, maintenance, and repair of signal and train control systems, devices, and appliances
- 49 CFR 237-Bridge Safety Standards
- 49 CFR 238-Passenger Equipment Safety Standards
- 49 CFR 239-Passenger Train Emergency Preparedness

- Grantee's System Safety Program Plan
  - The System Safety Program Plan is a component of the Safety and Security Management Plan (SSMP). It should follow the APTA/FRA Guide, soon to be an FRA regulation in 49CFR270. Refer to the Notice of Proposed Rulemaking, https://www.federalregister.gov/articles/2012/09/07/2012-20999/system-safety-program, in which "FRA proposes to require commuter and intercity passenger railroads to develop and implement a system safety program (SSP) to improve the safety of their operations. An SSP would be a structured program with proactive processes and procedures developed and implemented by commuter and intercity passenger railroads to identify and mitigate or eliminate hazards and the resulting risks on each railroad's system. A railroad would have a substantial amount of flexibility to tailor an SSP to its specific operations. An SSP would be implemented by a written SSP plan and submitted to FRA for review and approval. A railroad's compliance with its SSP would be audited by FRA."

4.0 SCOPE OF WORK

Referring to the documents in 3.0 above and the conditions at the project sites, the MTAC will perform the review as follows. In addition, the MTAC will coordinate with FRA Safety personnel to ensure they conduct their reviews. The review under this MP is ideally performed once per project phase.

1. Plan the review – based on activities, documentation, committees, and responsibilities identified in the Grantee's Safety and Security Management Plan (SSMP), prepare a list of documents and materials to review, individuals to interview, and sites to visit; and a schedule for the interviews and site visits

2. Safety, Security -- Threat, Vulnerability, Hazard Analyses – Coordination of reviews by FRA and DHS
   - Obtain the established coordination plan between the FRA Railroad Policy and Development and FRA Office of Safety; in accordance with this plan, ensure reviews and approvals by the Office of Safety are performed in a timely manner;
   - Ensure the FRA Office of Safety staff reviews and approves the Grantee's policy, process, and procedures prior to Grantee's start of the analyses;
   - For security related analyses and designs, ensure the Security Officer within the FRA Office of Safety provides a review and also obtains reviews as required from the Department of Homeland Security, Transportation Security Administration, etc.

3. Assess the Grantee's project documents, SSMP, and Threat/Vulnerability/Hazard Analysis.

Consider whether the analysis is adequate and whether the proposed infrastructure and operations planning and design will tend to do the following:

- Protect life, prevent accidents and injuries for
  - pedestrians and bicyclists at stations
  - pedestrians, bicyclists, and autos at grade crossings
  - train passengers
- Protect property
- Control and minimize the effects of all incidents and accidents
- Eliminate/mitigate hazards and reduce vulnerability to security threats
- Prevent release of hazardous materials
- Create a safe connected rail network infrastructure
- Create safe operating conditions given the proposed railroad infrastructure conditions and train traffic

4. Interview the Grantee and consultant staff (senior and middle managers and consultant personnel identified in the SSMP, PMP or others with safety and security responsibilities in the agency and throughout the project) – to verify that personnel charged with carrying out the safety and security programs are aware of their responsibilities and are capable of meeting them.

5. Assess the consistency between the Grantee's SSMP, hazard analysis, risk analysis and the Grantee's activities and processes; and assess both for consistency with the FRA's safety regulations.

6. The FRA Office of Safety is responsible for field inspections and final regulatory inspections. The MTAC should coordinate with FRA and ensure the reviews and approvals are obtained from the FRA Office of Safety staff for the following:

   During concept design, preliminary engineering and final design
   - Highway-Rail Crossing and Trespasser Prevention including quiet zones
   - Motive Power and Equipment
   - Signal and Train Control
   - Track

   During construction
   - field inspections (periodic and final) and certifications where applicable, e.g. PTC

   During Pre-revenue Testing
   - Testing Plans, verification of integrated testing, and certifications where applicable, e.g. PTC

7. Inspecting selected sites, to view evidence that safety and security programs are being implemented throughout the project area.

8. Produce a report on the review, by topic, with findings, analysis, professional opinions regarding status, and recommendations for action. Refer to MP 01 for more information on reports.

4.1 Typical Contents of SSMP

1. Management Commitment and Philosophy

    Safety and Security Policy Statement
    Overarching Goal
    Applicability and Scope

2. Safety and Security Integration into Project Development

    Safety and Security Activities
    Safety and Security Procedures and Resources
    Agency / Grantee Management Interfaces
        Organization Chart
        Identification of Safety and Security Decision Makers
        Defined Interfaces for Grantee staff and construction contractors

3. Safety and Security Responsibility Assignments

    Responsibility and Authority

    At project transition points, e.g. from PE to Design-Build contract; from PE to Final Design; from Final Design to Construction, etc., demonstration of proper turnover of materials, information, and plans to new project team members

    Committee Structures
        Safety and Security Review Committee
        Fire/Life Safety and Security Committee
        Safety and Security Change Review Board
        Safety and Security Operations Review Committee

    Safety and Security Responsibilities Matrix
        Designated Function for Safety
        Designated Function for Security
        Construction Safety
        Project Manager (Executive)
        Operations Manager

4. Safety and Security Design Criteria
    Approach to Development of Design Criteria
    Design Reviews
    Deviations, changes, configuration control

5. Safety and Security Analysis
    - Preliminary Safety and Security Analysis
        - Hazard Analysis and
        - Threat and Vulnerability Analysis
        - Health Hazard Analysis
            - Systems, subsystems
            - Failure modes, effects, criticality analysis

6. Process for Ensuring Qualifying Operations and Maintenance Personnel
    - O&M Personnel Requirements
    - Plans and procedures
    - Training Program
    - Emergency Preparedness
    - Public Awareness

7. Safety and Security Verification Process
    - Design Criteria Verification Process
    - Construction Specification Conformance Process
    - Testing and Inspection Verification
    - Hazard and Vulnerability Resolution Verification
    - Operational Readiness Verification
    - Safety and Security Certification Requirements

8. Construction Safety and Security
    - Construction Safety and Security Program Elements
    - Construction Phase Hazard and Vulnerability Analysis

9. FRA Office of Safety reviews and coordination for compliance with regulations

10. US Dept. of Homeland Security coordination

5.0 REFERENCES – SEE MP 01

Monitoring Procedure 23 - Real Estate Acquisition and Management Plan Review

1.0 PURPOSE

This Monitoring Procedure describes the Monitoring and Technical Assistance Contractor's (MTAC) review and analysis of the Grantee's plan for and implementation of real estate acquisition and management.

2.0 KEY PRINCIPLES

On major capital projects, real property acquisition and relocation components represent substantial project risk. Therefore, the Grantee should apply its energies early in Planning and PE to the real estate work. In addition, the Grantee's project team must include individuals with real estate expertise and an understanding of the risks that real estate can pose to project schedule and cost.

3.0 REQUIRED DOCUMENTS

In order to perform the review, the MTAC will obtain the Real Estate Acquisition and Management Plan (RAMP) and supporting documents (depending on the phase, obtain project cost estimate and schedule documents listed in Section 3.0 of MP 32A Planning and Concept Design or 39 Preliminary Engineering and Final Design.)

In addition the MTAC should access the Uniform Act Relocation Assistance and Real Property Acquisition Policies Act of 1970 and 49CFR24 Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally-assisted Programs.

4.0 SCOPE OF WORK

4.1 MTAC Qualifications

The MTAC performing this review should have significant real estate experience, with working knowledge of Appraisal, Acquisition, Relocation, and Property Management – four major elements of the Uniform Act.

4.2 RAMP Review

The MTAC will confirm that the Grantee's RAMP includes the contents in Appendix A below, and aligns with the following principles:

1. Completeness of real estate information; consistency, appropriate level of detail (for project phase)
2. Real estate cost estimates and schedules are complete, realistic, and fit within the accepted overall project cost estimate and schedule.
3. Real estate risks are identified and risk potential impacts on project scope and cost are evaluated and mitigated
4. Real estate work on the project meets the requirements of all state, local and Federal laws, regulations, and guidance associated with acquiring real estate, including the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 as amended (Uniform Act)

The MTAC should evaluate:

1. Grantee's approach
   a. Adequacy and soundness of the Grantee's organizational structure relating to real estate acquisition management
      i. Identification of the individual(s) responsible for performing property management, including contract for demolition
      ii. Identification of persons or parties to establish offers of just compensation and authorize condemnation
   b. Understanding of, and assure compliance with, all state, local and Federal laws, regulations, and guidance associated with acquiring real estate.
   c. Early involvement with real estate work on the project

2. Tools and Document Control
   a. Use of document control/tracking tools to monitor RE status, avoid impacts
   b. Plan to deal with changes, corrections, as a result of negotiations, etc.
   c. Plan for filing and maintaining documents, and organizing parcel and condemnation files

3. Acquisition and Relocations Plan
   a. Map highlighting the parcels and spreadsheet to track parcels by:
      i. description of properties, title info
      ii. lengths of right-of-way, dimensions of parcels
      iii. full and partial takes
      iv. residential and non-residential displacements/relocations
      v. information on major stakeholders, property owners
      vi. foreseeable impacts due to the acquisitions and relocations

vii. identification of properties that require environmental mitigation, extensive utility work, or third party coordination
    - NOTE: Hazardous Material Potential - Has a search of historical uses of the parcel(s) been conducted? Has the cost and time to provide environmental mitigation been factored in?

viii. Status of appraisals

b. Type of transaction (per parcel):
   i. purchase, such as fee simple, etc.
   ii. acquisition of other property rights, easements, etc.
   iii. functionally replaced properties (wetlands, parklands, etc.)
   iv. administrative settlements
   v. eminent domain
   vi. relocation/dislocation

c. Acquisition and Relocations Schedule
   i. Consistency between the RE schedule and project schedule
   ii. Negotiations, offers of just compensation, and closing/escrows
   iii. Potential condemnation proceedings
   iv. Draft agreements/agreements
   v. Relocations- schedule for displacements/relocations showing their relationship with the critical path of the project schedule; schedule for negotiations, offers of just compensation, and closing/escrows
      - NOTE: Re-sequencing of construction due to delayed real estate can result in major cost and schedule impacts to the project. For this reason, coordination between real estate acquisition and construction activities must be evaluated in the following areas:
        - Third Parties:
        - Consider the experience of the local agency/entity (such as a City) in real estate acquisition under Federal acquisition laws.
        - Has the time and cost associated with obtaining agreements from railroads for acquiring parcels, obtaining easements, and performing legal reviews by Grantee and Railroad been considered?
        - Negotiations with a Private or Public Utility Agency: does the agency have the time and ability to perform in a timely manner? Does it have cost estimating and scheduling ability? Consider "Prior Rights" documentation and the potential resultant replacement easement or Right of Way for utility companies. Consider the reasonableness of utility relocation and "betterments" in the project cost.
      - NOTE: Additional Schedule Considerations
        - Appraisal: has the time to order and receive appraisals been considered?
        - Offer: is the time allowed for the property owner to accept the offer considered?
        - Negotiations: if the initial offer is not accepted by the property owner, what is the amount of time allocated to the Grantee to take additional

measures before proceeding to condemnation (if the Grantee has the authority for condemnation)?
    - Quick take, condemnation, or eminent domain process: check the amount of time estimated for adequacy
    - Grantee's board approval: check the Grantee has allowed adequate amount of time between offer acceptance or the settlement is reached and the Grantee's Board approval
    - Review time by funding agencies: has time been allowed for potential multiple agency concurrence (Federal, State, and local)?
    - Title: following all approvals and concurrences, what is the time required to transfer ownership?
    - Relocations: has the time for relocating business or residence been accounted for?

d. Acquisition and Relocation Costs
   i. Grantee's basis for the estimate; anticipated updates of the estimate
   ii. How the estimate will be compared to actual costs as the project progresses
   iii. If available, the MTAC will review historical data for real estate acquisition in the immediate project area to assess cost uncertainties:
      - NOTE: Estimates for real estate are frequently low. FRA provides a model estimating spreadsheet to assist the MTAC in reviewing the Grantee's approach to estimating real estate costs (refer to Appendix B of this MP). The spreadsheet may help the MTAC to ensure that all components are included in the estimate.
        - Additional costs due to partial acquisitions (damage to remainder).
        - Potential increase between negotiated costs and the appraised cost.
        - Cost of demolition is in estimate
   iv. Relocations: have all the costs of relocating the business or residence (for example replacement and moving costs) been included in the estimate?
   v. Court and Legal Costs: if a settlement cannot be reached, have court and legal costs been considered? Discuss whether "Cost to Cure" costs have been considered.
   vi. Appraisals: Cost of appraisals, review appraisals, survey, title, and closing: has escalation of appraisals versus the timing of actual acquisition been taken into account?
   vii. Negotiations/Just Compensation: Review the adequacy and soundness of the Grantee's plan for conducting negotiations:
      - Who will negotiate?
      - What is their authority?
      - When will negotiations initiate?
      - Who must approve administrative settlements and other concessions to property owners?
      - What is the documentation required during the negotiations process?
      - Who signs the offer letter?
      - Will the negotiator also handle relocation payments?
      - How is the interface between negotiations and condemnation handled?

- Which documents will the negotiator be expected to provide to legal for settlement and condemnation?
- Will the negotiator be present at closing?
- Review the adequacy and soundness of the Grantee's plan for establishing an offer of just compensation including identifying responsible staff and the basis of the offer

viii. Closing/Escrows:
- Who will provide this service?
- How will it function?
- What is the estimated length of time to deposit funds to escrow for closing?
- Which documents will be necessary?
- What form of deeds will be used?
- How will property taxes be paid and exempted?

ix. Condemnation:
- Who will authorize suits?
- Who will file?
- What is the relationship between the Grantee and its legal personnel?
- What authority does the attorney have for settlement?
- What are progress reporting requirements

x. Appeals:
- What are the legal requirements for administrative appeals?
- How will the agency establish and staff an appeal function?
- Who is the recipient of appeal requests?
- What is the appeal process?

5.0 REFERENCES – SEE MP 01

APPENDIX A

Sample Table of Contents for Real Estate Acquisition Management Plan

	Real Estate Acquisition and Management Plan Elements
1	**Introduction** Short history of project
2	**Agency's Real Estate Policies and Procedures** referring to applicable statutes, regulations, policies
3	**Real Estate Team Organizational Structure** Staff and Contractor functions, resumes, description of roles and responsibilities Org chart showing lines of authority -Grantee real estate staff and consultant experience is critical for reducing project risks and uncertainties. The MTAC should evaluate whether the Grantee has adequate experience in acquiring real estate per the requirements of the Uniform Act.
4	**Document Control**
5	**Property Management Plan** Disposition Plan Acquisition Process Acquisition Plan -- Ownership and Title Information Acquisition Schedule, include critical path from Project Schedule Pre NEPA ROD: Draft Agreements w/Real Estate Third Parties Post NEPA ROD: Executed Agreements w/Real Estate Third Parties Cost Estimate, Appraisals, Negotiations/Offers of Just Compensation, Final Costs Closing/Escrows Condemnation Relocation Process Relocation Plan – Owner, Tenant information Relocation Schedule, include critical path from Project Schedule Cost Estimate, Negotiations, Final Costs, Appeals

APPENDIX B

Real Estate Cost Estimate Template and Supporting Questions

Cost Estimate Template		Desc/Number of Parcel	Cost	Subtotal	Total
LAND					
	Fee Acquisitions		$		
	Full Takes		$		
	Partial Takes		$		
	Easement Acquisitions		$		
	Other Rights		$		
	TOTAL LAND COST			$	
	Administrative Settlement Rate of ____ x Administrative Increase ____ = ____%			$	
	Condemnation Rate of ____ x Excess Award ____ = ____%			$	
	TOTAL LAND/SETTLEMENT				$
RELOCATION					
	Residential (Owners)		$		
	Residential (Tenants)		$		
	Business (Owners and Tenants)		$		
	Others (Personal Property Moves)		$		
	Last Resort Housing		$		
	TOTAL RELOCATION				$
SERVICES					
	Title Work (Reports, Insurance, Closings)		$		
	Appraisals		$		
	Appraisal Reviews		$		
	Other Services related to acquisition, relocation, property management, etc.		$		
	Legal (Pre-condemnation)		$		
	Legal (Condemnation)		$		
	TOTAL SERVICES				$
GRAND TOTAL					**$**

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Monitoring Procedure 24 - Quality Assurance/Quality Control Review

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1.0 PURPOSE

The success of a Grantee's major capital High Speed Intercity Passenger Rail (HSIPR) project depends to a large degree on a sound quality assurance and quality control program developed and executed by the Grantee and its design and construction contractors.

The purpose of this Monitoring Procedure (MP) is to describe how the Monitoring and Technical Assistance Contractor (MTAC) will review the Grantee's QA/QC program.

2.0 KEY PRINCIPLES

The QA/QC program is a vital part of a Grantee's Project Management Plan (PMP). At a minimum it should define the functions, procedures, and responsibilities for designing and constructing a major capital project.

1. Quality Assurance covers planning quality management activities and verifying those activities are carried out
2. Quality Control covers implementing the quality management plan activities that will result in quality deliverables

Specifically, a typical QA/QC program should address, but not be limited to:

- Management responsibility
- Documented quality system
- Design and construction quality
- Document control
- Purchasing
- Product identification and traceability
- Material testing
- Inspection, measuring and test equipment
- Corrective action
- Quality records
- Quality audits
- Training

3.0 REQUIRED DOCUMENTS

The MTAC will obtain current versions of documents appropriate to the current project development phase, including but not limited to:

1. Project Management Plan
2. Quality Assurance/Quality Control Program Plan (PMP sub plan)

3. Grantee Technical Capacity and Capability Plan (PMP sub plan)
4. Other sub plans

4.0 SCOPE OF WORK

This review will cover grantee compliance with FRA requirements for a QA/QC Program review.

4.1 Quality Management Program

1. The MTAC will verify that the Grantee has a documented, implemented, and maintained Quality Management Program supporting the entire Grantee organization and the project. Procedures and activities may include document configuration and change control, design review, soil and material inspection, and material testing.
2. The Grantee will set up an internal audit to ensure that the Quality Management Program functions as intended.
3. The MTAC will verify that the Quality Management Program satisfies project quality objectives related to:
   a. Document control
   b. Design
   c. Procurement
   d. Construction
   e. Start-up
   f. Operations
4. The MTAC should verify and assess how the Grantee has defined its quality policy and the quality responsibilities for the project team.
5. The MTAC should ensure that the Grantee has assigned qualified personnel—independent of those with direct responsibility for the work being performed—to carry out QA/QC.
6. The MTAC should verify and ensure that such personnel are in fact implementing and maintaining the Grantee's quality policy.
7. The MTAC should review the Grantee's quality control and assurance procedures and determine their adequacy.

4.1.1 Quality Assurance

1. The MTAC will evaluate the Grantee's:
   a. Plan for quality management activities
   b. Ability to establish quality systems
   c. Identification and evaluation of quality problems and solutions

4.1.2 Quality Control

1. The MTAC will evaluate how the Grantee:
   a. Implemented quality management activities
   b. Documented quality management activities

4.2 Document Control

1. The MTAC will ensure that the Grantee has a Document Control Program as part of its QA/QC Plan.
2. The MTAC will ensure that the Grantee's document control procedures include:
   a. Document review
   b. Distribution and storage
   c. Adequate quality assurance procedures to ensure document controls are in place and implemented

4.3 Design Control

1. The MTAC will ensure that the Grantee has a Design Control Plan as part of its QA/QC plan that includes procedures for design verification and design review.
2. The MTAC's design verification procedures will include activities such as:
   a. Independent checks on design drawings and specifications to document:
      i. Completeness
      ii. Coordination
      iii. Constructability
      iv. Operability
      v. Maintainability
   b. Design calculations for:
      i. Structural
      ii. Mechanical
      iii. Electrical
      iv. Other systems
   c. Confirmation that the consultant(s) responsible for design have established procedures for controlling their design processes
   d. Confirmation that the Grantee has procedures for design consultants to review the design review
   e. Confirmation that the Grantee has procedures for design and specification changes, including signoff and documenting these changes
   f. Confirmation that the Grantee has documented procedures and requirements for as-built documents
   g. Confirmation that the Grantee QA is adequate to ensure design control procedures are in place and being implemented

4.4 Procurement and Construction and Inspection

1. The MTAC will ensure that the Grantee has competitive bid procedures to ensure that bids for desired services are obtained from a number of qualified contractors.

4.4.1 Procurement Plan

1. The Grantee will include in its Procurement Plan:
   a. A statement of general requirements, including:

i. Quality requirements
ii. Any past, demonstrated capability, and performance requirements

4.4.2 Procurement

1. The MTAC will ensure quality control requirements are included within Grantee proposals and bids and are formally communicated to:
   a. Potential consultants
   b. Contractors
   c. Subcontractors
2. The MTAC will ensure Grantee procurement documents, in particular construction contract documents, are reviewed and approved by a designated authority before they are released:
   a. General conditions
   b. Specific conditions
   c. QC requirements
3. The MTAC will review and assess the Grantee's procedures and requirements for product identification and traceability of equipment manufacturers or other manufacturers supplying products for the project.
4. The MTAC will review and assess the Grantee's procedures and requirements for product identification and traceability when products and materials are turned over to the owner at project conclusion.
5. The above requirements will be placed in contract documents where appropriate.

4.4.3 Construction and Inspection

1. The MTAC will review and assess the Grantee's requirements for a QC inspection and testing program covering all phases of the work:
   a. Inspection and testing procedures for special processes
   b. Requirements for calibrating and inspecting maintenance, measuring, or test equipment
2. The MTAC will ensure and confirm that:
   a. The QA/QC plan adequately describes required inspection and testing and expected standards
   b. Testing and inspection requirements are referenced in the project specifications
   c. Grantee QA procedures are adequate to ensure that the QC program is successfully implemented during construction
3. The MTAC will review and assess the Grantee's procedures for handling nonconforming work and verifying that such procedures define:
   a. Responsibilities
   b. Conditions that would cause work to stop
   c. How to record nonconforming work
4. The MTAC will review and assess the Grantee's procedures for taking corrective action.

4.5 Operations, Startup, and Training

4.5.1 Control Procedures

1. The MTAC will review and assess the Grantee's control procedures for testing:
   a. Systems
   b. Vehicles
   c. Service equipment

4.5.2 Training Procedures

1. The MTAC will review and assess the Grantee's training procedures for operations and maintenance to ensure a smooth transition to operations.
2. The MTAC will confirm that Grantee QA procedures are adequate to ensure the training program is implemented successfully.

5.0 PROPOSED APPROACH

5.1 QA/QC Review

The MTAC's review of the adequacy and soundness of the Grantee's QA/QC Program will occur at the completion of the Planning and Preliminary Engineering phases. FRA may require subsequent reviews if there are updates or changes to the Grantee's QA/QC Plan.

Appendix A in this MP contains a typical Table of Contents for a QA/QC Program Plan and the milestones for completing the elements within the plan.

APPENDIX A

Sample Table of Contents – Quality Assurance/Quality Control Plan

Quality Control / Quality Assurance Table of Contents	Planning/ Concept Design	Preliminary Engineering	Final Design	Construction
Quality Management Program				
Introduction	C	U		
Quality Policy	C	U		
Quality Objectives	C	U		
Quality Management Responsibility	C	U		
Quality Management Training Procedures	C	U		
Document Control Procedures and Activities				
Project Document Review, Distribution, Storage Procedures	C	U		
Quality Records Distribution, Maintenance, Storage Procedures	C	U		
Document Control Quality Assurance Procedures	C	U		
Design Control Procedures and Activities				
Design Verification Procedures	C	U		
Design Review Procedures for Drawings and Specifications	C	U		
Design Change Procedures	P	C	U	
Design Control Quality Assurance Procedures	C	U		
Procurement Procedures and Construction Procedures				
Construction Procurement Procedures, Identification of Contract Requirements		C	U	
Construction Contract Document Review Procedures including General and Supplementary Conditions		C	U	
Equipment and Vehicle Procurement Procedures		C	U	
Product Identification		C	U	
Product Identification Procedures		C	U	
Inventory Control Procedures		C	U	
Routing Documentation Procedures		C	U	
Special Process Procedures		C	U	U
Construction Inspection Procedures (project site and fabrication site)		C	U	U
Measuring and Test Equipment Quality Control Procedures		C	U	U
Testing Procedures (soils, materials)		C	U	U
Nonconformance Procedures		C	U	U
Corrective Action Procedures		C	U	U
Procurement/Construction Quality Assurance Procedures		C	U	U
Operations, Startup and Training				
Testing Procedures for Systems, Vehicles, Service Equipment		C	U	U
Training Procedures		C	U	U
Operations, Startup, Training Quality Assurance Procedures		C	U	U

P Preliminary information required C Element to be completed U Element to be modified or augmented with additional information as necessary

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Monitoring Procedure 25 - Recurring Oversight and Related Reports

1.0 PURPOSE

This Monitoring Procedure (MP) describes FRA requirements for MTAC when performing recurring oversight of a Grantee's major capital rail project/s. It also provides direction on the reports developed by the MTAC in support of the oversight work.

Recurring oversight by the Monitoring and Technical Assistance Contractor (MTAC) provides a basis for FRA's stewardship role and a venue to foster best practices. Recurring oversight helps Grantees to identify and avoid problems, capture opportunities, mitigate risks, and meet the requirements of their agreements with FRA.

2.0 KEY PRINCIPLES

During oversight of the project the MTAC obtains important information related to project planning, design, and construction, as well as the Grantee's ability to implement the project. As part of recurring oversight, the MTAC is expected to proactively engage with the Grantee and offer alternative approaches and suggestions to help solve problems.

The MTAC will update the Federal team about findings, project status, issues of concern, and recommendations for action. The MTAC's discussion with the Federal team, combined with written reports, allows FRA to make appropriate and timely decisions about project advancement and funding. Through oversight and reporting, the MTAC will help to ensure that the project is delivered on time, within budget, and meets all Federal requirements.

3.0 REQUIRED DOCUMENTS

The MTAC will review project materials and documents as part of recurring oversight, including but not limited to:

1. Grantee correspondence with FRA, other agencies, third parties, etc.
2. PMP and PMP Sub-Plans
3. Analyses and planning studies for operations, capacity, and service
4. Design drawings, construction documents, and specifications
5. Site investigation and analysis documents
6. Third-party agreements and service-outcome agreements
7. Project schedule
8. Cost estimate
9. Project delivery and procurement documents
10. Construction administration/management files

4.0 SCOPE OF WORK

4.1 Discussions with the Grantee

The MTAC should be proactive in its oversight role. Through investigation and dialogue with the Grantee, the MTAC should assess the project, provide suggestions and recommendations and offer professional opinions based on its observations, knowledge, experience, etc. The information collected should be included in the MTAC's report so the report supports the oversight goals.

1. The MTAC will hold meetings with the Grantee monthly and/or quarterly, based on the project's activity level. The MTAC should recommend adjustments to the meeting frequency as the activity level changes. The duration of the MTAC's visit will depend on the stage of project development as well as the project's activity level. For projects in construction, the MTAC should plan sufficient time to be on site to participate in site tours, meetings with individuals representing all aspects of the project, and discussions with the agency's leadership and management.

4.2 Meetings and Meeting Notes

4.2.1 Quarterly Meetings

FRA or the MTAC usually leads the quarterly meeting attended by the Grantee's executive management and project team as well as FRA leadership. The meeting may be held at the Grantee's office or at FRA Headquarters. The quarterly meeting allows FRA and Grantee a venue to accelerate the resolution of project issues and move the project forward.

1. Prior to the meeting, the MTAC prepares the agenda and briefs the Federal team on agenda items and major issues of concern.
2. During the meeting the MTAC takes notes that capture the discussion and serves as the official record of the meeting. The notes should also include prior and current action items identifying the responsible party and a sign-in sheet of meeting attendees.

4.2.2 Monthly Meetings

FRA or the MTAC usually leads the monthly meetings attended by the Grantee's project team. The responsibilities of the MTAC are the same as the quarterly meetings.

4.2.3 Special Meetings

Special meetings and site visits may be held when required. The responsibilities of the MTAC are the same as the quarterly meetings.

4.2.4 Meeting Notes

For all meetings, the MTAC will submit draft notes to the Federal team for review and concurrence no later than 10 business days after the meeting.

4.3 Meeting Reports

In addition to meeting notes, the MTAC will produce reports (Comprehensive and Mini-Monthly Reports as described below) for the Federal team. Reports should be written simply and clearly—they should "tell it like it is"—and include graphic aids such as photos and tables to help convey meaning. The MTAC should not repeat text within a report but should cross reference earlier text.

For special meetings or site visits (i.e., visits to vehicle manufacturing facilities) the MTAC will prepare a trip report. These reports summarize the items discussed and should be no more than seven pages long.

Reports will follow the formatting requirements listed in MP 01.

Report distribution / timeframe / reconciliation procedures:

1. 24 hours after meeting - MTAC will send the Federal team a brief email (using a bullet format) with a project assessment and update with issues highlighted.
2. 10 business days after meeting - MTAC develops a draft report and emails it to the Federal team for review and concurrence.
3. 15 business days after meeting – MTAC incorporates comments, if any, by Federal team into revised draft / final report and emails it to the Federal team. If authorized by the Federal team, the MTAC shares this document with the Grantee for concurrence on the facts.
4. If there are differences of opinion between the MTAC and the Grantee about the MTAC's conclusions, the Federal team may direct the MTAC to reconcile with the Grantee. If this occurs the MTAC should submit an amended report to the Federal team that highlights report modifications within 15 days of the reconciliation.

4.3.1 Comprehensive Report (Monthly or Quarterly) Report

The MTAC must prepare a Comprehensive Report the third month of every quarter—March, June, September, and December. If coverage of all topics every month is deemed necessary, the comprehensive report format can be used monthly instead of the Mini-Monthly (described in Section 4.3.2 of this MP).

In the Comprehensive, the MTAC provides the Federal team with an update of the entire project including critical issues, MTAC concerns, recommendations, and professional opinions on the project's status. It is based on the MTAC's independent observations and opinions from meetings with the Grantee and through study of Grantee materials. At a minimum, the Comprehensive should contain the following information in the order outlined below, within a maximum of 20 pages, excluding appendices.

4.3.1.1 Report Content

1) Executive Summary

The executive summary will be succinct and contain information that is of interest to FRA executive staff/upper management. It should brief the reader in a clear, concise manner on the status of the project and include major issues impacting project scope, schedule, budget, safety, and quality.

No more than three pages long, the executive summary should include one paragraph each describing the project scope, a brief summary of the project status, changes since the last report, critical issues that should be brought to FRA's attention, an indication of whether the Grantee is taking action to resolve the issues, the MTAC's assessment and recommendations, and a table containing cost, schedule, and project completion information using the following format:

Project Name				
			At Grant Award	At Present
Total Cost Estimate				
	Total Contingency (incl in Total Cost Estimate)		$	$
		Allocated Contingency	$	$
		Unallocated Contingency	$	$
		Total Contingency	$	$
Schedule (completion or date of revenue service)				
	Based on Expenditures/Total Project Cost			
	Based on Time Expended/Total Project Time			
	Based on percent complete of construction (where appl)			
Date of next Quarterly Meeting				

2) Body of Report

The MTAC will include any issues observed during quarterly reviews or that are outstanding from other in-depth reviews. Use tables, schedules, and photos to help explain. Topics include:

a. Grantee's capacity, capability, and approach to the project:
   i. Based on observations and discussions with the Grantee and review of the PMP and sub-plans, the MTAC will assess the Grantee's management capacity and capability to successfully complete the project and achieve compliance with applicable statutes, regulations, and standards
   ii. The MTAC will assess the Grantee's use of project controls for scope, quality, schedule, cost, risk, and safety
b. Project scope, including:
   i. Sufficiency of analyses and plans for operations and service
   ii. Condition and quality of design/construction documents, bidding, and construction status

iii. List and status of third-party agreements including utilities, railroads, other agencies, etc.
iv. Selection of delivery method, description of contract packages, construction sequencing, contract terms, and conditions
v. Vehicle status of design, procurement, safety approvals, testing, etc.
vi. Safety and security activities including hazard analyses, threat and vulnerability assessments, development of safety and security design criteria, certifiable elements, plan for oversight, etc.
vii. Compliance with applicable statutes, regulations, guidance, and agreements

c. Project Management Plan and Sub-Plans
d. Project Schedule status:
   i. Table of key milestones – planned and actual
   ii. Explanation of changes between baseline schedule and current schedule
   iii. Explanation of changes in critical path and recommended actions to recover
   iv. 90-day look ahead for important activities by the Grantee, the Federal team, and the MTAC
e. Project cost status, including:
   i. Table showing original budget, current budget, expenditures to date, earned value, and estimate to complete by element for the current month
   ii. Explanation of variances between planned and actual cost to date
   iii. Information on funding sources, if required
f. Project risk, including:
   i. Discuss the Grantee's status of risk assessment, including treatment of risks and related mitigation actions, as well as contingencies. Provide date of initial risk assessment and updates.
g. Table of action items including pending items

3) Appendices

a. Project Map
b. Acronyms
c. Lessons Learned/Best Practices (MP 26)
d. Before and After information (MP 27)
e. Longer supporting information, e.g. during construction track construction changes and claims, source of change (owner, contractor, site conditions, etc.)

4.3.2 Mini-Monthly Report

In an effort to streamline the process of reporting and to provide the Federal team with project information in a more timely way, a shorter, more focused report, the Mini-Monthly, may be requested of the MTAC. This report can be developed for the first two months of every calendar quarter. The third month however requires a Comprehensive Report.

It is important to not shorten the meetings with the Grantee. Only the report may be changed to be more targeted and focused in its coverage of critical issues. The Mini should follow the outline for the Comprehensive, however, with the exception of the executive summary and the project overview, the MTAC should include other sections that are needed to inform the Federal team of the most critical

project occurrences, issues, and next steps, as well as professional opinions and recommendations. These reports should be no more than twelve pages long, excluding appendices.

4.3.3 Final Monthly Report

The MTAC will submit a Final monthly report to the Federal team after the project is complete, the phase is complete, or construction is complete and revenue operations has commenced, if applicable.

The MTAC should organize this report according to the outline for the Comprehensive. The report should highlight, in a broad way, the most important events, issues, hurdles, resolutions, and actions taken during project life so that the report is instructive for future projects. Excerpts of the report can become Lessons Learned.

In addition, as preparation for a Before and After report (MP 27), the MTAC should ensure the Grantee provides information on the project's benefits and impacts on passenger service, railroad operations, and overall system performance, and organizes such information to mirror the Grantee's Service Outcome Agreement, where applicable.

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Monitoring Procedure 26 – Lessons Learned / Best Practices

1.0 PURPOSE

FRA, Volpe, Grantees, stakeholders in rail projects, and even host railroads can learn from the project experiences of others. This Monitoring Procedure (MP) describes FRA's expectations of the Monitoring and Technical Assistance Contractor (MTAC) to record those experiences.

2.0 KEY PRINCIPLES

FRA's goals for Lessons Learned / Best Practices are the following:

1. Increase awareness of project pitfalls as well as good practices
2. Make the lessons available via the FRA public website
3. Change FRA policies and practices when lessons suggest such changes should be made

3.0 REQUIRED DOCUMENTS

As required, the MTAC will obtain documents and other materials from the Grantee or other sources.

4.0 SCOPE OF WORK

The MTAC should identify lessons and best practices in the course of the project, and describe each in a Lessoned Learned / Best Practices Report that includes narrative, drawings, photos, and video.

Each report should be short -- two to three pages maximum, with just enough background so the reader can put things in context. It may focus on events or insights from any project phase – planning, project development, construction, operations; and it may focus on any aspect – leadership, management, planning methodologies, design guidelines or criteria, challenges from public process or politics, techniques in design or construction, cost estimating, scheduling, testing preparatory to operations, etc. The report should include significant findings, recommendations, and new insights.

The MTAC and the Grantee may jointly develop the report, or the Grantee may read the MTAC's draft and provide input. The MTAC and/or Grantee may be asked to present the report at an FRA meeting.

5.0 TOPICS FOR BEST PRACTICES

The following is food for thought – areas where there is a known need for best practice guides.

1) Project Initiation
   a) How corridor and multi-state partnerships can help States, railroads, operators, and FRA to plan rail networks, and more effectively accomplish passenger rail projects within those networks.

b) Putting together a robust project team – what are the necessary and appropriate skills, experience, and levels of staff?

2) Planning and Concept Design

a) Stations
   i) Analyzing markets for corridor alignment and station location
   ii) Carefully inserting railroad infrastructure to enhance, not divide, communities
   iii) Planning for value capture/land use development in station areas
b) Modeling railroad operations; assessing railroad capacity; forecasting ridership
c) Environmental impact assessment and NEPA for rail projects
d) How compliance with Buy America, the Americans with Disabilities Act, and the Uniform Relocation Assistance and Real Property Acquisition Policies Act shapes your project;
e) Agreements among project parties
f) Real estate complexities/pitfalls including contractor access, staging, and lay-down areas – more area than you might think!
g) Hazard and vulnerability analyses and recommendations

3) Project controls
a) Cost estimating, cost management, cost estimating
b) Project scheduling
c) Risk assessment, management, mitigation

4) Design
a) Level of development/detail for Preliminary Engineering (PE) plans
   i) Track design
      (1) appropriately scaled, track geometry (spirals, curves, tangents)
      (2) points of switch
      (3) designation of existing track, new track, track to be removed, future track work
   ii) level of investigation for utilities
   iii) level of investigation for geotech conditions

b) Platforms
   i) height (48”, 15”, other)
   ii) length (can it accommodate the size of trains, any projected increase in consists)
   iii) location on mainline vs. on siding
   iv) level boarding requirements
      (1) public ownership/maintenance of the line vs. privately owned or long term lease
      (2) accommodating wide loads via gauntlet tracks/bypass tracks
      (3) curved platforms
      (4) pedestrian and baggage access to platforms, etc.

c) Signal design
   i) Locations - particularly at stations, to maximize platform lengths and pockets that are used for complicated train movements;

ii) Speeds - what aspects should typically be incorporated on the different classes of track, designing and spacing turnouts to accommodate the braking distance of a misrouted freight train.
iii) PTC

d) Track, types of track
   i) For upgrades, what is appropriate -- continuously welded rail (CWR) versus jointed rail; also is there sufficient ballast for CWR
   ii) What size rail is appropriate - 136 lb. vs. 115 lb.
   iii) Are wood or cement ties more appropriate
   iv) What are appropriate track centers – what are the state minimums for track centers; the advantages of using existing track centers vs. cost of using wider track centers (e.g. need to widen roadbed, replace bridges and other structures, etc.)

e) Turnouts
   i) What size is appropriate
   ii) When to use hand thrown vs. powered
   iii) Use of electric locks
   iv) Location of turnouts (e.g. on tangents, off of bridge/away from bridge structures, not along platforms, 100 ft. between the next crossover/turnout)

f) Hazard and vulnerability mitigations

5) Systems Integration and Revenue Service Start-up
   a) Developing a test plan
   b) Safety and Security certifications

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Monitoring Procedure 27 – Before-and-After Study

1.0 PURPOSE

This Monitoring Procedure (MP) describes FRA requirements for Monitoring and Technical Assistance Contractor (MTAC) activities related to Before-and-After Studies.

2.0 KEY PRINCIPLES

Before-and-After studies compare scope, capital cost, operational performance, and ridership, before and after an FRA-funded rail project progresses through a phase or phases. Points of reference include:

- actual conditions before
- forecasts made during
- actual conditions after

The information should be gathered and preserved for every project in every phase (planning, design, construction, and operation), so that when a project progresses to the next phase, a comparison can be made with the earlier point of reference. Refer to the sample table below.

The comparisons will show what has been accomplished through the FRA capital program, and the professionalism of the Grantee and its team. The capital cost portion of the Before-and After study will be the building block for an FRA cost database that can become an estimating resource for future projects.

3.0 REQUIRED DOCUMENTS

Relevant project information on project scope, capital cost, operational performance, ridership, and agreements for construction and maintenance, operations, and service outcomes (ref. MP 20 for more information on agreements.)

4.0 SCOPE OF WORK

4.1 Individual Corridors

The MTAC will discuss the Before-and-After study with the Grantee, and ensure the Grantee preserves and compiles the relevant information, and summarizes it in the table below. For an individual corridor, the Grantee should:

- set up an electronic archive for drawings, cost estimates (in original and in SCC format); information on operational performance and ridership; information on development and population densities in station areas.
- at each phase, document the required information including narratives to explain changes.

The MTAC will also oversee Service Outcome Agreement compliance and when necessary advise the parties on process, content, and compliance.

4.2 Nationwide Basis

For the nationwide Before-and-After Summary Report, a designated MTAC will collect copies of the individual Grantees' information (described above) and, when available, add "after actuals" for operational performance and ridership from the Grantee, the train operating entity, or others as appropriate. The MTAC will compile all information into a report. As appendices, the report will include for each project a one to two page scope description with changes highlighted; and the SCC capital cost Main Worksheets.

Before and After Study

Project Name: **Forecast Year:**

Milestones		Date	Scope		Capital Cost YOE (X000)	Capital Cost	Ridership (Passengers per day)	Operating Cost		Operational Performance				Densities in Station Areas (use separate columns for each station area)		Reasons for Changes
			Route Miles	Number of Stations		Per Route Mile (X000)		Per Passenger Mile	Per Route Mile	Frequencies	Scheduled Trip Time	Run Time	Host Railroad Delay Minutes	Development (total SF)	Population (residential, employment)	
Completion of Planning/Concept Design	Actual (if applicable)	1/1/2013					10,000			4		3 hr 30 min	19.8			
	Forecast	1/1/2013	200	5	$100,000	$500	40,000			6		3 hr 20 min	16.0			
Completion of Preliminary Engineering	Forecast	6/1/2014	220	6	$85,000	$386	35,000									(1)
Completion of Final Design	Forecast	1/1/2016	220	6	$120,000	$545	35,000									
100% complete for construction; As-built drawings and final costs in; Revenue operations started	Actual	1/1/2019	220	6	$130,000	$591	35,000									
1 year after start of RevOps	Actual	1/1/2020					30,000									
5 years after	Actual	1/1/2025					35,000									
10 years after	Actual	1/1/2030					40,000									
20 years after	Actual	1/1/2040					50,000									

(1) At Rural Rte. 6, the elevated portion of Track / Railbed was eliminated; instead the railroad will be depressed with new road bridge above; Station B also now at grade.

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Monitoring Procedure 30 – Value Engineering Review

1.0 PURPOSE

This Monitoring Procedure describes the Monitoring and Technical Assistance Contractor's (MTAC) review of the Grantee's Value Engineering (VE) practices, particularly the Grantee's success in identifying scope that could be done more efficiently for equal or less cost; and success in the weighing long- and short-term value (quality/capacity) against long- and short-term cost.

2.0 KEY PRINCIPLES

The optimal point to conduct VE is half-way to three-quarters through Preliminary Engineering, when design criteria are developed, capacity/operational analyses are complete, and the implications of the infrastructure schematic design are becoming clear. This timing works for all project delivery methods.

Value engineering requires a systematic process applied by a multidisciplinary team. One core objectives of VE is to improve communication among involved parties. VE is particularly valuable when a project involves numerous stakeholders. Improvements in communication alone can make the VE effort a success.

3.0 REQUIRED DOCUMENTS

The MTAC should obtain the following project documents from the Grantee before performing the VE review:

1. Value Engineering Work Plan including disciplines and hours for the analysis
2. Orientation memorandum including logistics, assumptions, any scope limitations of the study, and cost models
3. When the MTAC has not been able to attend the workshop: VE reports indicating the disposition of VE recommendations (accepted, discarded, held)

4.0 SCOPE OF WORK

4.1 MTAC Oversight

1. The MTAC shall evaluate the Grantee's Value Engineering (VE) program to assess the efficacy of the process and quality of decisions weighing long- and short-term value (quality/capacity) against long- and short-term cost. The MTAC will evaluate using the SAVE Standard, the Value Standard and Body of Knowledge, June 2007 (or the latest edition,) by SAVE International. Refer to http://www.value-eng.org/
2. The MTAC should attend the VE workshop if possible.
3. The MTAC will confirm that the Grantee's VE program accomplishes the following:
   a. The design information supplied is sufficient to conduct the VE study and includes:
      i. A complete cost estimate following the plan set reviewed

ii. Design memoranda for key disciplines
iii. Design criteria
iv. Plan set and specifications at Concept Design (10 percent) or Preliminary Engineering (30 percent)
v. Environmental documents
vi. Milestone schedule

b. The team is multidisciplinary, independent from the project team, and qualified to conduct the study
c. The Final VE Report includes the disposition of each recommendation – rejected proposals are based on reasonable criteria; accepted proposals are incorporated into the revised project documents and tracked in configuration control

4.2 Grantee's VE Program

The Grantee should build the VE effort into the project schedule so that adequate time is allowed for preparation, the Workshop, and recording of decisions / disposition of VE recommendations.

4.2.1 Pre-Workshop

1. The Grantee prepares for the VE study. Typical activities include:
   a. Obtain management support for the VE.
   b. Select appropriate VE workshop participants.
      i. Altogether they should represent the many disciplines required to develop, deliver, and operate the project/service; they should understand the functions with the greatest impact on cost, operability and risk.
      ii. Invaluable to the effort are outside "peer experts" -- technical, managerial, and operational – who will take time to study the project and its trade-offs.
      iii. Also key to the VE workshop success is participation by project leadership and staff. Agency leadership should attend the final presentation of VE recommendations.
   c. Develop the scope of work and objectives for the study; develop a work plan; define logistics for the workshop, and distribute all to the team
   d. Collect and transmit the project support memoranda, plan set, draft specifications, project schedule and capital cost estimate

4.2.2 Workshop

The Grantee's facilitator takes workshop participants through the following steps:

1. **Information** Gathering - The team reviews and defines the current conditions of the project and identifies the goals of the study.

2. **Function Analysis** - The team defines the project functions, and evaluates them for improvement or elimination, or if new functions are needed to meet the project's goals. The team considers the cost-to-worth ratio of the project's basic and secondary functions:
   a. Cost-driving design criteria and functions
   b. Marginally justified support functions

c. Project elements that have poor cost to worth relationships
d. Schedules that maximize the time-value of capital investment

3. **Creativity** - The team brainstorms other ways to perform project function(s).

4. **Evaluation** - The team follows a structured evaluation process to select ideas with the potential for value improvement that comply with the project's function(s) and take into account performance requirements and resource limits. The team consider important tradeoffs:
   a. Cost vs. flexibility, redundancy, convenience
   b. Cost savings and innovation vs. agency risk
   c. Initial capital savings vs. operational cost
   d. Potential inefficiencies of phased construction vs. cash flow

5. **Development** - The team develops the selected ideas as alternatives (or proposals) and provides sufficient documentation to allow decision makers to decide if the alternative (or proposal) should be implemented. The team makes recommendations.

6. **Presentation** - The team leader writes a report and/or presentation that shows the team's recommendations and associated value improvement opportunity.

4.2.3 Post-Workshop

1. The Grantee's leadership confirms the disposition of the accepted VE recommendations.
2. The Grantee implements changes to the project documents (drawings, cost estimate). Changes are tracked in the Grantee's Project Configuration Management process.

5.0 REFERENCES – SEE MP 01

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Monitoring Procedure 31 – Annual Monitoring Review and Closeout of Grant

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1.0 PURPOSE

This Monitoring Procedure (MP) describes FRA requirements for the Monitoring and Technical Assistance Contractor (MTAC) when performing an Annual Monitoring Review of Grantee's projects and the review prior to closing out the grant agreement between FRA and the Grantee.

2.0 KEY PRINCIPLES

Based on a cursory comparison of risk among all projects in FRA's program, some projects will be selected by FRA for the Annual Monitoring Review. This review ensures that Grantees comply with FRA grant agreement provisions. It focuses on the Grantee's program management, financial reporting, and document management, so as to minimize fraud, waste, and abuse.

The review prior to close out ensures the Grantee is fully prepared for grant closeout.

3.0 REQUIRED DOCUMENTS

3.1 Annual Monitoring Review

The MTAC will obtain the necessary Grantee materials to review the elements in the checklists and other materials contained in FRA's Monitoring Manual. The MTAC will obtain the Manual from the FRA Regional Manager/Project Manager (manual is stored on FRA RPD internal webpage). The Manual is organized into the following sections:

1. General Monitoring Materials: monitoring manual, monitoring plan, routine monitoring template
2. Desk Review Materials: templates and checklists for use in desk reviews
3. Site Visit Materials: templates and checklists for use in site reviews
4. Completed Monitoring Reports (sorted by state): approved and finalized monitoring reports

3.2 Review Prior to Grant Close Out

The MTAC will obtain the latest progress reports and most recent deliverables from the Grantee:

1. Grant and financial documents:
   a. Latest approved grant agreement, attachments, and amendments
   b. Financial Status Report, Final Request for Payment, Outlay Report, and Request for Reimbursement for Construction Programs (SF-270):
      i. Report of Federally-Owned Property
   c. Submitted by the Grantee within 90 days of project completion:

   i. Federal Financial Report (SF-425)
   ii. Certification of project costs
   iii. Third-party audit if required
2. Grantee project final reports:
   a. Final inspection report
   b. Testing reports and readiness for operations
   c. Operating and maintenance manuals and training
   d. Warrantees and guarantees
   e. Buy America documentation
   f. Safety and security certifications
   g. ADA-compliance documentation
   h. Before and After studies
3. Grantee project as-built documents:
   a. Plans and specifications
   b. Cost breakdown; evidence of resolution of change orders and claims
   c. Schedule

4.0 SCOPE OF WORK

4.1 Annual Monitoring Review

The MTAC should provide information on the Grantee's projects using the FRA checklist format, coordinate with the Federal team and FRA staff, including Regional / Project Managers, grants managers, financial managers, and others as required.

1. Schedule the review with the Grantee and the Federal team in advance.
2. The review may require a special site visit, or more likely, it can take place during a regularly scheduled monthly or quarterly site visit. The report must include the MTAC's findings, conclusions, and recommendations for improvement, as required.
3. Provide a draft report. (See MP 01)

4.2 Review Prior to Grant Close Out

For the review prior to close out of the grant agreement, the MTAC will:

1. Obtain the documents listed above from the Grantee.
2. Coordinate the documents for delivery to the Federal team.
3. Check the documents for correctness.
4. Produce a final oversight report that summarizes the project and close out documents.
5. Produce a Lessons Learned / Best Practice report for one or more lessons that may be useful to others.
6. Provide a draft report. (See MP 01)

5.0 REFERENCES – SEE MP 01

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Monitoring Procedure 32A – Planning and Concept Design

1.0 PURPOSE

This Monitoring Procedure (MP) describes FRA requirements for the Monitoring and Technical Assistance Contractor (MTAC) when evaluating the Grantee's planning processes and its planning work products. This MP covers State rail planning, regional and corridor planning, and station area planning.

2.0 KEY PRINCIPLES

To decide how something should be in the future requires a vision or idea of a desired state; it requires investigation and analysis of existing and potential future conditions to understand where change is necessary, possible, and desirable; and it requires synthesis to crystalize and develop a coherent new reality. These three planning activities link knowledge to collective action. The planning process brings many "actors" or stakeholders together to identify a vision, establish goals, discuss existing conditions and possible alternatives, arrive at an agreed approach, and move into implementation.

Planning for intercity passenger rail and high-speed rail aims to improve connectivity between cities and towns as well as intermodal access within station cities. Passenger rail planning reflects input from many stakeholders: State elected representatives and governors, the passenger rail project sponsor, host railroads, rail operators, advisory boards, local jurisdictions, transit operators, community and industry groups, and other interested parties.

FRA funds passenger rail planning at the multi-state, regional, State, corridor, and station area levels. Planning at the multi-state and State levels becomes the platform for regional and corridor plans, which in turn provide a foundation for project design, construction, and operations.

The MTAC's evaluation of the Grantee's planning processes and work products provides critical input to FRA's determination of the likelihood that the plan can achieve its stated purposes and goals through subsequent project implementation.

One aspect of the planning process is coordination with the environmental review process. All federally-funded projects require appropriate environmental documentation to be prepared consistent with the National Environmental Policy Act (NEPA.) Coordinating the planning and environmental analyses requires "a clear and complete understanding of all project elements, reached through sound engineering and railroad planning. . ."[1]

The following table is a guide to the transition from the planning to the design phase. The planning activities listed can apply at the multi-state, region, State, and corridor levels, and station areas.

[1] Railroad Corridor Transportation Plans: A Guidance Manual, July 2005 (available at http://www.fra.dot.gov/eLib/Details/L04161).

Transition from Planning to PE	
Planning and Concept Design / Tier 1 NEPA	**Preliminary Engineering / Tier II or Project NEPA**
Rationale	
Identify a vision Establish rationale for project or service Establish goals, objectives, and desired outcomes. Develop NEPA Purpose and Need Statement for the corridor	Develop NEPA Purpose and Need Statement for the project
Service Planning	
Service planning and analysis as part of Alternatives Analysis; includes general selection among alternatives. Data analyses of existing conditions, consider possible alternative future conditions, and concepts for selected alternative: • Identify challenges and opportunities • Identify and select markets to serve • Consider modal alternatives and make selection • Conduct travel demand and revenue forecasts • Analyze and project capacity conditions • Perform conceptual railroad operations modeling including timetables, equipment, infrastructure, outputs such as trip-time, reliability, frequency, capacity • Identify stations including spacing, general location • Develop Op & Maintenance cost estimates • Identify and confirm entities responsible for administering, managing, and overseeing services • Prepare contents for Service Outcomes Agreement (agreement is pursued once funding for construction is identified)	For the proposed alternative, completion of service analyses and planning (refinement if necessary for ridership and revenue forecasts, railroad and train capacity analysis, and detailed operations modeling with timetables.) Development and finalization is required for: • Station location, form, intermodal connections, and access • Detailed Op & Maintenance cost estimates • Confirmation of entities responsible for services such as equipment maintenance, maintenance of way, and train operations • Agreements / draft agreements with host railroads and other rail entities • Agreements for integration of service with other passenger transport • Prepare contents for Service Outcomes Agreement (agreement is pursued once funding for construction is identified)

Transition from Planning to PE	
Planning and Concept Design / Tier 1 NEPA	**Preliminary Engineering / Tier II or Project NEPA**
Infrastructure Planning and Design	
Systems planning and cost estimating as part of Alternatives Analysis. Includes general selection among alternatives. • GENERAL LOCATION - horizontal and vertical alignment of railroad and general location of stations • Conceptual estimate of capital cost • Development of project schedule by phase • Consider methods of project delivery	Physical design including specific selection among alternatives. • SPECIFIC LOCATION - horizontal and vertical alignment of railroad and stations; access; intermodal connections • Development of design to at least 30% completion, to generate reliable cost estimate for construction and operations • Estimate of capital cost reliable enough to remain unchanged through construction completion • Development of detailed project schedule • Decision re method of project delivery
Environmental Analysis	
NEPA environmental evaluation of service and infrastructure; includes public participation. Includes development and review of alternatives, selection of preferred alternative; determination in EA, or EIS. Refer to MP 32B.	Completion of project environmental evaluation. Includes development and review of alternatives and selection. Finalization of CE, FONSI for EA, or Record of Decision for EIS, before start of Final Design.
Finance Planning	
Includes development of draft financial plan. Refer to MP 49.	Includes finalization of financial plan including funding sources, cash flow, securing funding commitments for construction before start of Final Design.

3.0 REQUIRED DOCUMENTS

1. The MTAC should obtain applicable documents from the Grantee, such as:
   a. Background studies
   b. Planning narratives including rationale, assumptions, and planning criteria
   c. Agreements:
      - Grantee's agreement with FRA for the work
      - Construction and Maintenance
      - Operations
      - Service Outcome Agreement
      - Real estate agreements
   d. Planning analyses of:
      - Passenger rail needs and opportunities
      - Passenger rail market potential
      - Railroad infrastructure network and train capacities
      - Railroad and train operations

e. Analysis of alternatives:
   i. Concept design studies:
      - Horizontal and vertical alignments in the context of existing development
      - Civil works, track, bridges, tunnels, stations, maintenance facilities, systems
      - Real estate acquisition
      - Rolling stock
   ii. Plans and forecasts:
      - Railroad infrastructure network and train capacity plans
      - Passenger rail ridership and revenue forecasts
      - Operations plans for all entities providing service
      - Station plans, station area plans
   iii. Associated environmental documents
   iv. Cost estimates:
      - Capital cost
      - Operations and maintenance costs
   v. Schedules:
      - For planning work
      - High-level schedule for full build-out (including design, construction)
   vi. Preliminary assessment of risks
   vii. Financial projections

4.0 SCOPE OF WORK

The MTAC will apply its planning expertise, knowledge, and experience in the railroad industry to the study and evaluation of the Grantee's railroad planning activities and documents, will provide its professional opinion on their adequacy and merits, and make recommendations for their improvement.

4.1 Network Planning for Multi-state Regions

The MTAC may be asked to participate in FRA-led multi-state regional network planning activities. Presently, the work is focused on regional rail in the Southwest and Northeast. FRA expects to initiate work in other regions of the country soon. Regional network plans are based on evaluation of potential markets for passenger rail service, and optimal network integration and sequencing of rail corridors. The work includes identification of funding strategies and consideration of project development and delivery issues associated with multi-state service. Regional network plans influence the direction and content of passenger rail corridor investment plans. FRA has developed a regional network planning tool called "CONNECT" -- contact FRA Planning for more information.

4.2 Corridor Planning

For high-speed and intercity passenger rail corridor plans, Grantees will develop a Service Development Plan (SDP) and typically, a corresponding Tier 1 or Programmatic environmental

review with a Service NEPA.[2] The SDP brings together many inter-related projects that collectively produce benefits greater than the sum of individual projects.

An SDP comprehensively addresses the planning, design, construction and acquisition of infrastructure, equipment, stations, and facilities required to operate high-speed and intercity passenger rail service. It establishes the overall scope and approach for the proposed service.

Primary objectives of the SDP include:

- Clear demonstration of the rationale for new or improved intercity passenger rail service
- Analysis of alternatives for the proposed new or improved intercity passenger rail service and detail the alternative selected [through the NEPA process if applicable]
- Demonstration of the operational and financial feasibility of the proposed alternative
- If applicable, description of how implementation may be divided into discrete phases

Key References:

- Appendix A SDP Outline – July 2010 NOFA for Service Development Programs[3] (below)
- Appendix B Planning and Concept Design – Additional Information and Requirements (below)
- *Railroad Corridor Transportation Plans: A Guidance Manual*, July 2005 (available at http://www.fra.dot.gov/eLib/Details/L04161)

4.3 State Rail Planning

The State Rail Plan describes the State's long-term vision for rail service and its role in the statewide multimodal transportation system. Based on an inventory of the existing rail system, and an assessment of needs and opportunities, the Plan prioritizes future projects, programs, policies, laws, and funding necessary to achieve the long-term vision. In addition, since it is State policy, the Plan demonstrates political, legal, and financial support for rail development. For FRA's State Rail Plans Guidance, September 2013, see http://www.fra.dot.gov/eLib/Details/L04760.

1. The MTAC will review the adequacy of the State Rail Plan in:
   a. Providing a long-term vision for rail in the State
   b. Evaluating:
      - Existing transportation conditions including rail, highway, and air
      - Trends for fuel costs, congestion, industry, etc.
      - Trends and factors related to demographics and the overall economy
   c. Analyzing:
      - Railroad capacity
      - Needs and opportunities for passenger and freight rail service
      - Impacts of rail on transportation, economy, environment

[2] Refer to MP 32B for definition of Service NEPA.
[3] USDOT, FRA HSIPR Program. Notice of funding availability for Service Development Programs; issuance of interim program guidance; pg. 38344, Federal Register / Vol. 75, No. 126 / Thursday, July 1, 2010 / Notices (available in Appendix A of this MP).

d. Demonstrating input from Plan stakeholders
e. Providing a prioritized list of near- and long-term projects based on goals to achieve the vision, using evaluations, analyses, and inputs from capital cost estimates and funding plans for near-term projects

4.4 Station Area Planning

The Station Area Plan describes the vision for the one-quarter to one-half mile radius around a passenger rail station. The Plan includes the station itself – its horizontal and vertical location, form and mass, public-space implications, and architecture. It includes enhancements to transportation connections between rail, transit, automobiles, biking, walking, and passenger loading. It also includes development plans– form, mass, types of development, and urban design parameters and motifs. The Station Area Plan can guide the insertion of a new station into a context and illustrate how the station is networked to the city and region through enhancements to transportation and development.

For FRA's recommendations titled "Station Area Planning for High-Speed and Intercity Passenger Rail," June 2011, see http://www.fra.dot.gov/eLib/Details/L03759.

The MTAC will review the Station Area Plan for its adequacy in addressing station location, transportation connections, and urban design and infill development.

APPENDIX A

SDP Outline – July 2010 NOFA for Service Development Programs

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Excerpt from:

Federal Register / Vol. 75, No. 126 / Thursday, July 1, 2010 / Notices
DEPARTMENT OF TRANSPORTATION
Federal Railroad Administration
High-Speed Intercity Passenger Rail (HSIPR) Program
AGENCY: Federal Railroad Administration (FRA), Department of Transportation (DOT).
ACTION: Notice of funding availability for Individual Projects; issuance of interim program guidance.

Appendix 2.1 Service Development Program Planning

The Service Development Plan (SDP) is prepared during the planning phase for HSIPR Service Development Programs and lays out the overall scope and approach for the proposed service. Among the primary objectives of the SDP are:

- To clearly demonstrate the purpose and need for new or improved HSIPR service;
- To analyze alternatives for the proposed new or improved HSIPR service and identify the alternative that would best addresses the identified purpose and need;
- To demonstrate the operation and financial feasibility of the alternative that is proposed to be pursued; and
- As applicable, to describe how the implementation of the HSIPR Service Development Program may be divided into discrete phases.

The following model outline for the SDP describes the specific elements and content that optimally would be included in an SDP. While nearly all of the topics addressed in the major sections of this outline are necessarily interrelated, and should be addressed through an iterative analytical process, this outline's organization highlights the major disciplines and analytical capabilities that should be brought together in the development of an SDP.

1. Purpose and Need

The fundamental starting point of any transportation planning effort, including SDPs developed under the HSIPR program, is the identification of the purpose and need for an improvement to the transportation system service in a given geographic market. In outlining a transportation problem in need of a solution, the Purpose and Need section should provide, at a minimum, a description of the transportation challenges and opportunities faced in the markets to be served by the proposed service, based on current and forecasted travel demand and capacity conditions.

2. Rationale

The rationale demonstrates how the proposed new or improved HSIPR service would cost-effectively address transportation and other needs. The rationale is based on current and forecasted travel demand and capacity condition. This section should demonstrate how the proposed service can cost-effectively address transportation and other needs considering system alternatives (highway, air, other, as applicable).

Development of the program rationale considers multimodal system alternatives (highway, air, other, as applicable), including a qualitative and quantitative assessment of the costs, benefits, impacts, and risks of the alternatives. Program rationale also explores synergies between the proposed service and large-scale goals and development plans within its service region and communities.

3. Identification of Alternatives

This section describes the alternative transportation improvements, including HSIPR improvements and improvements to other modes, which have been considered within the SDP to address the underlying transportation purpose and need. At a minimum, this section should identify a base case (also known as a ‘‘do-nothing’’ or ‘‘do-minimum’’ case), against which these alternatives have been analyzed within the SDP, and provide a rationale for the selection of the base case.

4. Planning Methodology

The SDP should clearly describe the basic elements of the methodology used in developing the plan. This may address a wide array of topics, but at a minimum, it should address:

a. The planning horizon utilized;
b. Any major, cross-cutting assumptions employed throughout the SDP; and
c. The level of public involvement in developing the plan.

5. Demand and Revenue Forecasts

The SDP should address the methods, assumptions, and outputs for travel demand forecasts, and the expected revenue from the service. It should provide information on the following topics and outputs:

a. Demand Forecasts
    - Methodology—Document the modeling methodology and approach used to forecast passenger rail demand (e.g., a four-step model), including competing modes, HSIPR alternatives considered, and the method for reflecting passenger capacity constraints (such as equipment, station, and station access capacity) within the HSIPR service.
    - Study Area Definition—Describe the extent of the study area, road network extent, rail stations, airports, intercity bus terminals considered.
    - Data sources—Provide the assumptions and data used to quantify the existing travel market and forecast year travel market.
    - Travel Model—
        i. Show the demand model structure including example equations and elasticities.
        ii. Describe the base and future year model, including specific travel network and service characteristics. This should include pricing assumptions (including the

rationale and basis for including or excluding both revenue-maximizing and public benefit-maximizing pricing models) and travel time-related assumptions (including frequency, reliability, and schedule data for the service). Also include the manner in which exogenous growth (e.g., related to general economic, employment, or population growth), has been accounted for in the model.

iii. Include the mode choice model structure such as logit nested diagrams.

iv. iv. Explain the model calibration and validation.

- Model Forecasts—Present and explain the detailed base and forecast year ridership outputs including trip-table outputs), along with the ramp-up methodology employed for determining ridership during the intermediate years between project completion and the model forecast year.

b. Revenue Forecasts

- Ticket Revenue Forecasts—Explain base and forecast year ticket revenue forecasts.
- Auxiliary Revenue Forecasts—If applicable provide base and forecast year auxiliary revenue, including but not limited to, food and beverage revenue, mail and express revenue.

6. Operations Modeling

This section describes the underlying operational analyses, including railroad operation simulations and equipment and crew scheduling analyses, which in turn reflect such variables as travel demand and rolling stock configuration. The modeling should include all rail activity in the corridor including freight and commuter rail.

If the new or improved HSIPR service contemplated under the SDP makes use of facilities that would be shared with rail freight, commuter rail, or other Intercity Passenger Rail services, the existing and future characteristics of those services—as developed cooperatively with the rail freight, commuter, and Intercity Passenger Rail operators—should be included as an integral element to the SDP. In particular, the SDP should show how the proposed Service Development Program will protect the quality of those other services through a planning horizon year. In general, operations modeling performed in accordance with FRA's publication ''Railroad Corridor Transportation Plans: A Guidance Manual'' would support an SDP. The section on operations modeling should provide information on the following topics and outputs.

a. Modeling Methodologies

- Describe in detail the Service Network Analysis models and methodologies used, including the method through which potential infrastructure improvement were identified and incorporated into the modeling effort.
- Specifically describe how stochastic operations variation, in terms of operational reliability of scheduled rail service, operational variability of non-scheduled rail service, and equipment and infrastructure reliability, has been incorporated into the modeling effort.

b. Operating Timetables
   - Provide base case and alternative-specific schedules for existing and new HSIPR service and commuter rail service, and operating windows or schedules, if applicable, for rail freight and other activities (e.g., maintenance of way). Include both revenue operations and all scheduled or likely non-revenue (deadhead) movements.

c. Equipment Consists
   - Describe the equipment consists for all services included in the operations modeling, including motive-power (locomotive or multiple-unit) characteristics (e.g., weight, horsepower, tractive effort, etc.), non-powered equipment characteristics (e.g., consist lengths in units and distance, trailing tonnage, etc.), and any use of distributed power, electronically controlled pneumatic (ECP) braking systems, or other practices affecting train performance.
   - Provide baseline acceleration rates and braking curves for all trains included in the operations modeling, consistent with the consist characteristics described.

d. Rail Infrastructure Characteristics
   - Describe the origin on the rail infrastructure network employed in the operations modeling, including whether or not it was provided by the infrastructure owner or independently developed.
   - Describe any major infrastructure-related assumptions employed in the operations modeling, including signal system characteristics, maximum unbalance, and turnout speeds.

e. Outputs
   - Provide detailed outputs from the operations modeling of all base case and alternative scenarios, including stringline (time and distance) diagrams, delay matrices, and train-performance calculator speed and distance graphs.

f. Equipment and Train Crew Scheduling
   - Provide outputs of HSIPR equipment and train crew schedule modeling, demonstrating how equipment and train crews will turn at endpoints, and the total equipment and train crew resources required to meet each modeled HSIPR operating timetable.

g. Terminal, Yard, and Support Operations
   - Provide outputs of detailed modeling of operations at major terminals, demonstrating the adequacy of identified platform tracks, pocket tracks, yard capacity, and maintenance of equipment facilities to meet the requirements of each modeled HSIPR operating timetable.

7. Station and Access Analysis

This section of the SDP addresses the location of the stations to be served by the proposed new or improved HSIPR service, how these stations will accommodate the proposed HSIPR service, how passengers will access those stations, and how these stations will be integrated with connections to other modes of transportation. The topics addressed under this section will depend greatly on whether the SDP is intended to support the introduction of a new HSIPR service on a new route, or whether it relates to the improvement of an existing HSIPR service—generally, the latter, in serving existing

stations, will not require detailed planning of station locations. This section of the SDP should provide information on the following topics and outputs.

a. Station Location Analysis
   - An analysis of potential alternatives for station locations, with the identification of preferred locations.
   - A description of the methodology employed in selecting station locations, including consideration of zoning, land use, land ownership, station access, demographics, and livable community factors (such the relative consideration of center-city and ‘‘beltway’’ type stations).
   - A description of any planned joint use or development of each station facility by other passenger rail operators, other transportation operators (e.g., transit, intercity bus, air transport), or commercial or residential real estate developments.

b. Station Operations
   - An analysis to determine the adequacy of Station capacity to meet the needs of the HSIPR service, including platform length, platform and concourse pedestrian capacity, ticketing capacity, compliance with Americans with Disabilities Act (ADA) requirements, and compatibility between station facilities and HSIPR equipment (e.g., platform and equipment floor heights).

c. Intermodal Connectivity
   - A detailed description of all non-HSIPR passenger transportation operations and services to be integrated into each station.
   - A description of the degree on integration of intermodal connections with each station facility (e.g., complete collocation, short distance proximity, distant proximity, etc.), including estimates of door- to-door passenger transfer times (excluding waiting, ticketing, and/or check-in time) from one mode to another (e.g., the time it would take to go from the an HSIPR service platform to a subway station entrance, or an airline check-in counter).
   - A description of additional intermodal integration measures to be employed, such as integrated ticketing, schedule coordination, travel information integration, etc.

d. Station Access
   - An analysis of how passengers will access each station, and how these access options will provide sufficient capacity to satisfy forecasted ridership to and from the station, including public transportation, road network capacity, vehicle pick-up/drop-off, and parking.

8. Conceptual Design and Capital Programming

The SDP describes the rail equipment and infrastructure improvements (and other investments) required for each discrete phase of service implementation. If applicable, the SDP should prioritize improvements for each phase. The SDP presents estimated capital costs for projects and project groups, with documentation of assumptions and methods.

a. Project Identification
   - The SDP should identify in detail each discrete project that will be necessary to implement the planned new or improved HSIPR service, such as construction of specific stations, individual sections of additional or upgraded track, locomotive and rolling stock purchases, etc.
   - ''Projects'' should be defined at a level of detail sufficient to delineate between elements of the overall scope with differing geographic locations, different types of investments (e.g., track improvements vs. station projects vs. equipment purchases), and different implementation schedules. The manner in which the proposed scope is likely to be divided into contracts for implementation may also be considered in identifying the scope of discrete ''projects.'' In general, each ''project'' should be defined with the aim of making its scope easily comprehensible and identifiable to a layperson.
   - The identification of discrete projects should likewise be consistent with proper usage of the Work Breakdown Structure (WBS) tool for project management—the ''projects'' themselves should constitute one of the top levels of the Service Development Program's overall WBS.
b. Project Cost Estimates
   - The SDP should include project costs estimates in both the WBS and HSIPR Standard Cost Category format.
   - The SDP should include the documentation of the cost estimates in their original format, illustrating exactly how those cost estimates were calculated.
   - The cost estimates should be supported by a detailed description of the methodology and assumptions used in developing the estimates, including values and sources of unit costs for labor, materials, and equipment; overhead costs or other additives; allocated and unallocated contingencies; credit value of salvaged materials; and cost escalation factors. The source of unit costs should be explained for cost estimates based on broad, top-down ''indicative project'' prices. Unless explicitly justified, total contingencies for cost estimates developed during the planning phase should be no greater than 30 percent.
c. Project Schedule and Prioritization
   - The SDP should present the proposed schedule for the implementation of the Service Development Plan organized in the format of Work Breakdown Structure and consistent the phases of projects development.
   - The schedule should illustrate the duration of each activity within the WBS, the earliest date at which each activity could commence, and the dependencies between the various activities.
d. Conceptual Design Documentation
   - The SDP should include basic visual depictions of the projects encompassed by the proposed Service Development Program, including maps and track charts.
   - Track charts should clearly show the current and proposed future track configurations throughout the geographic area encompassed by the Service Development plan (and any proposed interim configurations, if phased implementation is proposed). Track

charts should be drawn to an appropriate linear scale for the level of complexity of the track configuration in a particular segment, and should clearly show turnout sizes, road crossings, overhead and undergrade bridges, station and yard locations, junctions, track curvature, grade, signal location, signal rule applicability (e.g., CTC, ATC, PTC, DTC, etc.) and maximum authorized speeds. The physical location of specific projects should be shown clearly, including the limits of any linear-oriented projects (e.g., roadbed rehabilitation, rail replacement, tie replacement, etc.).

9. Operating and Maintenance Costs and Capital Replacement Forecast

The SDP should include operating and financial projections for each phase of the planned intercity passenger rail service. The SDP should address the methods, assumptions and outputs for operating expenses for the train service including maintenance of way, maintenance of equipment, transportation (train movement), passenger traffic and services (marketing, reservations/information, station, and on-board services), and general/administrative expenses. Cost-sharing arrangements and access fees with infrastructure owners and rail operators should also be included. Where applicable, allocation of costs across routes should also be discussed.

a. Costing Methodology and Assumptions
   For each different cost area, the SDP should provide the basis for estimation (application of unit costs from industry peers or a detailed resource build-up approach) of operating expenses. The SDP should include documentation of key assumptions and provide back-up data on how unit costs and quantities and cost escalation factors were derived. Typical cost areas include:
   - Maintenance of way—Includes the cost of maintaining the MOW, signals, buildings, structures, bridges etc.
   - Maintenance of equipment—Includes the cost of layover and turnaround servicing, preventive maintenance, bad orders, wreck & accidents, and contractor maintenance.
   - Transportation (train movement)—Includes the cost of trainmen, enginemen, bus connections, train fuel, propulsion power, railroad access and incentive payments.
   - Marketing and Information—Includes the cost of advertising, marketing, reservations, information.
   - Station—Includes the cost of station staff (ticketing, baggage, red caps, porters etc.), building rent, maintenance, utilities, security.
   - On-board services—Includes the cost of on-board service staff, food and provisions.
   - General/administrative expenses.
b. Summary of Operating Costs
c. Route Profit and Loss Statement
   Estimate the Profit and Loss Statement for the route based on revenue and operating cost forecasts.
d. Capital Replacement Costs
   The SDP should provide detailed estimates of any additional capital costs, beyond those incurred in the initial implementation of the Service Development Program, that are anticipated to be required due to lifecycle replacement or other factors through the planning horizon of the SDP.

10. Public Benefits Analysis

The SDP should include a description and quantification of benefits, whether operational, transportation output-related, and economic in nature, with particular focus on job creation and retention, ‘‘green’’ environmental outcomes, potential energy savings, and effects on community livability. Except where clearly unmonetizable, the SDP should provide the estimated economic value of those benefits. At a minimum, this section of the SDP should include:

a. Operational and Transportation Output Benefits
   The SDP should clearly identify the operational and transportation output-related benefits that will be generated by the project. Examples of operational benefits include trip-time improvements, reliability improvements (as measured by train delay-minutes), frequency increases, and passenger capacity increases (as measured by seat-miles). Transportation output benefits include increases in HSIPR passenger-trips and passenger-miles traveled, reductions in passenger-delay-minutes, and passenger-travel time savings resulting from faster scheduled trips times.
b. User and Non-User Economic Benefits
   The SDP should include an analysis of the monetized economic benefits to user and non-user that will be generated by the project, regardless of how or where those benefits are generated. User benefits include items such as the value of travel time savings to rail users, while non-user benefits include items such as the monetized value of emissions reductions, community development, and travel time savings due to congestion reduction for users of other modes from which demand is anticipated to shift to the new or improved HSIPR service.
c. Benefits by Rail Service Type
   All user and non-user benefits should be delineated by the type of improved rail service (i.e., HSIPR, commuter, or freight) that will generate those benefits. For example, user benefits in the form of travel time savings generated by a project for HSIPR passengers should be shown delineated from those travel time savings accruing to users of a commuter rail service that will also benefit from the project. Likewise, non-user benefits in the form of emission reductions resulting from the shift of passengers to HSIPR service should be separated from benefits resulting from a shift of road freight transport to rail freight service.

Planning and Concept Design Additional Information / Requirements		
Description	**MP**	Refer to Monitoring Procedures listed
Legal Authority		
		Grantee's review of State statutes to demonstrate its authority to implement the project, and its knowledge of requirements and constraints flowing from State law that may impact project cost and schedule if not addressed proactively.
Summary Planning Documents		
At completion of this phase for a major corridor, the summary documents include: Alternatives Analysis Report, Service Development Plan, Tier I NEPA and decision document.		These documents describes the establishment of a project rationale; the alternatives considered; their characteristics with respect to markets served, service provided, infrastructure changes required, environmental impacts, costs, and funding; and the alternative that is selected and taken to a higher level of development.
PMP and subplans		
	20	Project Management Plan
	21	Management & Technical Capacity/Capability
	22	Safety and Security Management Plan
	23	Real Estate Acquisition and Management Plan
	24	QA/QC Plan
	38	Vehicle Acquisition and Management Plan
	49	Finance Plan
Service Planning	32A	
Service Development Plan (see Appendix A) Service Outcome Agreements (SOA) Other Agreements		Service planning considers market and service alternatives, and physical and service contraints/opportunities. Through an SOA, the Grantee (Rail Project Sponsor), Passenger Train Operator, and Host Railroad agree to targets for daily round trips, average scheduled trip time, and minutes of delay. The SOA also covers agreement enforcement, dispute resolution, agreement term, modification procedures, and O & M commitments related to the project. The SOA references the following agreements between/among the following parties: - Grantee and FRA for the project; Grantee and Passenger Train Operator; Grantee and Host Railroad; Grantee and other Real Estate owners - Passenger Train Operator, Host Railroad, and Feeder Railroads

Planning and Concept Design Additional Information / Requirements		
Description	**MP**	Refer to Monitoring Procedures listed
Concept Design - Drawing Attributes	32C	
Alternatives Analysis		**Screening, Individual Alternatives, Development of Selected Alternative**
FRA expects well developed concept design drawings during the Planning phase so that a good basis for further design is established, capital costs can be roughly but confidently estimated, and choices among alternatives can be made knowledgeably. The MTAC should review the Grantee's concept design work for completeness and coordination, recognizing that much of the information is treated broadly.		For screening of alternatives, drawings will indicate lengths of typical construction conditions; for example, typical on-grade ROW and track and station type; and atypical construction conditions, for example, special elevated or tunnel lengths. For development of individual alternatives, design criteria including safety/security criteria will be developed. Concept drawings will show the alignment divided into discrete segments based on topography and land use, as well as on typical and atypical construction conditions. Conceptual / diagrammatic plans and cross-sectional drawings based on design criteria will be developed for each segment, showing relationship to grade, track quantity and configuration, and real estate acquisition. For the selected alternative, planning diagrams and concept design drawings will be developed into typical and atypical segments and station areas. In addition, studies will be prepared for land use, real estate, economic development, along with descriptive narratives and design criteria.
Concept Design Activity		**Type/Level of Design Detail**
Design Objectives and Basic Criteria		Grantee's accepted design criteria / standards and performance objectives
Aerial Photography		Digitized aerial photo background with limited controls (e.g. to support reasonably accurate scaling of dimension of physical features)
		Areas of sensitivity, identified in environmental document
Real Estate, ROW		Right-of-way limits, existing and proposed (indicating actual or potential takes). These limits would not be necessarily be field surveyed but would indicate general dimensions.
		A list of real estate agreements required for access, e.g. bridge commissions, city or private land owners, railroads
Renderings		Concept renderings of major project features (e.g., stations, railway segments)
Transportation Facilities-Civil		Basic railroad guideway facility dimensions, indicating footprints and limits of proposed improvements - track and track components, including turnouts, railroad crossings, and highway crossings

Planning and Concept Design Additional Information / Requirements		
Description	**MP**	Refer to Monitoring Procedures listed
Transportation Facilities - Structures		Structure types, including examples of typical/similar designs indicating dimensions and proposed locations; typical sections through civil and site structures such as bridges, tunnels, culverts, and retaining walls
Civil and Site Structures		Location and relocation of major utilities (e.g., high voltage overhead or underground power, commercial power, underground major sewer, gas, water, other pipeline, communications lines); drainage channels, other. Access roads to utility infrastructure.
		Related highway and street improvements, including any traffic signals
Systems Elements		Description of signal systems elements (including, but not limited to, communications, signals including PTC, signal power, and highway crossing signalization, operations control, and safety and security emergency systems planned); performance characteristics and capacities.
		Description of traction power facilities and infrastructure. Proposed locations of major equipment (e.g., traction power stations, catenary alignment and possible configuration, etc.)
Stations		Basic footprint, locations of stations, including platforms; basic indication of station accessways for pedestrians, transit, and autos
Maintenance Facilities		Overall site plan (schematic indicating proposed limits, general features)
		Basic footprint of new or expanded yards, shops/garages Description of improvements to control centers
Vehicle		Outline specification for rolling stock, including both cars and locomotives; including type, basic dimensions, dynamic envelope
Project Delivery Methods	32D	Consideration of project delivery options (design-bid-build, design-build, etc.)

Planning and Concept Design Additional Information / Requirements		
Description	**MP**	Refer to Monitoring Procedures listed
Capital Cost Estimate	33	
Alternatives Analysis		**Screening, Individual Alternatives, Development of Selected Alternative**
Grantee consultant design teams are expected to have sufficient knowledge and experience to produce reliable cost estimates. A cost estimating methodology report should be submitted to explain the estimating approaches used, assumptions made, specific items such as lump sum values, the method for developing unit costs, and cost estimating relationships.		For screening of alternatives, parametric cost estimating is appropriate. Aggregated unit costs should be based on similar projects in the recent past. Typical and atypical construction conditions are the basis for estimating. For development of an individual alternative, segment-based cost estimating is appropriate. Costs are estimated based on diagrammatic plans, cross-sectional drawings, and design criteria for each segment. For the selected alternative the segment-based costing approach is used augmented by risk identification. The cost estimate should be built from the bottom up to address all scope elements, real estate, professional services, contingency, financing costs, and inflation costs to yield a cost in year-of-expenditure dollars.
Project Schedule	34	
		For the selected alternative, the Grantee should develop a concept schedule that shows at a high-level the PE, FD, and construction phases, so as to reflect the anticipated project delivery method. Construction phasing or sequencing shall be shown in the schedule.
Risk and Contingency Considerations	40	
		Focus on Risk Identification. Inadequate consideration of uncertainty during alternatives analysis and the resulting underestimation of capital costs creates a delivery problem for projects and a credibility problem for the industry. Uncertainties in design, delivery method, construction, funding, and political and institutional support should be identified, quantified, and isolated if possible. The Grantee should develop and populate a risk register that includes known risks, uncertainties, and unknowns. The risks can then be categorized by type, project phase, and potential severity. The risk register is useful during alternatives analysis as well as after a preferred alternative has been selected.
Before and After Study	27	

U.S. DOT Federal Railroad Administration
Office of Passenger and Freight Programs

Monitoring Procedure 32B – Environmental Review

1.0 PURPOSE

This Monitoring Procedure (MP) describes FRA requirements for the Monitoring and Technical Assistance Contractor (MTAC) when evaluating the Grantee's processes and work products related to the environmental review of projects.

2.0 KEY PRINCIPLES

The Council on Environmental Quality (CEQ) encourages integrating environmental reviews required by the National Environmental Policy Act (NEPA) with other planning and environmental reviews, to avoid duplicative or inconsistent processes and facilitate quicker, more informed decision-making.[1]

Consistent with CEQ, FRA's review process ensures that environmental values are integrated into project decision-making processes by considering the environmental impacts of proposed actions and all reasonable alternatives to those actions. FRA also ensures that information on environmental impacts and alternatives is publicly available before decisions are made and actions occur.

FRA staff work with Grantees and other parties in the preparation of environmental studies and documents. Through collaboration with FRA, state and local agencies provide environmental review services and prepare documents on behalf of FRA. The environmental documents are used and issued as FRA agency documents.

The MTAC should obtain direction from FRA staff regarding the MTAC's role in the environmental process. The MTAC may be asked to assist FRA staff in the review and preparation of NEPA and related documents, and other aspects of the environmental review process.

3.0 REQUIRED DOCUMENTS

The MTAC should obtain direction from FRA staff regarding applicable documents from the Grantee, such as:

1. Grant Agreement
2. Service Development Plan materials
3. Alternative analysis materials
4. Scoping documents
5. Public participation materials
6. Design documents

[1] In March 2012, CEQ issued Final Guidance to Promote Efficient Environmental Reviews, available at http://www.whitehouse.gov/administration/eop/ceq/initiatives/nepa/efficiencies-guidance.

7. Materials related to analysis and compliance with
    a. National Environmental Policy Act (42 U.S.C. 4321 et seq., hereinafter NEPA), especially NEPA section 102 (2)(C) (42 U.S.C. 4332(2)(C)); including mitigation information; including decision documents such as CE, FONSI, and ROD
    b. Section 4(f) of the Department of Transportation Act (49 U.S.C. 303(c))
    c. Section 106 of the National Historic Preservation Act (16 U.S.C. 470(f))
    d. Section 309(a) of the Clean Air Act (42 U.S.C. 7609(a))
    e. Section 307(c)(2) of the Coastal Zone Management Act (16 U.S.C. 1456(c)(2))
    f. Section 2(a) of the Fish and Wildlife Coordination Act (16 U.S.C. 662(a))
    g. Section 7 of the Endangered Species Act (16 U.S.C. 1536)
    h. Noise Control Act of 1972 (42 U.S.C. 4901 et seq.) and
    i. Executive Orders, regulations, and guidelines cited in Appendices A and B of this MP

4.0 SCOPE OF WORK

Since FRA is responsible for compliance with environmental regulations the MTAC must understand its role as evaluator/recommender to FRA. The MTAC must check in with FRA before proceeding with a course of action related to a Grantee's environmental process and products, or its own work, for example, application of methodologies, agency coordination, handling letters and public responses. The MTAC must obtain agreement on the approach by the following individuals:

- FRA Regional Manager or Project Manager (Team Lead)
- FRA Environmental Protection Specialist (Subject Lead and Manager of the environmental review process)
- FRA Chief of Planning and Environment Division or Environmental Team Lead

Once the approach is set, the MTAC may be responsible to do the following:

1. Set up meetings with the individuals above—as frequently as required, weekly, monthly, or periodically—and obtain their concurrence, approval, and input.
2. Study and evaluate the Grantee's environmental processes and documents, provide a professional opinion on the adequacy of those documents, and make recommendations to FRA for improvements or actions.
3. Review for adequacy and timing the Grantee's approach to incorporating environmental requirements, including restrictions contained in the project's NEPA documents, into the project design documents and the Grantee's plan.
4. During design and construction, check, review, and update the design documents when changes occur in environmental requirements. Check for consistency. Assess the level to which environmental impacts and avoidance or mitigation measures are reflected in project design documents. Check constructability, cost, and time effects of implementing the mitigation measures.
5. Verify that necessary agreements and permits are identified.
6. Verify that impacts to third parties, especially to those in the railroad environment, stakeholders, and parties to agreements, are identified in the environmental document and listed at their current addresses for distribution of the document. Confirm that the Grantee has received comments, if any, from such third parties.

7. As a possible further step, prior to the NEPA decision, encourage the Grantee to document resolution of railroad operation impacts and mitigations, and to obtain sign-off of this plan by affected parties.
8. During construction, verify that the contract documents and/or interagency or public-private partnership agreements are being followed and that the project itself and the related mitigation measures are being implemented consistent with the environmental decision document.

4.1 NEPA Basics

The National Environmental Policy Act (NEPA) is the national charter for protecting the environment. Refer to 42 USC 4321-4347 (available at http://www.dot.gov/regulations/42-usc-sec4321-4347).

The purposes of NEPA are:

- "To declare a national policy which will encourage productive and enjoyable harmony between man and his environment
- To promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man
- To enrich the understanding of the ecological systems and natural resources important to the nation
- To establish a Council on Environmental Quality"[2]

The implementing regulations for NEPA written by CEQ are applicable to and binding on all Federal agencies. These regulations are listed in 40 CFR 1500-1518 (available at http://www.gpo.gov/fdsys/pkg/CFR-2004-title40-vol30/pdf/CFR-2004-title40-vol30-chapV.pdf).

FRA implementation of CEQ regulations is through the *FRA Procedures for Considering Environmental Impacts* as amended (available in Appendix B and at http://www.fra.dot.gov/eLib/details/L02561 and http://www.fra.dot.gov/Page/PO215).

The NEPA process consists of an evaluation of the environmental effects of a Federal action, using three levels of analysis:

- Categorical Exclusion (CE)
  "Means a category of actions which do not individually or cumulatively have a significant effect on the human environment and which have been found to have no such effect in procedures adopted by a Federal agency in implementation of these regulations (§ 1507.3 Agency Procedures) and for which, therefore, neither an environmental assessment nor an environmental impact statement is required."[3] (ref.1508.4)
  "Human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment." (ref. 1508.4)

[2] http://www.dot.gov/sites/dot.dev/files/docs/NEPA%20of%201969.txt
[3] NEPA Implementing Regulations by CEQ, 40CFR1500-1518, http://www.gpo.gov/fdsys/pkg/CFR-2004-title40-vol30/pdf/CFR-2004-title40-vol30-chapV.pdf

- Environmental assessment (EA)
  "(a) Means a concise public document for which a Federal agency is responsible that serves to:
  (1) Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.
  (2) Aid an agency's compliance with the Act when no environmental impact statement is necessary.
  (3) Facilitate preparation of a statement when one is necessary.
  (b) Shall include brief discussions of the need for the proposal, of alternatives as required by section 102(2)(E), of the environmental impacts of the proposed action and alternatives, and a listing of agencies and persons consulted." (ref. 1508.9)

  If through the EA process, the Federal agency determines the project would have no significant impact, the agency issues a finding of no significant impact (FONSI). "Finding of no significant impact means a document by a Federal agency briefly presenting the reasons why an action, not otherwise excluded (§ 1508.4), will not have a significant effect on the human environment and for which an environmental impact statement therefore will not be prepared. It shall include the environmental assessment or a summary of it and shall note any other environmental documents related to it (§ 1501.7(a)(5)). If the assessment is included, the finding need not repeat any of the discussion in the assessment but may incorporate it by reference." (ref. 1508.13)

- Environmental impact statement (EIS)
  "Means a detailed written statement as required by section 102(2)(C) of the Act."[4] (ref. 1508.11) If the EA determines that the action will have a significant effect on the human environment, an EIS is prepared. An EIS is a more detailed evaluation of the proposed action and alternatives. After a final EIS is prepared and at the time of its decision, a Federal agency will prepare a public record stating what the decision was; identifying all alternatives considered; stating whether all practicable means to avoid or minimize environmental harm from the alternative selected were adopted, and if not, why they were not. It also includes a monitoring and enforcement program for mitigation. This is the Record of Decision (ROD).

A NEPA analysis can be conducted during the planning or preliminary engineering phase as described in Section 4.2, but it must be completed before a project starts final design or is released for a design-build contract. The implementing regulations state "Agencies shall not commit resources prejudicing the selection of alternatives before making a final decision." (ref. 1506.1 Limitation on Actions during NEPA process)[5]

[4] Ibid
[5] NEPA Implementing Regulations by CEQ, 40CFR1500-1518, http://www.gpo.gov/fdsys/pkg/CFR-2004-title40-vol30/pdf/CFR-2004-title40-vol30-chapV.pdf

4.2 FRA and NEPA

To Grantees and the industry at large, FRA provides information and resources on environmental issues relating to the planning and development of the nation's railroad system. These issues range from hazardous materials, safety, noise, and invasive species to climate change and community livability. For railroad projects, FRA implements Federal environmental laws and policies and conducts environmental impact assessments of pending actions and projects. For rail planning, actions typically involve infrastructure and service changes over very long and linear geographic areas across multiple jurisdictions. Rail projects tend to be more localized.

Since NEPA regulations require consideration of all reasonable alternatives to inform decision making, the integration of planning and NEPA allows for an effective and efficient process to make decisions. Environmental documents are intended to "serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made" (ref. 1502.2(g)).

During Planning, for complex corridor conditions, in tandem with development of the Service Development Plan described in MP 32A, a Tier 1 or Programmatic environmental review is performed (ref. 1508.28 Tiering) to address broad questions and environmental effects in an entire corridor. For rail projects, a "Service NEPA" is completed with the Tier 1 to address questions and effects relating to alternatives for route, stations, and other facilities; and alternatives for service including type, level of service, and operating technology.[6] The NEPA process concludes with FRA's issuance of a decision document (FONSI or ROD) that may include mitigation measures to minimize impacts. State environmental reviews are ideally conducted in concert with NEPA.

At its best, planning is a rational, open, and transparent process that encourages informed decision making with public input. Agencies are required to include the public in preparing and implementing NEPA procedures. For FRA projects, this typically means participation by the Grantee's executive leadership, boards of directors of partner agencies, advisory groups, community and business groups, resource agencies, affected entities and property owners, the general public, and other stakeholders.

During Preliminary Engineering, project-specific environmental reviews build on the Tier 1 NEPA work, with additional public input.

For more information on FRA's approach to NEPA reviews, see appendices on the following pages:

- Appendix A: Environmental Documentation
- Appendix B: FRA Procedures for Considering Environmental Impacts
- Appendix C: NEPA Project Checklist

For a list of CEs, see FRA's Categorical Exclusion Guidance at http://www.fra.dot.gov/Page/P0550.

5.0 REFERENCES – SEE MP 01

[6] "Service NEPA" is a term coined by FRA.

APPENDIX A

Environmental Documentation - Federal Register Volume 75 No. 126

Federal Register / Vol. 75, No. 126 / Thursday, July 1, 2010 / Notices pg. 38361
DEPARTMENT OF TRANSPORTATION , Federal Railroad Administration , High-Speed Intercity Passenger Rail (HSIPR) Program , AGENCY: Federal Railroad Administration (FRA), Department of Transportation (DOT). ACTION: Notice of funding availability for individual projects; issuance of interim program guidance.

Appendix 2.2 Environmental Documentation
The environmental review process required by NEPA applies to all Federal grant programs. NEPA requires Federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. NEPA also mandates that all reasonable alternatives be considered, and to that end, an alternatives analysis is typically conducted during the environmental review process. Agencies must also make information on these impacts and alternatives publicly available before decisions are made and actions occur.

Appendix 2.2.1 Corridor-Wide Environmental Documentation (''Service NEPA'')
As part of the Service Development Program planning phase applicants must complete an environmental review, which addresses the full extent of the overall Service Development Program and its related actions. Within the context of the HSIPR program, this evaluation is referred to as ''Service NEPA.''

Service NEPA involves at least a programmatic/Tier 1 environmental review (using tiered reviews and documents), or a project environmental review, that addresses broad questions and likely environmental effects in the entire corridor relating to the type of service(s) being proposed, including alternative cities and stations served, geographical route alternatives, service levels and frequencies, choice of operating technologies (e.g., diesel vs. electric operation and maximum operating speeds), ridership projections, major infrastructure components, and identification of major terminal area or facility capacity constraints. Standard Service Development Programs are often best addressed with project NEPA documentation; while more complex Major Service Development Programs often call for a tiered approach.

Service NEPA is intended to support a Federal decision concerning whether or not to implement a Service Development Program. For major Service Development Programs, FRA generally prefers to use a tiered NEPA process and a Tier-1 environmental impact statement (EIS) to satisfy Service NEPA at a point prior to Preliminary Engineering that is required to support a more detailed, comprehensive ''project NEPA'' document. Furthermore, completion of a tiered Service NEPA EIS allows for the significant narrowing of the alternatives to be considered in preparing subsequent project NEPA documents, allowing for reduced Preliminary Engineering costs.

While FRA anticipates that most Major Service Development Programs will follow a tiered approach towards NEPA document development (including preparation of a Service NEPA EIS during the planning phase), FRA will consider a non-tiered service NEPA approach where appropriate and conducive to the efficient progression of the project and the consideration of environmental impacts. In general, FRA will

consider using project NEPA for Service Development Programs where one or more of the following factors apply:

- There are no routing decisions required for the proposed service;
- The projects necessary to implement the proposal are likely to be modest in scale and unlikely to cause significant environmental impacts;
- The Preliminary Engineering effort for the Service Development Program is likely to be modest in scale, cost, and duration; and
- The project sponsor will be providing all necessary funding, from non-HSIPR program sources, to complete Preliminary Engineering and site-specific environmental analysis.

For Service Development Programs that meet these criteria and for which FRA has decided not to tier, NEPA will be satisfied through a unified project-level document developed during the PE/NEPA phase.

Appendix 2.2.2—Project Environmental Documentation (''Project NEPA'')
As part of the PE/NEPA phase of project development, a project NEPA document and other required environmental documentation to satisfy other Federal laws are prepared for the specific design alternative identified through Preliminary Engineering and other reasonable alternatives (integrated with the design alternatives analysis performed as part of Preliminary Engineering). Additionally, the design and engineering outputs of Preliminary Engineering will serve as inputs into the evaluation of environmental impacts just as identified impacts are inputs for design and engineering. Therefore, it is essential that Preliminary Engineering and project NEPA be closely coordinated and performed in tandem with one another.

Appendix 2.2.3—NEPA Roles and Responsibilities
FRA, as the Federal sponsoring agency, has primary responsibility for assuring compliance with NEPA and related environmental laws for projects funded under the HSIPR program. While NEPA compliance is a Federal agency responsibility and the ultimate decisions remain with the Federal sponsoring agency, FRA encourages applicants to take a leading role in preparing environmental documentation, consistent with existing law and regulations.

In the varied and flexible HSIPR program no single approach to NEPA compliance will work for every proposal. Therefore, FRA will work closely with applicants to assist in the timely and effective completion of the NEPA process in the manner most pertinent to the applicant's proposal.

Appendix 2.2.4—FRA NEPA Compliance
All NEPA documents must be supported by environmental and historic preservation analyses required by the National Environmental Policy Act (42 U.S.C. 4332) (NEPA), the National Historic Preservation Act (16 U.S.C. 470(f)) (NHPA), and related laws and regulations. Such analyses must be conducted in accordance with the Council on Environmental Quality's regulations implementing NEPA (40 CFR part 1500 et seq.), FRA's ''Procedures for Considering Environmental Impacts'' (45 FR 40854, June 16, 1980, as revised May 26, 1999, 64 FR 28545), Section 106 of the NHPA, and related environmental and historic preservation statutes and regulations, and other related laws and regulations such as the Clean Water Act and the Endangered Species Act.

APPENDIX B
FRA Procedures for Considering Environmenal Impacts – Excerpts

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TOC and Sections 1, 2, 3, 10, 13, 14 from:

Federal Register /Vol. 64, No. 101 /Wednesday, May 26, 1999 /Notices pg. 28545
USDOT, FRA Procedures for Considering Environmental Impacts
AGENCY: Federal Railroad Administration (FRA), Department of Transportation (DOT).
ACTION: Notice of Updated Environmental Assessment Procedures.

Note: this is available in full at http://www.fra.dot.gov/eLib/details/L02561

TABLE OF CONTENTS

1. Purpose

This document establishes procedures for the assessment of environmental impacts of actions and legislation proposed by the Federal Railroad Administration (FRA), and for the preparation and processing of documents based on such assessments. These Procedures supplement the Council on Environmental Quality (CEQ) Regulations (40 CFR parts 1500 et seq., hereinafter ''CEQ 1500'') and Department of Transportation (DOT) Order 5610.1C. Although only certain portions of the CEQ regulations or DOT Order are specifically referenced in these Procedures, the unreferenced portions also apply.

2. Authority

These Procedures implement the requirements of section 20 of DOT Order 5610.1C. This document establishes procedures for compliance by the FRA with the National Environmental Policy Act (42 U.S.C. 4321 et seq., hereinafter NEPA), especially NEPA section 102 (2)(C) (42 U.S.C. 4332(2)(C)); section 4(f) of the Department of Transportation Act (49 U.S.C. 303(c)); section 106 of the National Historic Preservation Act (16 U.S.C. 470(f)); section 309(a) of the Clean Air Act (42 U.S.C. 7609(a)); section

307(c)(2) of the Coastal Zone Management Act (16 U.S.C. 1456(c)(2)); section 2(a) of the Fish and Wildlife Coordination Act (16 U.S.C. 662(a)); section 7 of the Endangered Species Act (16 U.S.C. 1536); the Noise Control Act of 1972 (42 U.S.C. 4901 et seq.); and certain Executive Orders, regulations, and guidelines cited in this document which relate to environmental assessment and environmental documentation.

3. Definitions

The definitions contained within CEQ 1508 apply to these Procedures. Additional or expanded definitions are as follows:

(a) ''Administrator'' means the Federal Railroad Administrator.

(b) ''CEQ'' means the Council on Environmental Quality.

(c) ''EIS'' means an Environmental Impact Statement.

(d) ''EPA'' means the U.S. Environmental Protection Agency.

(e) ''FONSI'' means a Finding of No Significant Impact.

(f) ''4(f)-Protected Properties'' are any publicly-owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State or local significance or any land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site) within the meaning of section 4(f) of the DOT Act (49 U.S.C. 303(c)).

(g) ''4(f)Determination'' is a report which must be prepared prior to the Administrator's approval of any FRA action which requires the use of any 4(f)-protected properties. This report documents both the supporting analysis and the finding required by section 4(f) of the DOT Act (49 U.S.C. 303(c)), that (1) there is no prudent and feasible alternative to the use of such land, and (2) the proposed FRA action includes all possible planning to minimize harm to the park, recreational area, wildlife and waterfowl refuge, or historic site resulting from the use.

(h) ''FRA Action'' is an action taken by the Administrator or his or her delegate. FRA actions include grants, loans, financing through redeemable preference shares and loan guarantees, contracts, purchases, leases, construction, research activities, rulemaking, regulatory actions, approvals, certifications, and licensing. FRA actions also include actions only partially funded by FRA. FRA actions include FRA-sponsored proposals for legislation and favorable reports on proposed rail-related legislation, but do not include responses to Congressional requests for reports on pending legislation or appropriation requests.

(i) ''Program Office'' is an office within FRA which has been delegated the authority to administer a particular FRA action or program and which therefore bears primary responsibility for performing

environmental assessments and preparing environmental documents in compliance with these Procedures.

(j) ''P–10'' refers to the Office of Environment, Energy, and Safety within the Department of Transportation.

10. Environmental Assessment Process

(a) Policy. The process of considering the environmental impacts of a proposed major FRA action should be begun by or under the supervision of the Program Office at the earliest practical time in the planning process for the proposed action and shall be considered along with technical and economic studies. To the fullest extent possible, steps to comply with all environmental review laws and regulations shall be undertaken concurrently.

(b) Scope. The process of considering environmental impacts should begin by identifying all reasonable alternatives to the proposed action, including ''no action'' and including mitigation measures not incorporated into the design of the proposed action. It is entirely proper that the number of alternatives being considered should decrease as the environmental consideration process proceeds and as analysis reveals that certain alternatives would in fact be unreasonable. The relevant environmental impacts of all alternatives should be identified and discussed, including both beneficial and adverse impacts; impacts which are direct, indirect, and cumulative; and impacts of both long and short-term duration; and mitigation measures that would be included for each alternative. Consultation with appropriate Federal, State, and local authorities, and to the extent necessary, with the public, should be begun at the earliest practicable time. The following aspects of potential environmental impact should be considered:

(1) Air quality;
(2) Water quality;
(3) Noise and vibration;
(4) Solid waste disposal;
(5) Ecological systems;
(6) Impacts on wetlands areas;
(7) Impacts on endangered species or wildlife:
(8) Flood hazards and floodplain management;
(9) Coastal zone management;
(10) Use of energy resources;
(11) Use of other natural resources, such as water, minerals, or timber;
(12) Aesthetic and design quality impacts;
(13) Impacts on transportation: of both passengers and freight; by all modes, including the bicycle and pedestrian modes; in local, regional, national, and international perspectives; and including impacts on traffic congestion;
(14) Possible barriers to the elderly and handicapped;
(15) Land use, existing and planned;
(16) Impacts on the socioeconomic environment, including the number and kinds of available jobs, the potential for community disruption and demographic shifts, the need for and

availability of relocation housing, impacts on commerce, including existing business districts, metropolitan areas, and the immediate area of the alternative, and impacts on local government services and revenues;
(17) Environmental Justice;
(18) Public health;
(19) Public safety, including any impacts due to hazardous materials; (20) Recreational opportunities; (21) Locations of historic, archeological, architectural, or cultural significance, including, if applicable, consultation with the appropriate State Historic Preservation Officer(s);
(22) Use of 4(f)-protected properties; and
(23) Construction period impacts.

(c) Depth. The environmental consideration process should seek to quantify each impact identified as relevant to the proposed action and to each alternative. Such quantification should properly develop, over the course of the environmental impact process, from a rough order-of- magnitude estimate of impact to finer and more precise measurements. The depth of analysis of each impact should be guided by the following factors:

(1) The likely significance of the impact;
(2) The magnitude of the proposed action or an alternative action;
(3) Whether the impact is beneficial or adverse; and
(4) Whether and to what extent the impact has been assessed in a prior environmental document.

(d) Environmental Assessment. An environmental assessment shall be prepared, in accordance with CEQ 1508.9, prior to all major FRA actions. The environmental assessment shall be used to determine the need to prepare either a FONSI or an EIS for the proposed action, in accordance with subsection (e) of this section. An environmental assessment need not be prepared as a separate document where the Program Office or an applicant has already decided to prepare an EIS for the proposed action. Evidence of consultation with appropriate Federal, State, and local authorities is especially desirable as a part of the environmental assessment. The Program Office is encouraged to seek the advice of the FRA Office of Policy and Program Development and the FRA Office of Chief Counsel as to the sufficiency of the environmental assessment.

(e) Determination Based on the Environmental Assessment. On the basis of the environmental assessment, the Program Office shall determine: whether the proposed action will or will not have a foreseeable significant impact on the quality of the human environment; whether or not the proposed action will use 4(f)-protected properties; whether or not the proposed action will occur in a wetlands area; and whether or not the proposed action will occur in a base flood plain. In making these four determinations, the Program Office shall seek the advice of the FRA Office of Chief Counsel and shall inform this advisory office of the ultimate determinations. Based on these four determinations, the Program Office shall take action in accordance with paragraphs (1) through (4) below, as applicable:

(1) If the Program Office determines that the proposed action will not have a foreseeable significant impact, the Program Office shall compile that determination and its supporting documentation into a FONSI and proceed in accordance with section 11 of these Procedures.

(2) If the Program Office determines that there is a foreseeable significant impact, it shall begin the scoping process (CEQ 1501.7) and proceed to prepare a draft EIS in accordance with sections 9 and 13 of these Procedures.

(3) If the Program Office determines that the proposed action contemplates using 4(f)-protected properties, it shall proceed in accordance with section 12 of these Procedures.

(4) If the Program Office determines that the proposed action will occur in a wetlands area or in a base floodplain, the Program Office shall comply with subsection 14(n)(6) or (8) of these Procedures, as applicable. If a FONSI is prepared, the reference in 14(n)(6) and (8) to final EIS should be read as reference to the FONSI.

13. Environmental Impact Statement

(a) General. The FRA shall prepare and include a final EIS in every recommendation on proposals for major FRA actions significantly affecting the quality of the human environment, as determined in accordance with section 10 of these Procedures. There are no actions which FRA has determined always require an EIS; however, an EIS shall be prepared for all major FRA actions significantly affecting the quality of the environment. This normally includes any construction of new major railroad lines or new major facilities or any change which will result in a significant increase in traffic.

(b) Decision making on the Proposed Action. No decision shall be made at any level of FRA to commit the FRA or its resources to a major FRA action for which an EIS must be prepared until the later of the following dates:

(1) Thirty (30) days after a final EIS covering the action has been submitted to the EPA, as measured from the date the EPA publishes a notice of the final EIS's availability in the Federal Register; or

(2) Ninety (90) days after a draft EIS has been made available to the public, as measured from the date the EPA publishes a notice of the draft EIS's availability in the Federal Register. The Program Office may seek a waiver from the EPA to shorten these time limits for compelling reasons of national policy.
In emergency circumstances, alternative arrangements can be made through CEQ. Any proposed waiver of time limits should be requested only after consultation with the FRA Office of Chief Counsel which will submit the request through P–10 to EPA or CEQ as appropriate.

(c) Staff Responsibilities and Timing.

(1) The Program Office shall begin the preparation of a draft EIS as soon as it determines, or the environmental assessment performed in accordance with section 10 of these Procedures discloses, that the proposed action will significantly affect the quality of the human environment.

(2) As soon as a decision to prepare a draft EIS has been made, if FRA is the lead or only agency, the Program Office, in consultation with the FRA Office of Chief Counsel, shall undertake the scoping process identified in CEQ 1501.7.

(3) In preparing a draft EIS, the Program Office shall perform such research and consultation as may be required in accordance with section 14 of these Procedures or as may be considered desirable as a result of the scoping process. The completed draft EIS shall be signed by the head of the Program Office. The Program Office shall forward a copy to the FRA Office of Policy and Program Development and a copy to the FRA Office of Chief Counsel.

(4) When requested by the Program Office, the FRA Office of Policy and Program Development shall review the draft EIS and shall advise the Program Office in writing as to the consistency of the draft EIS with FRA policies and programs.

(5) The FRA Office of Chief Counsel shall review every draft EIS and shall advise the program office in writing as to the legal sufficiency of the draft EIS.

(6) The Program Office shall submit the draft EIS to the Administrator concurrently with the advice obtained from the FRA Office of Policy and Program Development, when applicable, and from the FRA Office of Chief Counsel.

(7) A draft EIS may be formally released outside the FRA only after approval by the Administrator.

(8) The Program Office shall direct distribution of the draft EIS as follows: EPA (five copies); the Office of the Assistant Secretary of Transportation for Policy and International Affairs (two copies); all interested FRA regional offices; appropriate DOT Regional Representatives; the FRA Office of Policy and Program Development; the FRA Office of Chief Counsel; all Federal agencies which have jurisdiction by law or special expertise with respect to the environmental impacts of the proposed action; State and local government authorities and public libraries in the area to be affected by the proposed action; and all other interested parties identified during the preparation of the draft EIS pursuant to section 9(b)(1) of these Procedures.

(9) The draft EIS shall be made available for public and agency comment for at least 45 days from the Friday following the week the draft EIS was received by EPA. The time period for comments on the draft EIS shall be specified in a prominent place in the document, but comments received after the stated time period expires should be considered to the extent possible.

(10) Where a public hearing is to be held on the draft EIS, as determined in accordance with section 9(b)(5) of these Procedures, the draft EIS shall be made available to the public at least 30 days prior to the hearing.

(11) The Program Office shall consider all comments received on the draft EIS, issues raised through the citizen involvement process, and new information, and shall revise the text into a final EIS accordingly. (See CEQ 1503.4). If the proposed final EIS is not submitted to the Administrator within three years from the date of the draft EIS circulation, a written reevaluation of the draft shall be prepared to determine if the draft EIS remains applicable, accurate, and valid. If not, a supplement to the draft EIS or a new draft EIS shall be prepared and circulated as required by paragraphs (1) through (9) of this subsection. If the draft EIS remains applicable, accurate, and valid, the final EIS shall be signed by the head of the Program Office and copies forwarded to the FRA Office of Policy and Program Development and the FRA Office of Chief Counsel.

(12) When requested by the Program Office, the FRA Office of Policy and Program Development shall review the final EIS and shall advise the Program Office in writing as to the consistency of the final EIS with FRA policies and programs.

(13) The FRA Office of Chief Counsel shall review every final EIS and shall advise the Program Office in writing as to its legal sufficiency.

(14) The Program Office shall submit the final EIS to the Administrator concurrently with the advice obtained from the FRA Office of Policy and Program Development, when applicable, and the FRA Office of Chief Counsel.

(15) The final EIS may become final only upon approval by the Administrator.

(16) After approval by the Administrator, the Program Office shall direct distribution of the final EIS as follows: EPA (five copies); appropriate DOT Regional Representatives; all interested FRA regional offices; the FRA Office of Policy and Program Development; the FRA Office of Chief Counsel; State and local authorities and public libraries in the area affected by the proposed action; Federal agencies and other parties who commented substantively on the draft EIS in writing or at a public hearing; and all agencies, organizations, or individuals requesting copies.

(17) If major steps toward implementation of the proposed action have not commenced, or a major decision point for actions implemented in stages has not occurred within three years from the date of approval of the final EIS, a written reevaluation of the adequacy, accuracy, and validity of the final EIS shall be prepared, and a new or supplemental EIS prepared, if necessary. If major steps toward implementation of the proposed action have not occurred within the time frame, if any, set forth in the final EIS, or within five years from the date of approval of the final EIS, a written reevaluation of the adequacy, accuracy, and validity of the final EIS shall be prepared, and a new or supplemental EIS prepared, if necessary. A decision

that a new or supplemental EIS is not necessary must be processed in accordance with paragraph (14) of this subsection (c).

(d) Legislative EIS. An approved draft legislative EIS may be forwarded to the appropriate Congressional committee(s) up to 30 days later than the proposed legislation. If a final EIS is prepared as required by CEQ 1506.8(b)(2), it shall be forwarded to the appropriate Congressional committee as soon as it becomes available. Comments on the draft EIS and FRA's responses thereto shall be forwarded to the appropriate Congressional committee(s).

(e) Changes and Supplements. Where, in the development of an FRA action for which a draft or final EIS has been prepared, a significant change is made which would alter environmental impacts, or where significant new information becomes available regarding the environmental impacts of such an FRA action, the Program Office shall prepare an appropriate supplement to the original draft or final EIS for that portion of the FRA action affected. Such a supplement shall be processed in accordance with paragraphs (3) through (17) of subsection (c) of this section. If a formal administrative record is required for any FRA action for which a supplemental EIS is prepared, the supplemental EIS shall be introduced into the formal administrative record. The Program Office, in consultation with the FRA Office of Chief Counsel, shall determine whether and to what extent any portion of the proposed action is unaffected by the planning change or new information. FRA decision making on portions of the proposed action having utility independent of the affected portion may go forward regardless of the concurrent processing of the supplement.

(f) Representations of Mitigation. Where a final EIS has represented that certain measures would be taken to mitigate the adverse environmental impacts of an action, the FRA program office shall monitor the action and, as necessary, take steps to enforce the implementation of such measures. Where applicable, the Program Office shall include appropriate mitigation measures as a condition to financial assistance and as a provision of contracts. The program office shall, upon request, inform cooperating and commenting agencies on progress in carrying out mitigation measures they proposed and which were adopted by FRA and shall also, upon request, make available to the public the results of relevant monitoring.

(g) 4(f) Determinations. Where a 4(f) determination as well as an EIS is required for a proposed FRA action, it shall be prepared in accordance with section 12 of these Procedures and shall be integrated with the draft and final EIS.

(h) Contents of an EIS. The specific contents of both a draft and final EIS are prescribed by section 14 of these Procedures. Prescribed format for or page limitations on EIS's shall be those set out in CEQ 1502.7 and 1502.10. An EIS shall be prepared so as to focus on the significant issues, as identified by the environmental assessment and the process of public comment, and so as to avoid extraneous data and discussion. The text of an EIS should be written in plain language comprehensible to a lay person, with technical material gathered into appendices. Graphics and drawings, maps and photographs shall be used as necessary to clarify the proposal and its alternatives. The sources of all data used in an EIS shall be noted or referenced in the EIS.

14. Contents of an Environmental Impact Statement

To the fullest extent possible, the Program Office shall prepare draft environmental impact statements concurrently with and integrated with environmental impact analyses and related studies required by the various environmental review laws and Executive Orders listed in subsection (n) below.

In addition to the requirements of CEQ 1502.11 through 1502.18, and subject to the general provisions of section 13(h) of these Procedures, a draft or final EIS shall contain the following:

(a) If appropriate, identification of the document as containing a 4(f) determination made pursuant to section 4(f) of the Department of Transportation Act, 49 U.S.C. 303(c).

(b) If appropriate, a citation to section 106 of the National Historic Preservation Act, 16 U.S.C. 470(f).

(c) Identification of the FRA.

(d) The Program Office that prepared the document.
(e) The month and year of preparation of the document.

(f) In a draft EIS, the name and address of the person in the FRA to whom comments on the document should be addressed, and the date by which comments must be received to be considered.

(g) A list of those persons, organizations, or agencies assisting the FRA in the preparation of the document.

(h) In a draft EIS, a list of agencies, organizations, and persons to whom copies of the document are being sent.

(i) In a final EIS, a list of all agencies, organizations, or persons from whom comments were received on the draft EIS.

(j) A table of contents.

(k) A brief statement of the purpose and need to which the alternatives described in subsection (l) respond, including, where applicable, the legislative authority on which it is based; and the extent to which other Federal, State, or local agencies are funding or otherwise participating in or regulating the alternatives.

(l) A description of all reasonable alternative courses of action which could satisfy the purpose and need identified in subsection (k). The description should include the ‘‘no action’’ alternative and alternatives not currently within the authority of the FRA, as well as a description of feasible mitigation measures which have not been incorporated into the proposed action. The draft EIS may and the final EIS shall identify which alternative is the proposed action.

(m) A short description of the environment likely to be affected by the proposed action, by way of introduction to the environmental impact analysis, including a list of all States, counties, and metropolitan areas likely to be so affected.

(n) An analysis of the environmental impacts of the alternatives, including the proposed action, if identified. The discussion under each area of impact should cover the proposed action and all alternatives, even if only to point out that one or more alternatives would have no impact of that kind. Under each area of impact, the discussion should focus on alternatives which might enhance environmental quality or avoid some or all adverse impacts of the proposed action. Attachment 2 to DOT Order 5610.1C provides guidance on the contents of this section. Analysis should be focused on areas of significant impact: beneficial and adverse; direct, indirect, and cumulative; and both long- and short-term. There should be evidence of consultation with appropriate Federal, State and local officials. At a minimum, the following areas should be considered in the environmental analysis, although their discussion in the EIS is dependent on their relevance.

(1) Air quality. . .
(2) Water quality. . .
(3) Noise and vibration. . .
(4) Solid waste disposal. . .
(5) Natural ecological systems. . .
(6) Wetlands. . .
(7) Endangered species. . .
(8) Flood hazard evaluation and floodplain management. . .
(9) Coastal zone management. . .
(10) Production and consumption of energy. . .
(11) Use of natural resources other than energy, such as water, minerals, or timber. . .
(12) Aesthetic environment and scenic resources. . .
(13) Transportation. . .
(14) Elderly and handicapped. . .
(15) Land use. . .
(16) Socioeconomic environment. . .
(17) Public health. . .
(18) Public safety. . .
(19) Recreation areas and opportunities. . .
(20) Environmental Justice. . .
(21) Sites of historical, archeological, architectural, or cultural significance. . .
(22) Construction impacts. . .

(o) A summary of unavoidable adverse impacts of the alternatives and a description of mitigation measures planned to minimize each adverse impact. . .

(p) A brief discussion of the relationship between local short-term uses of the environment affected by the alternatives, and the maintenance and enhancement of long-term productivity in that environment.

(q) Any 4(f) determination covering the same proposed action as the EIS.

(r) A compilation of all applicable Federal, State and local permits, licenses, and approvals which are required before the proposed action may commence. The final EIS should reflect that there has been compliance with the requirements of all applicable environmental laws and orders. . .

(s) In a final EIS, a compilation of all responsible comments received on the draft EIS, whether made in writing or at a public hearing, and responses to each comment. . .

(t) An index, if possible and useful.

(u) Signature and date indicating the approval of the Administrator as required by section 13(c) of these Procedures.

U.S. DOT Federal Railroad Administration
Office of Passenger and Freight Programs

Monitoring Procedure 32C - Project Scope Review

1.0 PURPOSE

This Monitoring Procedure describes the Monitoring and Technical Assistance Contractor's (MTAC) review and analysis of the Grantee's project scope.

2.0 KEY PRINCIPLES

The scope of the project represented by the totality of all documentation, including environmental documents, basis of design and design criteria, third-party agreements, Real Estate Acquisition and Management Plan, and contract plans and specifications should be internally consistent, defined to a level appropriate for the project development phase and applicable project delivery method, consistent with the estimated cost and schedule, and consistent with the scope approved by FRA.

The individual or team of individuals selected to perform this evaluation should have extensive experience in the planning and delivery of large, complex, federally funded rail projects.

The MTAC may be directed to review the scope of the project during any phase.

The review results inform the risk analysis and the reviews to accept the Grantee's completion of the following phase work:

- Planning and Concept Design / NEPA Tier 1
    - The scope of a rail project is first established through the development of alternatives, and the selection of a preferred alternative. The scope at that point is often defined in general terms by:
        - length of the corridor and extent of improvements proposed for corridor
        - type of vehicle technology to be employed
        - general horizontal location
        - general vertical location -- relationship of the rail guideway to grade (roadbed/elevated structure/below-grade trench or tunnel)
        - number and general location of stations
    - Changes to project scope become increasingly costly and disruptive as the project moves from the evaluation of alternatives through Preliminary Engineering, Final Design, and into Construction.
- PE / NEPA
    - The scope of the project is better defined at the completion of the environmental review process required under the National Environmental Policy Act (NEPA) and is continuously refined as it moves through PE.
    - The scope of the project should be fully defined at completion of PE. This is particularly important for alternate project delivery methods such as Design-Build (D-B), which bid at completion of PE. D-B performance specifications state what D-B contractors must deliver; at the same time, they may limit the Grantee's rights to make design decisions.

Because the DB contractor controls the schedules for both design and construction, a scope change that occurs after contract award is likely to be much more costly than a similar change using Design-Bid-Build.

- FD
    - During FD, the scope is ideally only refined, not modified, as the drawings and specifications and related documents are prepared for construction.

3.0 REQUIRED DOCUMENTS

The MTAC will obtain from the Grantee current versions of the following documents. Depending on the project type and the phase during which this review is completed, not all of the documents listed below will be applicable or available.

1. Copy of the grantee's grant agreement(s) with FRA and the Grantee's application for funding. Note: the project scope review is intended to ensure the project aligns with proper planning and design processes as well as with the scope proposed in the original application.
2. Written project description; approved project scope with changes since the last milestone
3. Environmental documents (FEIS/ROD; EA/FONSI)
4. Basis of design reports; design criteria reports
5. Design documents (drawings, specifications)
6. Project schedule
7. Project cost estimate (and estimate from completed project phase to track changes)
8. Project Management Plan and subplans such as Risk and Contingency Management Plan
9. Planning and Concept Design documents
    a. Service Development Plan
    b. Service Outcome Agreement (performance objectives)
    c. Corridor studies (capacity, operations, etc.)
    d. Rail alignment and station location plans
10. Review documents:
    a. Value Engineering Reports
    b. Constructability Reviews
    c. Risk Assessment Reports

4.0 SCOPE OF WORK

4.1 On-Site Review Meeting

Before the on-site meeting, the MTAC should review the relevant documentation listed above, and propose to FRA a sampling approach to the scope documentation review that, regardless of the project type or phase, will provide FRA with reliable findings and recommendations.

The MTAC should arrange for an on-site briefing by the Grantee's project management team. The briefing should include:

- a narrative description of the project scope
- project graphics, drawings, maps, projections

- scope changes that have occurred since the last major review milestone, e.g. completion of Planning/Concept Design; completion of PE, etc.
- plan for project delivery
- plans to change the manner of project management in subsequent phases
- changes in external factors such as right-of-way, permits, or third-party agreements that would affect project scope

4.2 Review and Assessment

The MTAC should review the Grantee's plan to review project scope for completeness, coordination, timing of the reviews, personnel including independent peers reviewers and the Grantee's project team.

The Scope Review Checklist, attached as Appendix A, provides a guide to evaluating the scope. The checklist should be used in conjunction with the project cost estimate and schedule to develop a comprehensive understanding of the scope and as a cross-check for scope omissions and conflicts.

On the following, the MTAC will comprehensively address and report (see MP 01 for report outline.)

1. Does the Grantee have change control procedures and appropriately timed checks to track scope, verify approvals of changes, and ensure consistency of scope, cost estimate, and schedule?

2. Characterize the project scope in a manner that integrates and summarizes available information, provides professional opinions, analyses, and recommendations.

   In Planning/ Concept Design: (refer also to MP 32A)
   - Does the scope appear to fulfill the established project rationale, goals and objectives?
   - Have key stakeholders (host railroads, infrastructure owners, operators, FRA, community representatives, Grantee agency leadership, etc.) provided the appropriate input to the project scope?
   - Have planning analyses been done to provide parameters related to existing and forecasted infrastructure and service conditions?

   In PE: (refer also to MP 39)
   - Is the scope consistent with the approved Planning/Concept Design [and Tier 1 NEPA if applicable]?
   - Is the scope compliant with applicable laws and regulations?
   - Identify additional known or anticipated changes to scope. Are these changes incorporated into project documents and grant agreement?
   - Identify unknown or uncertain conditions (e.g., real estate to be acquired, permits to be issued, third-party agreements to be finalized). Assess the Grantee's plan and schedule for resolving these issues.
   - Considering known and uncertain conditions, do the cost estimate and schedule take these changes into account? Do the project documents and the risk/contingency management plan appropriately allocate the risk? Altogether, is

the scope internally consistent, defined to a level appropriate for PE and the applicable project delivery method, consistent with the scope approved by FRA?

In FD: (refer also to MP 39)

- Is the scope consistent with the approved PE / NEPA documents?
- Are the major work details, structural element dimensions, design interfaces, and physical interfaces consistent with the approved scope? Are the plans and drawings adequate in terms of content, presentation, clarity, cross-referencing?
- Is the scope internally consistent, defined to a level appropriate for FD and the applicable project delivery method, consistent with the estimated cost and schedule, and consistent with the scope approved by FRA?

3. The MTAC should present findings in order of importance (most likely, largest consequences, etc.) and accompanied by recommendations for modifications or additional work by the Grantee along with a time frame for the performance of the work.

5.0 REFERENCES – SEE MP 01

APPENDIX A
Scope Review Checklist

CONTENTS

The MTAC shall review design or contract packages, or major scope element against applicable criteria.

Design Document Coordination

The Civil, Structural, Architectural, Electrical, Mechanical, Power, Signal and Communications, Trackwork, Track Structures, Sitework, and other plan documents possess a comparable level of definition, clarity, presentation and cross-referencing. Design, construction, system and vehicle interfaces are well known and defined. Design Reports, Concept of Operations Report, and configuration studies are adequate and complete. Work descriptions and definitions used in designs and specifications are consistent and uniformly applied. The project phasing is adequate and the project is constructible. Adequate construction access and staging areas are defined.

SCC 10 Guideway and Track Elements and Structures

Major design decisions are documented through definition of track and guideway type (elevated, at-grade, underground), rehabilitation of existing infrastructure, and structures such as bridges/tunnels.

1) Major or critical work details, structural element dimensions, design interfaces, and physical interfaces are complete and defined appropriately in drawings, standards, criteria, specifications and contract package scopes.

2) Design Relative to Site and Geotechnical Conditions
   a) Site investigation
      i) Pre-construction site reconnaissance visits have been made
      ii) Site boundary and existing conditions surveys are complete
      iii) Flood hazard analyses have been conducted as required by Executive Order 11988 (including the potential for re-definition of flood plains and floodways as a result of climate change) and the results have been incorporated into the design
      iv) Geotechnical investigations are complete
         (1) Subsurface exploration or laboratory testing program
         (2) Identification of buried structures and utilities
         (3) Identification of contaminated soils and other hazardous material

b) Design in response to geotechnical and other below-grade conditions is appropriate
   i) Local seismic conditions and codes have been considered
   ii) Structural approach to ground conditions, subsidence, etc. is identified and resolved
   iii) Design of the rock support in station caverns, crossover caverns, the TBM tunnels, drill/blast tunnels, etc. is appropriate to rock characteristics (fracture planes, hardness and cleavage)
   iv) Relative to subsurface conditions, selection of building type, foundation, and methods of construction are reasonable
   v) Mass balance diagrams have been completed for alignments on fill or cut
   vi) The design appropriately responds to identified buried structures and utilities, contaminated soils and hazardous material on site, and provision for removal or remediation has been made

3) Structural systems and elements are established and dimensioned to show number of spans, span length, substructure design, etc.

4) Trackwork
   a) Includes track layout, turnouts, crossovers, and special trackwork; (Note: On a site specific basis, taking into account operating conditions, it may be appropriate to locate platforms off the mainline.)
   b) Track design is required to comply with 49 CFR 213
   c) Level of detail in Concept Design: Schematic.
   d) Level of detail in PE and FD: Scaled and dimensioned drawings, plans, profiles, with tabulations of track geometry (horizontal and vertical curve data).

5) For tunnels and elevated structures, the center line of track and base of rail are referenced to tunnel or elevated structure; guideway sections show the distance from centerline of track to critical clearance points such as walls, walkways and edges of platforms.

6) Tunnels are defined in terms of access and egress, construction access and laydown, temporary and permanent drainage, openings for stations, cross-passages or refuge chambers, ventilation or emergency access shafts or adits; sections and profiles depicting cross sections of major tunnel features; cross-checked to adjacent building foundations and coordinated with the vehicle's dynamic envelope, walkways, lighting, systems elements such as ventilation, communications and traction power and egress.

SCC 20 Stations and SCC 30 Maintenance Facilities, Yards, Shops and Admin Buildings

Major design decisions are documented through definition of station and maintenance facility structures and buildings, and as a subset, definition of access, functionality, operations, maintenance, fire/life safety, security.

1) Major or critical work details, structural element dimensions, design interfaces, and physical interfaces are complete and defined appropriately in drawings, standards, criteria, specifications and contract package scopes.
2) Site context

a) Site environment and development conditions are considered -- sun orientation, wind, topography, drainage patterns, flora, fauna; historical development context.
b) Site layout takes into account safety through principles of Crime Prevention Through Environmental Design (CPTED); and security based on a threat and vulnerability assessment.
c) Within the site plan are shown:
    i) Building footprint, trackwork/guideway; relationship of the building to grade; site utilities.
    ii) ADA-compliant walkways from the public way to the buildings, within public areas of the buildings, and to the train platform.
    iii) Prominently located transit bus and light rail transfer points with connecting walkways to the station and the public way.
    iv) Bikeways extending from the public way and prominently located bicycle parking lots.
    v) Conveniently located taxi and kiss-n-ride passenger drop-off with more distant auto parking.

3) Station and maintenance facility architecture is established.
    a) The drawing package of site plans, floor plans, longitudinal and cross sections, elevations and details illustrate typical and special conditions; finish schedules. Design interfaces among disciplines are defined in drawings, standards, design criteria, specifications.
    b) Building floor plans show ADA compliant access to public spaces; vertical circulation systems including stairs, elevators, escalators, dimensioned platforms, work bays in maintenance facilities, support spaces for mechanical and maintenance access; agent area, passenger waiting and facilities; fare gate area, and ADA compliant level boarding transition between the platform and train car. Building sections and elevations illustrate form, mass, relationship to grade and surrounding development; interior spaces.
    c) The building structural system is designed and dimensioned, with supporting calculations; it may reflect security criteria stemming from a threat and vulnerability assessment.
    d) Electrical power, lighting, fire/life safety including NFPA, security systems, passenger info, security systems; communications systems; mechanical including support facility and track area drainage, piped utilities, heating ventilation and air conditioning, and smoke evacuation; equipment; all shown on floor plans and described in schedules on drawings or specifications; all compliant with FRA safety regulations.

SCC 40 Sitework and Special Conditions

Major drainage facilities, flood control, hazardous materials, retaining walls, site structures, roadways, grade crossings, traffic control, utilities, are defined and physical limits and interfaces identified, based upon site specific surveying with digitized data integrated into alignment base mapping. Definition is through plans, plan profiles, standards and criteria, specifications.

1) Adequate construction access and staging areas are provided. Complex railroad reconfigurations (typically in and around major passenger stations or freight yards) should include a proposed construction staging sequence to avoid shutting down operating railroads during construction. Environmental documents and cost estimates should reflect the temporary tracks and other measures that may be taken to avoid impacts of construction sequencing.
2) Refer to Design Relative to Site and Geotechnical Conditions above.
3) Structural elements for retaining walls and other site structures are advanced in design.

SCC 50 Systems

1) System (Wayside and Facilities), Trackwork (Running and Special) and Vehicle (revenue and non-revenue) descriptions, functionalities, reliabilities, technologies (level identified and cost effectiveness known) and performances are defined.
   a) Major equipment (for the control center, substations, crossings, tunnel ventilation (both normal and emergency) and traction power) is well defined and identified in drawings and specifications, general arrangements and standard details, and single line drawings.
2) Signaling and Train Control
   a) Operations analysis has determined the most efficient location of interlockings based on track layout, headways, train lengths, braking tables as well as requirements of each interlocking and its control limits.
   b) Track plans define and identify vertical grades, horizontal and vertical curves, elevation, station platforms, switch point stationing, rail bonding and connection requirements as well as typical track circuit drawings.
   c) Site specific requirements are defined (for signal structural work) and location drawings for signal enclosures (as input to ROW requirements)
   d) Central instrument rooms (CIR), central instrument huts (CIH), central instrument locations (CIL), relay rooms; locations and sizes as well as room layouts (relay, termination, central instrument, power) are identified and defined.
   e) Signal cable routing methodology as well as power supply and distribution are identified and defined
   f) Positive Train Control (PTC) technology, where applicable, capable of preventing train-to-train collisions, overspeed derailments, and casualties or injuries to roadway workers (e.g., maintenance-of-way workers, bridge workers, and signal maintainers). PTC may be implemented as Overlay (existing method of operations remains) or Standalone (replaces existing methods of operation). PTC combines:
      i) Precise real-time locating (usually with GPS) of all trains and other vehicles occupying track;
      ii) Cataloging of infrastructure, including turnouts, crossing junctions, grades, and associated permissible speeds;
      iii) Algorithms that calculate the effective safe braking characteristics for each train en route in PTC territory; and
      iv) Wireless communications between all operating units, including engineers, dispatchers, and work crews.
   g) Software and interface requirements (to facilities, existing system, and other system elements) are identified and defined
   h) Maintenance, testing and training requirements are identified and defined (factory acceptance, site acceptance, field integration, start up, etc.)
3) System Description
   a) Built-in-place substations are identified, numbered and located with approximate spacings along the system route, ratings (MW) as well as the details, e.g. three phase nominal 12.47–13.2 kV distribution circuit [name utility] and any exceptions.

b) Nominal (full-load Vdc) project voltage is identified and basis of design and choice of project nominal voltage relative to system voltage is identified, voltage drop minimization, maximization of vehicle propulsion system performance, and train regeneration issues have been addressed.
c) Third-rail or overhead contact system (OCS) is defined
d) AC Switchgear type, ratings, relay protections provided
e) Traction Power Transformer type is defined.
f) Low Voltage Direct Current electric traction system - 12.5/25 kV alternating current system with redundant utility supply points.
g) DC Switchgear basis of design and choice of switches, busses and feeder breakers is identified and equipment list is complete.
h) Programmable Logic Controller (PLC) system, if provided, integrates and control intercubicle functions and provides control, monitoring, and data logging at each substation.
i) Substation grounding system basis of design and choice of separate AC and DC ground mats as well as stray current monitoring or testing, lightning arresters and protective relays and fault current contribution from the AC equipment to the DC equipment issues and utility system faults have been addressed.
j) Minimum voltage at the pantograph is identified and the basis is established for locations during the sustained project headways with substations operating, or with "..." substations out of service. If substations are required, under-voltage conditions are identified with one substation out of service and the operation plan identifies mitigation measures.
k) Overhead Contact Systems (OCS) are identified in terms of Single Contact Wire Auto Tensioned, Simple Catenary Auto Tensioned and Balanced Weight Anchor Assemblies, and issues associated with temperature variations are addressed as structures identified.

SCC 60 ROW, Land and existing improvements

1) The Real Estate Acquisition and Management Plan (RAMP) is complete consistent with the phase of the project. A fully complete RAMP is expected at the completion of PE. Land acquisition and relocation activities are being implemented in accordance with the RAMP and project schedule. Real estate documents and drawings identify the full takes, partial takes, residential, commercial or industrial relocations, easements and other rights to be acquired, possible eminent domain actions.
2) Site surveys include property lines and identification of structures for buildings, site features, utilities; surface improvements such as streets and railroad rights-of-way.
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; site access and staging areas and environmental mitigation requirements, e.g., wetland mitigation requirements.
4) Land owned or proposed for acquisition that is outside of the proposed project footprint must be identified as such.
5) The existence of contaminated or potentially contaminated property can influence the scope of the project footprint as well as the project schedule. The real estate to be acquired should be thoroughly analyzed during the NEPA review and through appropriate environmental site

assessments prior to initiation of the acquisition process. The Grantee must share this information with the property appraiser.
6) Refer to MP 23 Real Estate Acquisition and Management Plan for more information.

SCC 70 Vehicles

Refer to MP 38 Vehicle Acquisition and Management for more information.

(Revenue and non-revenue) descriptions, fleet size, functionalities, reliabilities, technology and performances are defined and drawn to the upper level of assembly, major equipment, general arrangements within passenger cars and locomotives:

1) System Functional Description has been developed and advanced to include the following:
   a) Definition of the subsystems that constitute the overall system
   b) Description, graphic depiction of each interface between subsystems
   c) Description of how each subsystem will meet the requirements of the specification
   d) Vehicle dynamic envelop has been defined to meets the facility and alignment limitations
   e) Vehicle-systems integration has been addressed to assure compatibility of electrification, signal and communications systems
2) Materials specifications have been developed and advanced to include lists of qualified materials considering the requirement for compliance with Buy America/n.
3) Testing requirements have been developed and advanced to include the following:
   a) High-level Test Program Plan for both production and on-site acceptance should be underway (including requirements for factory inspection and testing, First Article and Pre-shipment inspections, static and dynamic testing and conditional acceptance).
   b) Maintenance and Training Requirements should be defined and identified including development of maintenance and training requirements for new system elements.
4) All compliant with ADA and FRA Safety regulations.

SCC 80 Professional services

Refer to MP 21 Management and Technical Capacity and Capability for more information.

The roles and responsibilities of the Grantee's professional consultants (design, engineering, and construction management) or others such as attorneys or insurance professionals may be distinguished from the Grantee's own professional staff and manual labor. When the Grantee's manual labor, equipment and facilities are used to facilitate construction or to assist in construction of the project, a Force Account Plan and associated cost estimate should be provided. 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.

Project Delivery Method, Contract Packaging

Check that the Grantee has planned for construction, at either a project or contract package level, and has sufficiently analyzed and adequately addressed the following elements:

1) Delivery Methods
   a) Grantee has demonstrated that the selected delivery method is allowed under state law.
   b) When selecting a project delivery method, the Grantee has considered its contracting objectives, risk tolerance, level of uncertainties remaining during PE, and its own organizational capability and capacity; it has analyzed the costs and benefits of the various methods, and considered such aspects as loss of design control, input from construction contractors during Final Design, and reallocation of risk.
2) Contract packaging and structuring
   a) The Grantee has considered tradeoffs between large size contracts which are often more efficient to manage and small contracts that can attract interest and increase the number of bidders. Where small contract packages are used, they have been kept small enough to allow mid-sized contractors to bid without teaming as joint ventures (which tends to yield higher costs).
   b) Construction industry information sessions have been held after advertisement in industry publications in order to attract regional, national, and international contractors.
   c) Timing of major bid activity, within schedule constraints, will be managed to maximize contractor competition, with consideration to bid schedule for project(s) in the region such as highway or major redevelopment projects;
   d) Prequalification of general contractors or subcontractors has been considered to ensure quality, e.g. prequalification for experience with a type of construction, safety record, claims history, etc.
   e) "Procurement only" contracts have been minimized (consistent with industry practice and agency experience), recognizing there is a higher claims risk when the installation contractor does not have full control of the materials.
   f) Third parties:
      i) Third party procurement contracts have been utilized only where long lead-time items will impact project schedule if purchased by construction contractor.
      ii) Contract packaging for Third-party construction contracts has been structured to maximize competition; and has been coordinated with the project schedule to minimize schedule impact by critical third parties, e.g. utilities, fire/life safety test witnessing or installation
      iii) Agreements have been reached with third party contractors on Buy America/n, schedule, and cost.
3) Site investigation and geotechnical studies will be available to construction contractors.
4) The General Conditions, Supplementary Conditions, and Division 1 of the Specifications adequately describe for bidding construction contractors the following:
   a) project site access, schedule, unit prices
   b) provisions for change in compensation through incentives and liquidated damages
   c) risk allocation as related to unforeseen conditions including geotechnical conditions
   d) the construction contractor's design/engineering scope of work
   e) mobilization costs

f) cash flow in general including pay schedule
g) requirements for bonds, insurance, taxes
h) maintenance and warranty provisions
i) contractor field management and supervision
j) socio-economic requirements related to bidding

5) Market conditions are considered.
   a) Market conditions for the state/regional/local construction economy for the general contractors (GC) and subcontractors on public and private work.
   b) Market conditions for the national construction economy for rail GCs and subcontractors.
   c) Availability of labor for various trades such as electricians, etc.
   d) Availability of major materials at the bulk commodity level (fuel, cement, steel, copper, plywood/lumber, etc.) and the finished component level (traction power supply and distribution, train control elements, vehicles, microprocessor equipment, etc.)
   e) Availability of construction equipment, e.g. cranes, launching girders, pre-mix plants, barges.

6) Access and staging on project construction sites are considered.
   a) Transportation of materials to the various jobsites, access points and laydown areas, need for temporary construction for mobilization; potential weather impacts and related need to protect the work; identification of waste sites / borrow sites.
   b) Construction impacts on ongoing transport and neighborhoods
      i) Very complex railroad reconfigurations (typically in and around major passenger stations or freight yards) and corridor improvement projects with multiple work elements (e.g. track improvements, signal upgrades, and station work) must include a construction phasing plan that identifies the sequence in which work will be completed. The plan needs to:
         (1) package work into phases that maximize track outages;
         (2) ensure construction crews do not conflict with each other;
         (3) identify temporary structures that are needed, ensure impacts to railroad operations are minimized to the extent possible.
         (4) identify access points and access periods for construction work, given the competing need for ongoing train operations; consider adjusting train schedules, reducing service, and busing of passengers.
      ii) Ongoing operations for other transport such as transit, auto traffic, ped walks and bikeways.
      iii) Impacts due to socioeconomic conditions; constraints due to public spaces, historic, natural, and archaeological resources, air quality, noise, vibration, contaminated materials.
   c) Access restrictions
      i) Permits, environmental requirements, e.g., in-water work windows
      ii) Site availability in terms of hours per day, days per week, months or seasons during a year

7) Force account
   a) Contract packaging and project schedule have been coordinated to minimize overextension of agency force account personnel
   b) Force account procurement contracts have been utilized only in cases where agency has substantial market leverage or “purchasing power”

U.S. DOT Federal Railroad Administration
Office of Passenger and Freight Programs

Monitoring Procedure 32D - Project Delivery Method Review

1.0 PURPOSE

This Monitoring Procedure describes the Monitoring and Technical Assistance Contractor's (MTAC) review and analysis of the Grantee's consideration, selection, and implementation of a project delivery method for its project.

2.0 KEY PRINCIPLES

A variety of project delivery methods are available to the Grantee. The most common method is Design-Bid-Build, in which the Grantee's design consultant prepares 100% complete contract documents for bidding by construction contractors. Alternative contracting methods include design-build, design-build-operate and maintain, and the construction manager at-risk or construction manager/general contractor (CM/GC) approach. All of these delivery methods are viable and have been used successfully; however, some work better than others in particular situations.

The Grantee should thoughtfully consider the trade-offs associated with various project delivery methods and develop a sound rationale for selecting a particular method because it has some or all of the following attributes:

1. Complements the strengths or compensates for the weaknesses in the Grantee's own project team and its management and technical capacity and capability
2. Satisfies an important objective of the Grantee Agency's leadership team
3. Complies with State law
4. Accommodates the project's funding or cash flow position
5. Helps the schedule; gets into construction earlier
6. Fits a unique/overarching characteristic of the project
7. Takes advantage of current and expected conditions in the local, national, and international construction marketplace

3.0 REQUIRED DOCUMENTS

The MTAC will obtain current versions of the following:

1. A copy of grantee's grant agreement(s) with FRA
2. Written project description
3. Design documents (Plans, Specifications)
4. Project Management Plan (MP 20) and Sub-plans
   a. Grantee Management and Technical Capacity and Capability (refer to MP 21)
   b. Risk/Contingency Management Plan (refer to MP 40)
   c. Grantee's Project Delivery and Procurement section of the PMP (Appendix A below)
5. Project schedule
6. Cost estimate

4.0 SCOPE OF WORK

The MTAC will review the documents listed above, discuss with the Grantee and evaluate the Grantee's approach and documents related to the Grantee's design and construction procurement and contract packaging strategies.

4.1 MTAC Qualifications

The individual or team performing this evaluation should have extensive experience in planning and delivering large complex capital projects using a variety of delivery methods. The individual(s) should be familiar with the advantages and disadvantages in using the various techniques, and the factors that could influence the choice of a particular delivery method. Ideally, the individual(s) should have managed multiple construction projects using a variety of contracting methods.

4.2 Review of Selection and Implementation of Project Delivery Method

The MTAC review will:

1. Review and analyze the project information to understand the size and complexity of the project, including:
   a. The laws, regulations, policies, guidance documents, and practices that apply
   b. The ability to divide the project into contract packages attractive to medium-size and smaller contractors
   c. The project's potential effect on construction labor in the region given other projects in or near construction
   d. Its level of design customization and the related capacity and capability of domestic labor to provide custom materials, fabrications, and manufactured items
   e. The strengths and weaknesses of the design itself and the design documents in terms of completeness and coordination
   f. The magnitude of remaining uncertainties or unresolved issues
   g. The implementation schedule showing each major element or package and associated preparatory and subsequent events
   h. Potential alignments between various delivery methods and the Grantee's Project Schedule and funding / cash flow
   i. The opportunities and constraints the Grantee perceives for this project for bidding and construction

2. Discuss with the Grantee its management and technical capacity and capability
   a. its leaders' priorities
   b. its team's strengths (e.g. long history of building rail projects) and weaknesses (all new team)
   c. the opportunities and constraints the Grantee perceives for bidding and construction due to its management and technical capacity and capability

3. Evaluate the Grantee's selection of a delivery method.
   a. Is it a comprehensive project delivery strategy?

b. Is it likely to satisfy the overall project objectives?
c. Is it authorized by State law?
d. Does it consider relevant risks associated with the project element(s)?
e. Is the strategy, including the contract packaging plan, documented in the PMP?
f. Does the project schedule reflect the project delivery method, including sufficient preparation time?
g. Does the Grantee have staff resources to execute the project delivery strategy?
h. Identify discrepancies, shortcomings, fatal flaws in the Grantee's decision-making.
i. Suggest peer exchanges for the Grantee to learn from the delivery method experiences of others.

4. Evaluate the Grantee's implementation of the delivery method.
   a. Identify, describe, and analyze the Grantee's individual contract packages and anticipated or actual bids, pricing, and compensation components.
   b. Consider overheads, contingency and "contingency-like" components, and any negotiated profit or fee values.
   c. The MTAC will evaluate the degree to which such pricing or compensation components are aligned with the Grantee's project strategy and risk management plan and their effectiveness in minimizing cost (and cost overruns) and schedule slippage.

5. Provide a report to FRA on the evaluation, and include:
   a. Description of reviewer qualifications
   b. Description of Grantee personnel with whom discussions were held
   c. Evaluation of the Grantee's Project Delivery Plan
   d. Evaluation of Grantee's technical capacity and capability to implement the selected Project Delivery Method including staffing and procurement policies and processes

5.0 REFERENCES – SEE MP 01

APPENDIX A

Project Delivery and Procurement Table of Contents

Project Delivery and Procurement - Table of Contents

Procurement Plan and Schedule for the following services
(indicate project phase, durations for RFP, screening, interviews, selection, board approvals, etc.)

- Community Outreach Services
- Information Systems Services
- Real Estate Services
- Project Management Services
- Design Services
- Legal Services and other services

Procurement Plan and Schedule for the following services
(indicate project phase, durations for RFP, screening, interviews, selection, board approvals, etc.)

- Construction Management Services
- Construction Testing and Inspection Services

- Construction
  - Preliminary Selection of Project Delivery Method (DBB, DB, CMGC) (include rationale for and identification of risks inherent in selected method)
  - Final Selection of Project Delivery Method
  - Major Construction Packages – Description of Packages and Construction Sequencing
  - Procurement of Long Lead Items
  - Procurement of Materials, Equipment, Vehicles including procurement in advance of construction contract.
  - Work by Grantee's own Forces (Force Account Work)
  - Work by Third Parties such as Utilities, Railroads, Private Sector, etc.

The project delivery method for construction should be selected on the basis of how well it satisfies the Grantee's goals and objectives, for example, rapid construction, lowest constructed cost, or innovative design. There may be multiple objectives that apply to the overall project or selected elements.

Compare objectives and project delivery methods. Take into account:

- physical characteristics of the project
  - degree of difficulty of construction
  - amount of real estate and right-of-way to be acquired
  - negotiations with railroads
  - number of political jurisdictions involved
  - inclusion of structures such as tunnels and elevated guideways

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- The design approach to the project
- The preferred allocation of risk between itself, construction contractors,third parties

- The Grantee' technical capacity and ability to produce the project:
  - Different staffing levels and skill sets are required to successfully manage a design-bid-build approach versus a design-build approach.
  - An agency embarking on its first rail project will face many decisions that will require careful consideration. A traditional design-bid-build approach can provide more opportunities and time to consider those decisions without necessarily impacting the project schedule.
  - Using a design-build approach requires the Grantee to make decisions at the outset as part of the preparation of the performance specifications. A delay in making those decisions may negate the perceived schedule advantage offered by the design-build approach. Also the design consultant should know as early as possible whether the PE documents with a performance specification will be used for competitive bidding to design-build contractors.

- Document choice of and rationale for a project delivery method and contracting strategy.
- Cite the provision in State law that authorizes the selected delivery method.

Procurement Procedures
(advertising, bidding, awarding of contracts for consultants and construction contractors, procurement for equipment, etc.)

Disadvantaged Business Enterprises (DBE), Federal DBE, State/Local WBE & MBE

- Identification of opportunities
- Plans and Goals

U.S. DOT Federal Railroad Administration
Office of Passenger and Freight Programs

Monitoring Procedure 33 – Capital Cost Estimate Review

1.0 PURPOSE

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

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

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

2.0 KEY PRINCIPLES FOR COST ESTIMATING

1. PROVEN METHODOLOGIES: Proven professional quantity surveying and cost estimating practices should be used to develop the estimates;

2. THE WHOLE PICTURE: The cost estimate should reflect the project scope and schedule fully – meaning the estimate should not only reflect what is shown, but what is known to be needed to make a complete project.

3. REAL RELIABILITY: The cost estimate will incorporate a level of detail that is appropriate for the project phase; however, at any phase, adequate consideration of risks, uncertainties, and unknowns should be reflected in cost contingencies and reserves, so that a reliable estimate results. This means the estimate will remain relatively unchanged as the project progresses through planning, design, construction, and revenue operations.

3.0 REQUIRED DOCUMENTS

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

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

4.0 SCOPE OF WORK

4.1 Evaluation of the Grantee's management and control of project cost

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

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

4.2 Evaluation of the Grantee's cost estimate

4.2.1 Selecting the Review Approach

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

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

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

- Establishment of specialized quantitative cost modeling or assessments and surveillance reporting or trend analysis
- Reevaluation of project cost information periodically or when event-driven
- Presentation to the Grantee of findings, analysis, recommendations, and opinions
- Participation in workshops with the Grantee to discuss the project

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

4.2.2 Characterizing the Grantee's Level of Estimating and general approach

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

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

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

   - Level 1: Line items and /or the estimate
     - the product of unit cost and quantity
     - a cost estimating relationship (CER)[1]
     - a lump sum (sometimes referred to as an "allowance" or "plug number")

   - Level 2: Subdivide Level 1 as follows:
     - quantities indicated in both the design documents and the cost estimate
     - quantities indicated only in the cost estimate or only in the design documents

   - Level 3: Subdivide Level 2 into the following subcategories:
     - Cost to Cost CERs; Non-Cost to Cost CERs; Cost or Non-Cost to Non-CERs

   - Level 4: Subdivide Level 3 as follows:

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

- Project direct costs / indirect costs
- Escalation of materials and labor
- Total project allowances
- Construction contractor profit
- Total inflation costs (nationwide/regional change in costs over time)
- Total project contingency (allocated, unallocated, hidden or latent)

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

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

1) Parametric Estimating Check -- Identify the project's key input drivers (i.e. independent variables) and rank their relative impact on the estimate. Develop cost estimating relationships (CER) for the key variables; support the information and inputs used with historical costs that are calibrated to current conditions. Compare with the Grantee's costs.

2) Analogous Estimating Check -- The MTAC shall perform a check on the Grantee's estimate using "analogous" estimating. Analogous estimating uses historical cost information from existing completed projects as a basis for comparison. The completed projects are similar in design and operation to the proposed project. The cost of the proposed is estimated by adjusting the historical cost to account for differences between the two projects in size, performance, technology, and/or complexity. One source of historical cost information is the FTA Capital Cost Database.[2] The Database presents as-built costs for federally-funded, Light Rail, Heavy Rail, and Commuter Rail projects, tracked in SCC format and validated by the project Grantees. For elements common to both transit and rail, such as tunnels, aerial structures, real estate, etc., the Database can be useful for identifying variances in unit costs from Database averages or from specific known projects. FRA may in the future put rail project as-built costs into the Database.

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

1) The MTAC will make sure estimates and methods of estimation are:
   - Mechanically correct and complete
   - Appropriate for the current project phase
   - Consistent with relevant industry or engineering practices
   - Based on consistent methods of calculation
     - Consistent with project scope and schedule; consistent with project construction packages and that all scope elements are accounted for.

[2] http://www.fta.dot.gov/12305_11951.html

2) The MTAC will assess the Grantee's baseline cost or cost range and if necessary, shall develop its own baseline for presentation and discussion with the Grantee and FRA.

3) NOTE: Considering historical rates and economic forecasts, the MTAC will assess the Grantee's costs have been calculated reasonably for:
   a) material and labor escalation due to global or regional market forces;
   b) inflation from the Base Year to the Year of Expenditure. The MTAC shall ensure the Base Year used is in fact the current year.

4) The MTAC will provide its professional opinion on any overstatement or understatement in the Grantee's cost estimate, and it will support its opinion with spreadsheets and calculations.

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

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

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

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

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

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

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

Address the following Post-Bid:

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

4.2.7 Review During Construction -- Assessment of Grantee's Cost Estimate

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

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

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

Cost Contingency

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

Readiness to perform MP 40a or 40c Risk Analysis

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

5.0 REPORT

5.1.1 Executive Summary

The MTAC will provide an executive summary that:

- Synthesizes findings related to the cost estimate
- Characterizes significant uncertainties based on likelihood (probable, remote, improbable) and their consequences (catastrophic, critical, serious, moderate, marginal)
- Includes a professional opinion on how reliable the cost estimate is
- Includes a statement of the potential range of the cost estimate (lower, upper bound, and most likely)

- Outlines recommendations for additional work—including, but not limited to, investigation, planning or design work by the Grantee or other party—with a schedule for performing the work

5.1.2 Introduction

The MTAC will provide an introduction that:

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

5.1.3 Methodology

The MTAC will describe its approach for:

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

5.1.4 Evaluation of the Grantee's management and control of project cost

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

5.1.5 Cost Estimate Assessment

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

a. Describe the structure, quality, and level of detail of the project information (including Grantee and third party information):
   - Describe the contract packages and the estimating approach/consistency for each
b. Classify Cost Items:
   - Classify estimate data into one of three categories: Lump Sum, Unit Cost, or Cost Estimate Relationship
   - Select sample totals based on individual sampling rates for each cost grouping
   - Identify cost items for detailed review based on random selection of individual cost items
   - Evaluate whether allowances for the scale of the work covered are used reliably
c. Mechanical Check of Estimate:
   - Add lump-sum prices, unit price and quantity calculations, and cost estimating relationships to confirm the sponsor's total cost estimate
   - Perform a mathematical check of all the sampled unit price or quantity calculations
d. Comparison to Industry Standards:
   - Review sampled unit prices and quantities to ensure estimates conform to industry standards, regional variations, or other unique characteristics

- Check unit costs of similar items used in different conditions to ensure that local conditions and difficulty factors are considered
- Check sampled quantities from the design documents to confirm that the calculations are accurate

e. Correspondence with Scope Review:
   - Check sampled quantity estimates with those outlined in the project scope to determine the correlation between the design deliverables and the project cost estimate
   - Give the total estimate a "sanity check" to ensure that all major components are included
   - Review sample quantities for reasonableness and confirm that the major components accurately represent the design scope and industry standards
f. Costs associated with General and Supplementary Conditions of the Construction Contract—Division 1 Provisions:
   - For each contract package, evaluate the Grantee's proposed language and the scope allocation, schedule, and cost risk
   - To allow comparisons with the Grantee's estimates, develop independent cost estimates for General and Supplementary Conditions (Division 1) for the three largest construction contracts and the systems work
g. Present and evaluate cost contingency elements in the Grantee's cost estimate for patent (exposed) and latent (hidden costs that are functionally equivalent to contingency but not identified)
h. Escalation and Inflation Review:
   - Evaluate if escalation and inflation factors are applied uniformly
   - Review and evaluate how escalation factors are applied to costs for materials, labor, and equipment.
   - Review and evaluate how inflation rates to the Base Year dollar costs are applied to arrive at Year of Expenditure dollars
   - Consider the adequacy and reasonableness of the rates and the soundness of the economic forecasts
   - Compare the escalation and inflation factors used by the sponsor with the Producer Price Index data from the Bureau of Labor and Statistics (http://www.bls.gov) and other sources—such as ENR, Means, Richardson, etc. This will ensure that escalation and inflation costs are adequate to carry the project to the mid-point of construction (the assumed time that FRA will complete contract unit awards)

5.1.6 Appendices

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

6.0 REFERENCES – SEE MP 01

APPENDIX A

Grantee's Cost Estimating Methodology Memo

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

1) Introduction to the project;

2) Estimating Methodology – Describe the general approach to defining and quantifying the project capital cost estimate; if multiple parties are estimating parts of the project, this memo should help to ensure consistency of approach

    a) Parametric Approach

    b) Analogous Approach (using peer data, historical database information, etc.; typically used by Grantees in Concept Design and Preliminary Engineering) The breakdown may be organized into typical vs non-typical components of guideway, stations, support facilities; and/or into project-wide elements/costs and alignment segment-related costs.

    c) Bottom Up Approach (using built-up quantities and units for labor, material, equipment, and all supporting services or acquisition costs and based upon more defined and educated provisions as developed during the design process; typically used by Grantees in Preliminary Engineering and Final Design.)

3) Define the basis, sources and assumptions for costs:
    a) Cost of construction by railroads or other third parties
    b) Material and labor escalation
    c) Contingencies (allocated, unallocated, and hidden or latent)
    d) Inflation costs
    e) Allocated Contingency
    f) Unallocated Contingency
    g) Latent (or hidden) Contingency

4) Estimate Limitations – Describe perceived or known risks, as well as unknowns that could lead to changes in the estimate; these could stem from changes in project scope and design standards, schedule, incorrect unit cost or quantity assumptions, and unforeseen problems in implementation, or other conditions.

APPENDIX B

Definitive Project Cost Estimate Review Checklist

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

Review of Grantee's cost estimate shall indicate whether:

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

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

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

Construction Materials

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

Construction labor

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

Construction equipment

- Local equipment rental rates and current fuel costs are incorporated
- Consideration has been given to procuring certain pieces of equipment via a cost/benefit analysis that supports purchasing, rather than leasing

- Quotes have been obtained for specialty equipment (TBM's, etc), an appropriate evaluation of market conditions has been incorporated, and currency adjustments as applicable have been made.

Escalation for Construction Materials, Labor and Equipment

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

Special considerations

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

Construction Indirect Costs, Multipliers for Risk etc.

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

Cat. 60 - Real Estate

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

complete acquisition costs on similar projects in the recent past. The cost estimate for real estate should include all of the relevant cost elements identified in MP 23.

Cat. 70 - Vehicles

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

Cat. 80 - Professional Services

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

Cat. 90 - Unallocated Contingency

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

Cat. 100 – Finance Charges

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

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

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

U.S. DOT Federal Railroad Administration
Office of Passenger and Freight Programs

Monitoring Procedure 34 - Project Schedule Review

1.0 PURPOSE

Competent scheduling is required for sound project planning and control of costs and risks. This Monitoring Procedure (MP) describes how the Monitoring and Technical Assistance Contractor (MTAC) conducts a project schedule review to determine whether the sponsor's project schedule is reasonable given the project conditions.

2.0 KEY PRINCIPLES

The MTAC should evaluate the Grantee's Project Schedule for completeness and reliability; usefulness as a management tool; the degree to which it reflects the project scope, cost, management practices, and the method of project delivery.

3.0 REQUIRED DOCUMENTS

Before performing the review, the MTAC will meet with the Grantee and its staff and consultants to discuss the purpose of the review, and obtain required information, including but not limited to:

1. Schedule Assumptions (see a sample schedule in Appendix A of this MP)
2. Description of the schedule development, control process, and procedures
3. Latest schedules in electronic format

4.0 SCOPE OF WORK

4.1 Review of Schedule

The MTAC should review the Grantee's project schedule, related staff, and processes:

In planning, the Grantee develops a schematic schedule showing all project phases. In PE, the Grantee sets forth a more detailed schedule including activities within PE, FD, and related to the selected delivery method; schedule control procedures; and schedule control personnel.

In FD, the Grantee develops an Integrated Baseline Schedule showing critical project activities, logic flow and durations, including identification of agreements for third parties, utilities, and real estate/ROW. The schedule is recommended to be cost/resource-loaded.

Below are Schedule Essentials for any project phase:

	Schedule Essentials
Basis of Schedule	A logical document that defines the basis for the development of the project schedule -- - key elements, issues and special considerations, exclusions - includes Schedule Assumptions in Appendix A below - resource planning methodology - activity identification and duration estimating - source and methodology for determining logic and sequencing - labor productivity adjustments, including congestion assessment, extended work hours, winter work, curfews, etc. - production rates, identifies basis for startup and sequencing requirements, and defines any owner requirements such as regulatory, environmental, quality/ inspection - 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
Schedule Format	Consistent with relevant, identifiable industry engineering practices. Software is appropriate for size and complexity of project.
Schedule structure	Work Breakdown Structure has been applied in the development of the schedule. WBS consistent with the analyzed plan and program for all project participants' agreed upon roles, responsibilities, capabilities and capacities.
Schedule Level	Schedule is 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, environmental, public involvement, PE design, value engineering, final design, right-of-way, permits, third party agreements, 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.
Schedule elements	Schedule reflects the approved scope Schedule includes adequate time and appropriate sequencing for: • Design phases • Agreements - Right-of-way acquisition; household/business relocations; Utilities relocation; Railroad purchase and/or usage; Interagency Agreements; Funding milestones for Federal and non-Federal sources • Reviews - by FRA for environmental, risk assessment, PMP reviews, completion reviews for each phase; by state, other fed, third parties • Procurement - of design contracts; of materials, equipment, vehicles, especially long-lead items • Bid and award periods reflect the required sequencing and durations for the selected project delivery method and logically tied to the proper work activities • 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, Grantee operations and maintenance, mobilization, and integrated pre-revenue testing
Resource Scheduling	Quantities and costs as defined in cost estimate match resources/costs assigned to the activities in the schedule. The distribution of resources and costs per specification or industry standards are reasonably associated to the activity it is assigned.
Schedule Control	Define the approach to and use of scheduling tools, such as scheduling software, Grantee procedures for schedule change and update, use of a work breakdown structure, assignment of staff responsibility for schedule, cost loading, resource loading, etc.

In addition, the MTAC should review the project schedule and the Grantee's schedule staffing, capabilities and processes as follows:

1. Evaluation of the Grantee's schedule

    a. *Format*. Is the schedule format consistent with relevant, identifiable industry or engineering practices? Does it use software appropriate for the size and complexity of the project?
    b. *Quality.* What is the structure, quality, and detail of the schedule?
    c. *Completeness.* Is the schedule mechanically correct and complete and free of material inaccuracies or incomplete information?
    d. *Work Breakdown Structure.* How has the project work breakdown structure been applied to develop the schedule?

    e. Phasing and Sequencing:
        i. Does the schedule contain activities that adequately define the entire scope of the work being performed?
        ii. Is the schedule sufficiently developed to determine the validity, stability, and reasonableness of the project critical path?
        iii. Are near-critical paths easily identifiable and reasonable in terms of their logic and proximity to the project critical path?
        iv. Are the schedule assumptions for project phase durations reasonable?
            - Check for consistency with Grantee's Schedule Assumptions (see Appendix A)
            - Review project calendars used in the schedule (see Appendix B of this MP)
            - Assess the validity and reasonableness of activity durations for major elements on the critical path and the critical path schedule contingency (float)
            - Have labor and material availability been factored into construction durations?
        v. Are the project schedule structure and sequencing logical and reasonable?
            - Is sequencing, through the use of predecessors and successors, identified for all material tasks?
            - Is the work sequenced efficiently, i.e. can/should work be conducted in parallel that is shown in sequence?
            - Is the use of constraints identifiable, justified, and reasonable?
            - Are work areas identified in construction and properly sequenced from the appropriate predecessor activities (i.e., right-of-way acquisition, permitting, etc.)?
            - Are the durations and logic reasonable for temporary construction and physical construction constraints, such as transportation or site access restrictions?
            - Are project calendars appropriately defined and utilized and include allowances for seasonal weather variations?

    f. *Hierarchy.* Is the hierarchy of schedule elements evident?
        i. Is a top-level summary included to clarify phases or groups of activities?
        ii. Is the schedule detail beneath the 'hammock' or summary level task based?

g. *Cost/Resource-loaded Schedules.*

i. A cost/resource-loaded schedule enables the Grantee to be a more "informed consumer" of a construction contractor's schedule. If the schedule is cost loaded for construction activities, examine the flow of cost through time and assess the following:

- Do the quantities and costs assigned to activities in the schedule match those in the cost estimate?
- If the schedule critical path and logic ties among activities are reasonable, does the cost curve presented seem reasonable? Is the money flowing too fast? Are the costs front-end loaded?
- When the initial cost distribution is accepted, that curve becomes a baseline from which project progress is compared. If actual expenditures are "above the curve," investigate why project funds are being spent faster than anticipated. Verify the cost distribution was accepted by all parties including the construction contractor.
- Consider the cost impacts if the project experiences delays or finishes early.

ii. A resource-loaded schedule is the hardest to develop, but yields valuable information: Consider the job loading for the project for a daily work force and a monthly work force; how many people should be on the project; how many people and related equipment can fit into the available work space.

h. *Contingencies.* Discuss with the Grantee the exposed and hidden (patent and latent) contingency in the schedule, including amounts and how it is expressed in the schedule.

i. Develop a bar chart to illustrate the placement of this contingency across the project design phase and the major contract packages during construction

ii. Describe the adequacy of proposed contingency at milestones

iii. Describe the MTAC's approach to identifying schedule hidden contingency, e.g. talking with the Grantee's scheduler, etc.

iv. Evaluate schedule elements that are functionally equivalent to schedule contingency but not identified as such, including extended durations, forced float, dummy activities, or positive lag values

v. Determine if the use of constraints is identifiable and reasonable

vi. Float available in the schedule, at any time shall not be considered for the exclusive use of either the Grantee or the contractor. During the course of contract execution, any float generated due to the efficiencies of either party is not for the sole use of the party generating the float; rather it is a shared commodity to be reasonably used by either party. Efficiencies gained as a result of favorable weather within a calendar month will also contribute to the reserve of float. An accepted schedule showing work completed in less time than the contract completion date will be considered to have Project Float.

2. Evaluation of the Grantee's schedule control methods and staff

    a. The approach to and use of scheduling tools, such as scheduling software
    b. Grantee internal procedures for schedule maintenance; plan and timing of schedule reviews; procedures for schedule change and update
    c. Use of a work breakdown structure
    d. Assignment of staff responsibility for schedule, cost loading, resource loading, etc., and the adequacy of the scheduling staff and software for the size and complexity of the project.

3. Evaluation conclusions, recommendations

    a. Validate the usefulness of the schedule as a project management tool. Does it provide pertinent information on the overall pulse of the project? Does the schedule indicate to the reader what project work should be happening? If the schedule and project reality don't match, is the project ahead or has it slipped?
    b. Evaluate the level of definition of the schedule and elements within for relevance to the project phase
    c. Describe areas of concern; uncertainties, constraints to sequencing or duration; identify risks and provide a list of risks associated with the schedule. If requested, the MTAC will provide a written comparison of the proposed schedule with similar project(s) and analyze the differences. The MTAC will draw conclusions and provide recommendations based on this comparison.
    d. Make suggestions to improve the schedule and proactively help the Grantee solve schedule problems.

APPENDIX A
Sample Format – Schedule Assumptions

Items (basis for duration assumptions) should be tailored to the project; items shown are for example.

SCHEDULE ASSUMPTIONS	DURATION (Months)
Planning & Concept Design	
PMP and Sub-plans	X
Alternatives Analysis	X
Service Planning / Infrastructure Design	X
NEPA, Tier I	X
Service Development Plan	X
Cost Estimate, Schedule, Finance Plan	X
Reviews by FRA along the way and at end	X
Total	XX
Preliminary Engineering	
PMP and Sub-plans Design Refinement of Service Planning NEPA, Tier II or Project Cost Estimate, Schedule, Finance Plan Value Engineering Risk Assessment Reviews Total	etc
Final Design	
PMP and Sub-plans Design Cost Estimate, Schedule, Finance Plan Constructability Review Risk Assessment Refresh Reviews Total	
Bid and Award of Construction Packages	
Bid package A, B, C, etc. Prepare and bid documents Award	
Construction	
Track, ROW, guideway, Segment A, B, C Systems Stations Inspections, Safety Certifications, Reviews Testing	
Training of Operator and Staff / Simulated Rev. Operations	
Revenue Operations	

APPENDIX B
Sample Calendar Description and List

For capital projects, two calendars predominate. The majority of the physical construction activities are based on a five-day work week with non-work days for holidays and weather delays. Design and other activities are based on a five-day work week with non-work days for holidays. Additional calendars can be used for other activities.

The MTAC should ensure Grantees provide calendar information for their Project Schedules, and the number of schedule activities associated with each calendar -- useful for calculating acceleration and delays. Below are examples.

Calendar Name	Number of Activities Assigned	Number of Activities on Critical Path/Total Duration	Number of Non-Critical Activities With Less Than 30 Days Contingency/ Avg. Contingency
Construction 5 Day w/Union Holiday & 30 Weather Days	2649 activities	700/36 months	2000/10 days
Engineering/Procurement/Permit Calendar	1555 activities		
DTP/DTE Business Days	446 activities		
Standard 5 Day Work Week	100 activities		
Winter Outage Calendar w/30 Weather Days	21 activities		
5-Day Week, 2-Shift	10 activities		
7-day Workweek Test/Commission Yard Modification Pre-Revenue Operation Start Revenue Operations	9 activities	9/6 months	
54-Hour Outage calendar	5 activities		
Weekend Outage Calendar w/30 Weather Days	4 activities		
NATM Tunneling w/Union Holiday & 2 Weather Days	2 activities		
TOTAL	**4801 activities**		

U.S. DOT Federal Railroad Administration
Office of Passenger and Freight Programs

Monitoring Procedure 35 – Americans With Disabilities Act (ADA) Review

1.0 PURPOSE

This Monitoring Procedure describes the Monitoring and Technical Assistance Contractor's (MTAC) review and analysis of the Grantee's compliance with the regulations and guidance issued by the U.S. Department of Transportation implementing the transportation provisions of the Americans with Disabilities Act (ADA) of 1990 (49 CFR Parts 27, 37, and 38).

2.0 KEY PRINCIPLES

The review should focus on the provision of access to:

1. Stations and the public areas of maintenance facilities, including the approach from the public way
2. The passenger train car including how access is achieved from the station platform
3. Services within stations and passenger cars such as ticket counters, restrooms, drinking fountains, circulation, and seating

3.0 REQUIRED DOCUMENTS

The MTAC will obtain and study relevant project materials from the Grantee, such as:

1. Stations and maintenance facilities
   a. Facility site plans
   b. Building plans, sections, elevations, including plans and sections through the station platform and doorway of passenger cars to show platform height, length, width, path of travel, and any obstructions on the platform.
   c. Track plans at and in the vicinity of facilities
   d. Information on freight operations and track usage at and in the vicinity of facilities
2. Vehicles and vehicle boarding devices (i.e., bridgeplates, ramps, or lifts)
   a. Plans, sections, and elevations

4.0 SCOPE OF WORK

The MTAC shall review projects in relation to the references in Section 5 below. During each phase – planning, preliminary engineering, final design, and construction – the MTAC will assess the Grantee's compliance with ADA, identify discrepancies and deficiencies, and make recommendations for modifications or additional work to be performed by the Grantee. If there is non-compliance or there are serious impediments to compliance, the MTAC will notify FRA immediately. The FRA may ask the MTAC to recommend other infrastructure or service approaches to the Grantee, or to convene a workshop to discuss alternative possibilities with the Grantee.

4.1 Transportation Facilities

The MTAC should check the design and construction of transportation facilities include stations, maintenance facilities, transit connections, and other related features.

For the transition from the platform into the train car, if a means other than level-entry boarding is proposed, the Grantee must submit an analysis for each condition (each station, each platform) and submit a plan to FRA as provided in 49 CFR 37.42(c).

The review should include at least the following aspects of facilities:

1. Accessible Routes: Accessible routes provide a continuous unobstructed path connecting the architectural or mechanical components of a site and facility, including public interior spaces within facilities.
2. Exterior Elements:
    - Walkways/bikeways from public sidewalks to the building and platform
    - Transition from the platform into the passenger train car
    - Signage
    - Platforms
    - Ramps, stairs, elevators
    - Passenger loading zones including transit transfer and auto drop-off
    - Parking
3. Interior Elements
    - Doorways, circulation route, ramps, stairs, elevators
    - Service counters, restrooms, drinking fountains, seating
    - Communication systems (public address, fire alarm, assistive listening, clock, phone)
    - Signage

4.2 Passenger Train Cars

1. The MTAC should do a compliance check on the vehicle design and manufacture including the following car elements:
    - Signage
    - Doorways, thresholds, floors, steps
    - Circulation, handrails, and stanchions
    - Seating accommodation
    - Lighting, foot-candles of illumination for open doorways
    - Public information system
    - Restrooms
    - Level change mechanisms and/or boarding devices such as car lifts, car ramps, and bridge plates
2. Check compliance against the following standards:
    a. 49 CFR Part 38:
        i. Subpart F contains minimum design standards for intercity railcars and systems
        ii. Subpart H contains minimum design standards for high speed rail systems
    b. 49 CFR Part 27:
        i. Section 504 of the Rehabilitation Act, applicable to all Federal grantees

ii. Requires services be provided in the most integrated setting reasonably achievable

c. U.S. DOT Guidance: "What Accessibility Standards Apply to Passenger Rail Cars When Specific Design Standards Are Not Provided In 49 CFR Part 38?", December 2012

d. Specifications developed by the Next Generation Corridor Equipment Pool Committee (NGEC). Public law 110-432 PRIIA Section 305 required Amtrak to establish such a committee of representatives of Amtrak, the Federal Railroad Administration, host freight railroad companies, passenger railroad equipment manufacturers, interested States, and, as appropriate, other passenger railroad operators, to design, develop specifications for, and procure standardized next-generation corridor equipment.

5.0 REFERENCES – SEE MP 01

U.S. DOT Federal Railroad Administration
Office of Passenger and Freight Programs

Monitoring Procedure 36 – Buy America

1.0 PURPOSE

This Monitoring Procedure (MP) describes FRA requirements for the Monitoring and Technical Assistance Contractor (MTAC) when evaluating the Grantee's compliance with Buy America.

2.0 KEY PRINCIPLES

FRA's rail program includes a goal to increase the use of domestic resources in FRA-funded rail projects. The Buy America requirement reinforces this goal and helps to grow domestic manufacturing of materials and products used in railroad projects.

FRA encourages domestic sourcing of all materials used regardless of the statutory requirements attached to a particular grant.

1. Projects authorized under the Passenger Rail Investment and Improvement Act of 2008 (PRIIA) and funded by ARRA or FY 2010 appropriations are subject to the Buy America provision of 49 USC § 24405(a) - (Intercity Passenger Rail Service Corridor Capital Assistance, Grant conditions). 49 USC §24405(a) is also often applied through the grant agreement to many Tiger grants.
2. Amtrak projects are required to adhere to a Domestic Buying Preference through 49 USC § 24305(f) (Amtrak General Authority) or 49 USC § 24405(a), depending upon whether Amtrak is funding the project through its own capital or operating grants/funds or is acting as a contractor/subgrantee under another grant.
3. The Buy American Act of 1933 in 41 U.S.C. § 8302 also requires domestic sourcing of materials and manufactured goods and typically applies to Rail Line Relocation Grants.

The requirement that should be applied to the particular project would be found in the applicable grant agreement and should be carried forward into any subgrants or contracts/subcontracts funded by the grant.

3.0 REQUIRED DOCUMENTS

The MTAC will obtain and review the following project documents from the Grantee:

- Grantee's grant agreement with FRA
- Design standards and criteria
- Design and construction drawings, outline, and final specifications
- Solicitations for construction bids and other RFPs, contracts, and purchase agreements
- Certificates of Compliance and Non-Compliance with Buy America Requirements (see Appendix A for examples)
- Buy America requirement waiver granted by FRA, if applicable

- Rolling stock audit material and/or reports

4.0 BACKGROUND

The following are descriptions of domestic sourcing statutes that, depending on the fund source used, apply to procurements for FRA projects. Note that Buy America requirements cannot be bypassed by using only non-federal funds to purchase a project component/material that is not made in America. If the component/material is being used as part of the FRA-funded project, it must meet the respective Buy America requirement, regardless of the funding source for the component/material.

4.1 49 USC § 24405(a) - PRIIA "Buy America"

For Passenger Rail Investment and Improvement Act (PRIIA)-authorized projects costing $100,000 or more, the requirements apply to materials in end products and components but not in subcomponents (see definitions below). Materials may be new or used if used materials are repurposed in a project.

For manufactured products to be considered "manufactured" in the United States, all of the manufacturing processes must take place in the United States and the components of the products must be of U.S. origin (a component is considered to be of U.S. origin if it is manufactured in the United States, regardless of the origin of its subcomponents).

For locomotives, railcars, and other rolling stock, all components must be manufactured in the United States and final assembly of the end product (e.g., railcar) must take place in the United States. FRA has developed lists of items it has determined to be components of various railcar types. The grantee should have used one of these lists in procurements for rolling stock.

Additional requirements apply to steel and iron used in projects. For end products or components made predominantly of steel or iron (e.g., rail or grab bars) , manufacturing of the steel or iron used in those end products or components must also take place in the United States, except for metallurgical processes (including refinement of steel additives).

4.1.1 Definitions

- *End products.* Incorporate components at the final assembly location and are acquired ready to provide the intended end function without further manufacturing or assembly.
- *Components.* Directly incorporated into end products at the final assembly location.
- *Subcomponents.* One step removed from a component in the manufacturing process – they are incorporated into components during manufacturing.
- *Manufacturing.* The application of processes to substantially transform and add value to components or subcomponents and to create a functionally different product.
- *Final assembly.* The creation of an end product from individual elements brought together for that purpose through the application of manufacturing processes.

4.1.2 Waivers

FRA may waive PRIAA Buy America requirements if the FRA Administrator finds that either (1) their application would be inconsistent with the public interest, or (2) the materials for which a waiver is

requested are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality, or (3) that domestically manufactured rolling stock or power train equipment cannot be bought and delivered within a reasonable timeframe, or (4) that the inclusion of a domestic item or domestic material will increase the cost of the overall project by more than 25 percent.

All waivers must be approved by the FRA Administrator or designee following a public comment period. In practice, waiver applications are usually reviewed by the Department of Transportation (DOT) Deputy Secretary. Waiver applications are likely to take six months or more to process. Any waivers granted will be time limited and contingent on grantee agreement to continue to look for materials that meet Buy America requirements for future procurements.

4.2 41 U.S.C. § 8302 - Buy American Act

FRA has determined that Rail Line Relocation projects and projects funded from FY 2008 and FY 2009 Appropriations are subject to the requirements of the Buy American Act of 1933.

The Buy American Act requires that "only manufactured articles, materials, and supplies that have been manufactured in the United States substantially all [determined to mean greater than 50%] from articles, materials, or supplies mined, produced, or manufactured in the United States, shall be acquired for public use unless the head of the department or independent establishment concerned determines their acquisition to be inconsistent with the public interest or their cost to be unreasonable."

FRA generally may waive the Buy American Act requirements using the same justification as the PRIIA Buy America statute, with one exception: if the cost of a domestic item or domestic material will increase the cost of the contract between the Grantee and the supplier of that item or material by more than 6 percent.

Other exceptions to the Buy American Act exist where items are not 1) produced, or manufactured in the United States in sufficient and reasonably available commercial quantities and are not of a satisfactory quality" and 2) "procured under any contract with an award value that is not more than the micro-purchase threshold," which is currently set at $3,000.

5.0 SCOPE OF WORK

The MTAC should ensure that the Grantee understands that failure to comply with Buy America/n requirements can jeopardize its FRA grant. The MTAC will evaluate the Grantee's compliance with Buy America/n and will make recommendations if the Grantee encounters any difficulties. The MTAC will perform this work as directed by FRA, usually at completion of PE and FD for infrastructure, and when specifications are written and before bidding for vehicles.

5.1 Compliance Requirements for Grantees

The Grantee is responsible for showing compliance by taking the following actions:

1. Ensure that the design, detailing, and specification of materials and manufactured end products and components are done with domestic sourcing in mind.

2. Perform Buy America reviews before releasing construction documents for bid or specifications for manufacture; verify references to the applicable statutes and regulations are in solicitations and requests for proposals (RFPs)
    a. Verify that all iron, steel, end products and components are called to be manufactured domestically unless a waiver is obtained from FRA
    b. Include provisions in procurement contracts to ensure that the applicable statutory requirements flow down to suppliers, contractors, and sub-contractors
3. After the award, confirm that contractors/manufacturers understand they are responsible for complying with Buy America/n, and evaluate whether they are capable of complying.
4. Inspect manufacturer's facilities to verify domestic sourcing.
5. Obtain signed certifications from suppliers and contractors when construction materials are installed or during the manufacturing process.
6. Perform formal pre and post award audits for rolling stock procurements

5.2 MTAC Evaluation of Compliance

1. Ensure Grantees take the actions noted above. MTAC to perform the following:
    a. During design:
        i. Check that Grantee's procedures will ensure early detection of any deficiencies in procurement regulations
        ii. Guide Grantees when manufacturers are found to be deficient in Buy America or other related requirements
    b. Before solicitation:
        i. Review the Grantee's bid documents for requirements that could impact the ability of contractors or manufacturers to comply
        ii. Oversee pre-award reviews conducted by the Grantee before entering into a contract for construction or purchase for manufactured goods
        iii. Encourage the Grantee to conduct intermediate reviews for rolling stock procurements
    c. After the award:
        i. Oversee the Grantee's post-award audit and its confirmation that contractors and manufacturers are responsible for and capable of complying
        ii. Confirm the Grantee has verified the manufacturer's bid specifications comply
    d. During construction and manufacturing:
        i. Evaluate data provided to the Grantees by contractors and manufacturers
        ii. Verify final assembly sites along with tangible information and references to FRA regulations to enable Grantees to accurately evaluate Buy America review results
        iii. Monitor compliance before manufactured end products are delivered and placed into service
        iv. Confirm the Grantee has obtained signed certifications for all iron, steel, and manufactured end products (including rolling stock)
        v. Confirm that the Grantee has obtained signed Buy America certifications for manufactured end products and their components (See Appendix A of this MP for examples of certifications)
        vi. Check that the Grantee's certification includes the most up-to-date language requiring compliance with Buy America. MTACs should consult the FRA Buy America website at https://www.fra.dot.gov/Page/P0185 for recent changes

vii. Review the Grantee's certifications and supporting documents in detail. Ensure the Grantee's Buy America team has "drilled down" to the lowest level required to demonstrate that claims of U.S. origin content are valid

viii. Ensure that component manufacturing requirements are met. If there is doubt (for instance when major sub-assemblies of a component are made out-of-country but incorporated during the domestic vehicle final assembly) bring these to the Grantee's attention for clarification. If the Grantee cannot justify the discrepancy, the MTAC should report this finding to the FRA for further action.

e. Throughout the entire process:

i. Intervene at the appropriate time if it appears that Buy America might not be met or the Grantee's audit is inadequate; request FRA intervention when deficiencies are uncovered; provide reporting protocols for the Grantee to adopt

2. The MTAC should discuss recommendations and possible corrective actions with the FRA and concurrently with the Grantee. Examples:
   a. Advise revision of Grantee's procurement documents to include Buy America
   b. Advise performance of a procurement review by the Grantee to verify compliance; where faults exist, to modify language and procedures for future procurements.
   c. Advise explanation of circumstances that have led to a manufacturer's noncompliant process that includes partial assembly outside of the U.S.

6.0 REFERENCES – SEE MP 01

7.0 CERTIFICATES (SAMPLES)

These certificates are required for Buy America compliance, https://www.fra.dot.gov/Page/P0185

Certificate of Compliance with Buy America Requirements

The bidder or offeror hereby certifies that it will comply with the FRA Buy America requirements of 49 U.S.C. Section 24405(a)(1).

Date _____
Signature _____
Company _____
Name, Title _____

Certificate of Non-Compliance with Buy America Requirements

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. Section 24405(a)(1), but it may qualify for an exception to the requirement pursuant to 49 U.S.C. Section 24405(a)(2).

Date _____
Signature _____
Company _____
Name, Title _____

1.0 PURPOSE

This Monitoring Procedure describes the Monitoring and Technical Assistance Contractor's (MTAC) required oversight for Grantees' vehicle acquisition and management.

2.0 KEY PRINCIPLES

For successful rail vehicle procurement, testing, and start-up of operations, Grantees must have sufficient management and technical capacity and capability in development of vehicle design specifications and drawings, project controls, procurement, coordination with stakeholders, vehicle testing, and training of personnel prior to operations.

3.0 REQUIRED DOCUMENTS

The MTAC will obtain from the Grantees the following documents:

1. Management and project controls documents
   a. Project description
   b. Grant application and amendments
   c. Project management plan (for corridor project; for vehicle procurement)
   d. Project organizational chart
   e. Statement of equipment needs
   f. Service development plan (if applicable)
   g. Project schedule (for corridor project; for vehicle procurement)
   h. Cost estimate / budget / financial plan with funding sources, including allocation of funding for joint procurements
   i. Non-disclosure / confidentiality agreement with vendor/manufacturer, if reqd
   j. Procurement solicitations, technical responses and evaluations
   k. All monthly meeting project minutes
   l. Contracts for design-build with key contract clauses such as penalty clauses for late delivery, failure of the owner to take actions within a certain period, change order requirements, options for more similar vehicles
   m. Contract Deliverables Master List- Complete contract, all listed in T&C of vendor contract

2. Technical documents
   a. Environmental clearance document
   b. Engineering Plan
      i. Vehicle specifications including citation of appropriate regulations, environmental and performance standards, and the required approval or

certification by authority (Federal, State, etc.); e.g. RSAC requirements for passenger rail; and applicable regulatory approvals based on location/type of signal system

ii. Design, Analysis, Manufacture, and Testing
- Vehicle drawings
- Plan for PDR, IDR, FDR
- Plan for modeling of car body crashworthiness
- Plan for metal fab and mechanical equipment installation
- List of assemblies, and subassemblies to FAI
- List of drawings and supporting information for analysis and testing (including proof of design), availability, maintainability, operability, safety, serviceability, reliability, configuration control, and management

c. Inspection and Testing Program Plan
   i. Safety and security certification plans and the Certifiable Items List
   ii. FRA Safety regulatory assessments with concurrence or approvals
   iii. Buy America audits
   iv. First Article Inspections (including major components)
   v. Tests

d. Final delivery of vehicles
   i. Warranties

e. QA QC Plan for design/mfr of vehicles (and supporting documents)

f. Vehicle history books

g. Training programs (operator, engineering, maintenance, etc.)

4.0 SCOPE OF WORK

4.1 MTAC Management Support

On a program-wide basis, an MTAC will be asked to establish, maintain, and implement a vehicle information matrix to track projects and activities against schedule. The matrix will help to track FRA-funded equipment projects, by equipment type and quantity, with the documents listed in 3.0 above, and with the elements and activities listed in Appendix A below, for these purposes:

- To ensure coordination of activities by FRA Office of Safety and FRA Office of Railroad Policy and Development; notification of FRA staff of upcoming events, issues, and requirements for FRA action; ensure concerns of grantees and other parties are brought in a timely way to the appropriate FRA staff; ensure coordination with capital project deadlines, grant reimbursement processes and funding milestones, and adequate lead time for approvals
- To monitor procurement schedules, discuss with FRA Regional/Project Managers for the projects, and generate recommendations for reducing manufacturing and testing durations
- To meet during design with railroad suppliers and attend design meetings

This management support ties directly to technical oversight of Grantees, described below.

4.2 MTAC Technical Support

The MTAC's review helps to ensure the Grantee competently manages the vehicle specifications, procurement process, manufacturing approach, quality and testing process, commissioning, and safety assessment process, ownership, management and maintenance. It should also help to ensure the resulting vehicles meet program requirements, and conform to applicable statutory requirements, regulations, guidance, and cost and schedule limitations.

MTACs should develop an approach to the reviews that is appropriate to the Grantees' work and that yields accurate findings and valuable recommendations.

Multiple procurements are already in process. They are serving projects in multiple regions. Some of these procurements are "joint," meaning they serve two or more grantees from different parts of the country. Joint procurement should yield benefits such as:

- increased interoperability
- increased consistency in meeting standards
- reduced cost per vehicle for design, manufacture, project management
- increased efficiency in ownership, maintenance and operation of the fleet.

Through a Vehicle Task Order, an MTAC will oversee all vehicle procurements, and will ensure coordination between Grantees leading procurements and Grantees participating. Example: California and the Midwest Region Grantees are jointly procuring cars and locomotives. One is lead while the other Grantee is participating in the car procurement.

1. MTAC oversight of all Grantees engaged in procurements (leading and participating)

    a. The respective MTACs shall attend their own monthly and quarterly meetings and when necessary, attend the meetings of other Grantees participating in procurements.

    b. MTACs shall ensure Grantees actively coordinate with their joint procurement partners, and adequately prepare for delivery of vehicles, testing, and training of personnel prior to operations.

    c. The MTAC shall ensure that Grantees develop a Vehicle Acquisition and Management Plan that references items in 3.0 above and Appendix A below, and the following:
        - Equipment ownership, management, and maintenance
            - ownership structure; management responsibilities; assignment rights; equipment maintenance; financial terms to ensure adequate operating funding for vehicle O & M, and overhaul over the service life according to industry best practices
        - For multi-state equipment pools
            - state the terms of deployment/redeployment between corridors
            - describe the equitable allocation of pooled equipment
            - production order and delivery schedule between Grantees
        - The Plan shall also be consistent with the Project Fleet Management Plan

2. MTAC oversight of Grantees who are leading procurements

    a. The MTAC should ensure that Grantees have sufficient:
        i. Management and technical capacity and capability in rail vehicles
        ii. Expertise in project controls, especially management of the schedule, and ability to sequence activities to reduce overall duration.
        iii. Technical competence (reference items below and in Appendix A below)
            - Compliance with specifications approved by Passenger Rail Investment and Improvement Act of 2008, 305 Next-Generation Equipment Committee
            - Compatibility with Amtrak rolling stock (locomotives and cars) and fixed plant (station and maintenance shop)
            - Modeling of car body crashworthiness; consistency of test data against model
            - Vehicle Track Interaction (VTI) criteria
            - Design of traction power and signaling
            - Testing
            - ADA and Buy America (Pre-Award and Post-Award Audits)
            - Management of change orders
            - Agreements for pooled equipment are finalized
            - Ownership, management and maintenance

        iv. Ability to conduct planning and reviews and productively incorporate results of reviews into the project
            - QA QC plan so that materials are as specified, testing procedures and manufacturing processes are correct
            - System Safety Program Plan (per CFR 238)
            - Risk and Contingency (cost and schedule) Management Plan
            - Hazard Analysis, Threat and Vulnerability Assessment

5.0 REFERENCES - SEE MP 01

Rail Vehicle Technical Review Checklist

The MTAC should perform the reviews below and follow the checklist below; supplement it as needed. The MTAC should report discrepancies, make suggestions for correction as appropriate, follow up and report on the corrective actions taken by the Grantee.

The MTAC should consider the issues for each stage of the procurement process.

1. Cost - issues impacting cost as related to the use of technology, deviation from industry accepted designs, contract packaging, and specification enforcement
2. Schedule, issues potentially and actually impacting schedule
3. Vehicle quality and safety issues
4. Vehicle reliability, availability and maintainability
5. Issues impacting vehicle operability
6. Faulty or unreliable vehicle designs or systems
7. Known component or material deficiencies and availability of replacement parts
8. Ownership
9. Fleet management
10. Fleet maintenance
11. Other, such as payments to vendors (slow or no payments), commonality / compatibility with the existing vehicles, interface issues with other elements of the transit system

1. Planning, Solicitation, Vendor Selection

1. The MTAC will review the materials listed in Section 3.0 of this MP to ensure the acquisition/procurement documents meet the Grantee's stated purpose.
2. The MTAC will review the vendor selection process, including contractor proposals, completed contractor questionnaires, any best and final offers, proposal evaluations process, completed price proposal (or bid) forms, proposal questions and responses, pre-award site survey(s), pre-award Buy America audit, and any other related documentation to ensure it fulfills the Grantee's stated purpose.
3. The MTAC will evaluate the documentation and vendor selection process and will also:
   a. Determine that the selected vendor meets the qualification requirements
   b. Ensure the integrity of the proposal evaluation criteria and process
   c. Monitor the contract negotiation process and agreed-on terms
   d. Ensure that the contract vehicle options meet the Grantee's needs
   e. Verify that a pre-award Buy America audit is compliant
   f. Monitor any post-award, pre-initial Notice to Proceed (NTP) conference

2. Design and Manufacturing

1. <u>The Grantee will conduct a Preliminary Design Review (PDR), and Intermediate Design Review (IDR), and Final Design Review (FDR). The MTAC will participate and document these reviews in each instance.</u>
   a. These reviews are essential to verify the equipment is designed according to the approved specifications; and proper interface coordination occurs in a timely manner

(according to the agreed schedule) between vehicle design and train control, traction power, communication, track, wayside and related systems design.

b. During the IDR and FDR, Equipment Testing may be required to verify the equipment design qualification requirements are met.

2. The MTAC will ensure the Grantee's schedule includes all FRA Safety reviews, testing, qualification, or expected waiver requests (if required). This includes a minimum of 30 days advanced notice prior to the commencement of any testing that is required to demonstrate compliance with regulatory requirements. The Grantee is required to build FRA Safety requirements into its schedule.

3. As part of the Design and Manufacturing, the MTAC will review the Grantee's management of and processes for review and approval of the following:
   a. Vehicle manufacturer's design/ structural design
   b. Production schedule
   c. Materials
   d. Subsystems
   e. Sub-contractors
   f. QA/QC plans and inspection forms
   g. Hold points for Grantee inspections/approvals
   h. First Article Inspection (FAI) procedures and schedule
   i. Vehicle History Book Development
   j. CDRL submissions and approvals
   k. Verification of adherence to safety, security, Buy America Audit, and ADA requirements

4. The MTAC will also review and provide oversight of the Grantee's management of and processes for reviewing and approving the vehicle manufacturer's:
   a. Qualification and production conformance test plans (including static and dynamic testing) and execution of those plans
   b. Handling of non-compliant test results
   c. Retesting
   d. Acceptance of the vehicle structure, interior, propulsion and braking systems, doors, and all other vehicle systems

3. Pre-Revenue Testing (on the intended route)

Pre-Revenue Testing is required to verify the requirements of the specifications and compliance with FRA Safety Regulations are met. The MTAC will ensure requirements and compliance are met in the Pre-Revenue Testing Environment on the intended route. The MTAC shall review the following:

1. Identification of material, subcomponent, component, or system tests required to meet specifications or regulatory requirements
2. Expected equipment movement approvals from the FRA Office of Safety for delivery or shipment to testing locations
3. Hold points for Grantee inspections/approvals

4. First Article Inspection (FAI) procedures and schedule
5. Vehicle History Book Development
6. CDRL submissions and approvals
7. Sample car inspection requests for safety appliances and emergency signage
8. Vehicle qualification (if required) for high-speed or high cant deficiency operations (per 49 CFR Part 213)
9. Pre-revenue test plans per 49 CFR Part 238.111
10. Grantee's hardware and software safety program, including any Failure Modes, Effects, Criticality Analysis (FMECA) pursuant to 49 CFR Part 238.105
11. Submission of Locomotive Electronics Safety Analysis (SA) for FRA review pursuant to 49 CFR Part 229, Subpart E (if applicable)
12. Vehicle manufacturer's
    a. qualification and production conformance test plans (including static and dynamic testing) and execution of those plans
    b. testing and handling of non-compliant test results
    c. acceptance of the vehicle structure, interior, propulsion and braking systems, doors, and all other vehicle systems

4. Acceptance, Commissioning, and Readiness for Revenue Service

At this final stage of the procurement process, the MTAC should review acceptance and commissioning activities and provide oversight of the Grantee's planned management of and processes for:

1. Receipt of vehicles
2. Static and dynamic (on site) qualification/acceptance testing plans and procedures
3. Identification process for needed modifications and modification management process
4. Systems integration and interface compatibility testing (integrated testing) with civil infrastructure and wayside systems
5. Commissioning and start-up operations testing (including pre-revenue)
6. Acceptance and stocking of spare parts
7. Vehicle manufacturer and vendor manuals and training delivery
8. Conditional and final acceptance requirements
9. Warranty management
10. Delivery of vehicle history books
11. Satisfactory completion of the railroad's Pre-revenue Testing Plan under 49 CFR Part 238.111
12. FRA concurrence of vehicle qualification for high-speed or high cant deficiency operations (if required)

5. Meeting Notes, Trip Reports, and Reports on Reviews

The MTAC shall document every event, meeting, review, etc., with meeting note, trip report, or review report, as appropriate. (Refer to MP 01 for information on reports.)

APPENDIX A
Rail Vehicle Technical Review Checklist

Section	Issue	Description
1		**Planning and Solicitation**
	1	Confirm that the intended vehicle does not potentially conflict with statements in the environmental documents and describe any conflicts between environmental documents and the intended vehicle and Grantee's intended response
	2	Consider how well the proposed vehicle fulfills the Grantee's stated purpose of the project, complies with applicable statutes and regulations, and fits the operational requirements
	3	Will the specified vehicle fit the Grantee budget and resources available?
	4	Will additional vehicles be required and if so has the process taken follow-on procurements into account?
	5	Review draft specification and the final specifications: a. Do the payment schedule and the work schedule match? b. Will key technical documents be approved before hardware delivery? c. Can the vehicles be maintained with the resources at the Grantee's disposal? d. Will the specified training program enable the Grantee to perform vehicle operations and maintenance? e. Are adequate measures taken to protect the Grantee in terms of liquidated damages, weight penalties, design conformance, warranty provisions, delivery of "as-built" drawings?
	6	Review Contract Terms and Conditions: a. Are appropriate FRA contract clauses included? b. Have appropriate contract methods been followed to allow for competition and yield the best price for the technology and vehicle chosen? c. Aare Appropriate General Conditions, Special Provisions, Technical Provisions identified d. Does the payment schedule (in particular front-loaded payment schedule) adequately leverage compliance with specifications; does it ensure the Grantee holds sufficient reserve at Preliminary Design Review (PDR), Final Design Review (FDR), FAI, Performance Testing, Vehicle Acceptance, and the warrantee period for supplier and sub-suppliers
	7.	RFP Solicitation: a. Was an RFEI distributed? Adequate competition for selected technology/vehicle? b. Was the pre-proposal conference held and were questions answered fully? Was the Contractor questionnaire used?
2		**Vendor Selection**
	1	Review contractor technical and price proposals, any bid forms, questionnaires, BAFO, and other related documents to validate open and fair competition as well as technological and financially responsible vendor selection
	2	Determine that selected vendor meets specified requirements
	3	Monitor negotiation process and agreed terms
	4	Ensure any contract options meet Grantee's needs
	5	Verify Pre-Award Buy America Audit
	6	Monitor NTP post-award conferences

APPENDIX A
Rail Vehicle Technical Review Checklist

Section	Issue	Description
3		**Design, Manufacturing and Testing**
	1	Contract Deliverables Requirements List: Does the CDRL ensure that all critical performance issues are adequately analyzed, including: a. Structural strength and fatigue resistance of rail vehicle body and truck or bus vehicle frame and chassis b. Brake performance and compliance with industry practice and safety regulations c. Propulsion performance d. Dynamic performance e. HVAC performance f. Dynamic envelope, loading gauge, and clearance requirements g. Controls and interlocks h. Weight management i. Safety management j. Reliability management k. Availability management l. Maintainability and Mean Time To Repair m. Hardware and Software safety program n. Locomotive Electronics Safety Analysis (if applicable) Does the CDRL schedule assure that performance is proved by analysis before start of sub-assembly production?
	2	Test Program Plan and Procedures: a. Are critical specified performance criteria demonstrated by tests, by acceptable analysis, or prior agency certified tests? b. Are acceptance tests sufficient to demonstrate that each vehicle is compliant through testing of representative criteria? c. Is the test program valid for the vehicle and the intended infrastructure? For instance are new vehicle designs on new infrastructure treated to a different approach (a full system test for example) than existing vehicle designs? Existing vehicle designs previously tested on the existing infrastructure might only require vehicle testing to ensure satisfactory interfacing with the existing infrastructure? d. Do the qualification and acceptance test criteria ensure the vehicles “as delivered” will meet the Grantee’s needs within acceptable boundaries without having to repeat qualification tests? e. Do test procedures refer to applicable sections of the specification? f. Are test procedures up-to-date and do they reflect the latest design configurations? Will the test plan validate all analyses? g. Will the test plan validate performance that has not been analyzed? h. Will the acceptance testing proposed validate production results and fleet performance?
	3	Does the test plan and CDRL ensure the vehicle will perform on the actual infrastructure?
	4	Review Design Documents: a. Do the documents address the intended issues? b. Is there a properly sequenced and efficient design plan to ensure technical compliance that mitigates rework?

APPENDIX A
Rail Vehicle Technical Review Checklist

Section	Issue	Description
		c. Are assumptions valid and proven? d. Do analytical methods meet current professional standards? e. Is the Grantee's review conducted by persons competent in the field and capable of detecting and commenting on design and analytical errors? f. Are drawing and configuration control designed to ensure consistency throughout the fleet, including option orders? g. Is PDR consistent with the specification? h. Is FDR consistent with spec, with all issues of design and analysis closed? i. Does the FAI validate all items of production and does analysis and test precede production to minimize changes after production has started? j. Are waivers for existing designs evaluated fully to ensure they are based on proven in-service technology used in demonstrably similar systems? k. Are project technical issues being resolved/mitigated and open items resolved prior to the next payment?
	5	Review the Grantee Quality Assurance Plan and vehicle manufacturer's Quality Program Plan: a. Do the vehicle manufacturer and its supplier's QA program and the Grantee's oversight ensure delivery of the vehicle "as designed"? b. Does the Grantee have qualified inspector(s) on site during manufacturing, including during pre-production of jigs and fixtures? c. Do the Grantee and vehicle manufacturer reporting relationships provide sufficient independence to allow issues to be raised? d. Are protocols in place for dealing with discrepant or non-conformant products or materials and to quarantine them before proper disposal? Does the Grantee's inspector have a voice in the disposal of discrepant or non-conformant products or materials? e. Is the schedule such that choices between corrective action and meeting the schedule do not compromise vehicle quality? f. Have the vehicle manufacturer and the Grantee conducted quality audits on a pre-determined schedule?
	6	Are FAIs complete and do they validate intended design function and performance?
	7	Is the rail vehicle adequately integrated with other systems such as train control, traction power, communications, wayside facilities, shops and shop equipment?
	8	Have Buy America audits been completed and validated?
4		**Acceptance, Commissioning and Readiness for Revenue Service**
	1	Are the qualification and acceptance tests a full validation of the vehicle performance?
	2	Does vehicle acceptance validate the fleet performance within acceptable tolerances?
	3	Have Vehicle History Books been completed and do they represent the configuration of the as-built vehicles supplied?
	4	Have systems integration tests been completed satisfactorily with a validated vehicle configuration?
	5	Have spare parts, manuals, and training been supplied to support revenue service?
	6	Are all open items and warranty or fleet deficiencies being addressed?
	7	Are safety and security Certification Items List (CIL) completed or satisfactorily disposed to allow for safe and secure operation?
	8	Have reliability, maintainability and other proof of design been addressed or completed

U.S. DOT Federal Railroad Administration
Office of Passenger and Freight Programs

Monitoring Procedure MP39 – Preliminary Engineering, Final Design, Readiness to Procure Construction

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1.0 PURPOSE

This Monitoring Procedure describes the Monitoring and Technical Assistance Contractor's (MTAC) review and analysis of the Grantee's activities in Preliminary Engineering (PE), Final Design (FD), and the Grantee's readiness to procure construction.

2.0 KEY PRINCIPLES

Completion of the Preliminary Engineering phase encompasses a level of design that demonstrates the project is feasible and program requirements are fulfilled; completion of the environmental review and issuance of decision document; a cost estimate that is deemed sufficiently reliable to remain unchanged through construction.

Final Design is refinement of PE work and preparation of contract documents for bids.

Regardless of the Grantee's selected delivery method, readiness to procure construction requires

- procurement packages consistent with the scope, schedule, and budget;
- procurement packages that are complete -- including plans, specifications, and contract provisions, with federal procurement requirements addressed;
- a Grantee organization prepared to successfully manage procurement and construction; having in place the necessary qualified project staff;
- consistent project management plans, procurement and construction management procedures, including project controls procedures;
- resolved agreements with railroads, other governmental agencies, third parties, including real estate agreements;
- the required financial resources.

3.0 REQUIRED DOCUMENTS

Materials referenced below and in Appendix A.

4.0 SCOPE OF WORK

4.1 Overview of Review and Assessment

The MTAC will apply its planning expertise, knowledge, and experience in the railroad industry to study and evaluate the Grantee's PE and FD activities and documents, as well as the Grantee's preparations to procure construction. The MTAC will provide its professional opinion on their adequacy and merits, and make recommendations for improvement.

The MTAC should propose to FRA an approach to the review, with appropriate on-site meetings with the Grantee and its project team, to become fully informed on the project history, rationale, current status, and changes since the previous project phase.

The MTAC should review and discuss with the Grantee its plan for project management, the scope of work, plan for project delivery, and other topics in Appendix A. The MTAC should document the review in a report, identify apparent discrepancies and deficiencies, state findings and make recommendations for modifications or additional work to be performed by the Grantee, along with a time frame for performance of the work. (See MP 01 for report outline.)

The MTAC should obtain and study the materials for topics noted below and in Appendix A, and notify FRA of missing information that would hinder a thorough review.

4.2 Preliminary Engineering

For major corridors, planning and concept design are summarized in the Alternatives Analysis Report, Tier I NEPA document and decision, and Service Development Plan. In PE, the selected corridor alternative is developed further. Specific design alternatives are developed to effect new or improved intercity passenger rail service in the corridor. Project NEPA is prepared for these alternatives. Design and engineering outputs of PE are inputs to the evaluation of environmental impacts just as identified impacts are inputs for design and engineering. Refer to MP 32B for more info.

To obtain the most benefit from reviews such as Value Engineering (MP 30) and Risk Assessment (MP 40), they should be conducted one-half to three-quarters of the way through PE.

The amount of time and effort required for PE and the NEPA decision depend on the scope and complexity of the engineering, environmental, social, and regulatory issues to be addressed.

PE completion is marked by:

1. A level of design demonstrating project feasibility and fulfillment of program requirements
2. Completion of the NEPA review and issuance of a decision document.
3. Sign-off on a scaled set of drawings by all affected parties (typically includes Grantee, host railroad, Amtrak, cities, and FRA) indicating support for the project, knowledge of project contents, and understanding that they will pay for any changes they initiate.
4. Applicable federal and FRA program requirements for PE having been satisfied.
5. A cost estimate and schedule that fully reflect the scope of work in the design documents. This cost estimate should be considered sufficiently reliable to remain unchanged through construction completion, barring subsequent major scope or schedule changes.
6. FRA's acceptance of PE completion based in part on the results of the MTAC's evaluation.

4.3 Final Design (FD)

In FD, the work of PE is refined, and contract documents are prepared for construction bids. FD can be performed by the Grantee's design consultants in Design-Bid-Build or by the Contractor's design consultants in Design-Build.

Refer to Appendix A for expectations of the Grantee.

MTAC's Constructability review - To obtain benefit from a constructability review, the MTAC should undertake this no later than midway through FD. For **CONSTRUCTION IN EXISTING OPERATING RAILROAD ENVIRONMENTS**, the MTAC should comprehensively consider the adequacy of the Grantee's plans to successfully handle the complexity of construction within an existing operating railroad environment, including:

- Plans to reroute, shutdown, reschedule, stage, phase, worker-protect, and work-around existing rail traffic;
- The presence of agreements with existing freight or passenger train owners and other affected third parties to plans to reroute, shutdown, etc.;
- The adequacy of the Grantee's project cost and schedule to cover such rerouting, shutdowns, including if necessary, monetary compensation to the railroads.

4.4 Readiness to Procure Construction

The Grantee's issuance of contract documents for bid or proposal is a final step before the Grantee enters into binding construction contracts. The MTAC's review of the Grantee's readiness to procure construction work helps to ensure:

- The Grantee's organization is prepared to successfully manage the contract packages through procurement, construction and start-up, or in the case of a D/B or CM/GC contract, through design, construction, and revenue operations;
- The Grantee's plan for qualification, bid and award follows accepted best industry practices; the procedures provide for unexpected procurement issues (e.g., no bids, single bid, unacceptably high bids and protests);
- The Grantee's design documents are developed to an appropriate level of completion given the selected delivery method; the procurement packages and supporting documents are complete, accurate, and consistent with the project scope; the procurement package is consistent with appropriate Federal requirements, including Buy America requirements;
- The Grantee's cost estimates accurately reflect contractual requirements; project risks have been subject to mitigation measures to the greatest extent possible.

The MTAC's review should be conducted when the Grantee's contract document work is internally consistent and sufficiently complete. This is typically around the ninety percent (90%) design level for traditional design-bid-build contracts. If the Grantee plans to use an alternate delivery method such as design-build (D/B) or construction manager/general contractor (CM/GC) (also known as construction manager-at-risk (CMR), the timing of the review should be advanced accordingly.

The MTAC shall review the following for each segment or contract package:

- The adequacy of the entity identified to construct – a freight railroad, a general contractor, an operator such as Amtrak, a utility company, or governmental agency – and its organization, staff capabilities, and history of performing similar work.
- The risk allocation associated with the proposed contract terms;
- The unit costs, allowances, specifications, drawings, provision for staging and phasing, and contract package interface.

The MTAC's review team should consist of senior technical managers qualified to actually perform the work being reviewed. Because rail projects are complex and interdisciplinary in nature, the reviewers should have a broad range of knowledge, experience and capabilities. Structural plans should be reviewed by structural engineers; signaling plans should be reviewed by signaling engineers, etc.

READINESS REVIEW:

Review Item	**Review Objective**	**Review Method**
Construction Plans/Specifications	To confirm that the plans and specifications completely and clearly define the required work and that there are no major/significant omissions. To confirm that construction documents reflect results of Value Engineering choices and constructability reviews.	Review by qualified engineer(s) with expertise in the area(s) of design.
Construction Plans/ Specifications for Design-Build Delivery or other alternate delivery method	To confirm that the construction plans, specifications, bridging documents and/or performance requirements for design and construction are at the appropriate level of completion to adequately define the scope of work. A separate review of the Grantee's D/B procurement documents may be required to confirm that the process is sound and conforms to good industry practice.	Review by qualified engineer(s) and construction manager(s)
Construction Contract Terms and Conditions	To confirm that the construction contract completely and clearly defines the terms and conditions under which the Work will be performed. To confirm that federal procurement requirements are addressed, including Buy America requirements.	Review by a person or contract administrator with experience in managing construction contracts of similar scope and complexity
Construction Contract Document Terms and Conditions for DB and other alternate methods	To ensure consistency between the bid package and the contract packaging plan. For D/B Contracts, to confirm the contract defines both design and construction requirements. For CM/GC contracts, to confirm that both design and construction phase services are adequately defined; to confirm the amount of the contractor's fee; to confirm the CM/GC contract requirements correspond to requirements in the Grantee's design contract.	Review by a person or contract administrator with experience in managing a design-build contract of similar scope and complexity.
Quality assurance records	To confirm that quality assurance checks and reviews have been performed in accordance with approved QA QC Plan.	Review by a person with experience in performing quality assurance reviews.

Construction Cost Estimate	To confirm that the estimate is consistent with the Plans, Specifications, and Contract General and Special Conditions, and that it is based upon contemporary cost information. To confirm that the estimate of General Conditions' costs reflects actual contract requirements and not an industry average factor.	Review by a cost estimator experienced in the estimation of cost impacts of contract special provisions, terms, conditions, allowances, etc., related to risk transfer and construction limitations.

CONSISTENCY REVIEW:

Review Item	**Review Objective**
Plans, specifications, and special contract conditions wrt Env. documents	To confirm the design and construction requirements of the Environmental Document are reflected in the design and requirements of the bid package.
Plans, specifications, and special contract conditions wrt the project Scope of Work.	To ensure that the documents reflect the scope of work developed during previous phases and reflected in the grant agreement with FRA.
Plans, specifications, and special contract conditions wrt Project Master Schedule	To ensure consistency between the bid package and the Project Master Schedule. Review the schedule in context with the Cost Estimate(s); ensuring that cost associated with all work activities have been properly accounted for in the cost estimate and vice versa. Pay particular attention to schedule contingency for delay and re-bid, and ensure that predecessor activities will not interfere with construction per the bid package schedule (examples: preceding contractors, utilities relocations, real estate acquisition).
Construction Cost Estimate with respect to Project Budget	To confirm that the Construction Cost Estimate plus appropriate contingencies is affordable within the overall Project Budget. To confirm consistency of Cost (and Schedule) Package Level products and documentation with package management baselines. To confirm that the Project Schedule & Cost Estimate are in sync, i.e. time allocated for work activities in the cost estimate agrees with time allocation is schedule

GRANTEE ORGANIZATION AND PMP REVIEW:

Review Item	**Review Objective**
Third Party Agreements	To confirm that necessary third party agreements are in place to support the construction. Pay particular attention to design standards; utility agreements; agreement with other railroads; inclusion of enhancements; concurrent non-project activities, and timing of reviews, permits, land transfers, and funds transfers.

Real Estate requirements in contract documents	To confirm that all necessary real estate and rights-of-way (ROW) will be available for use by the contractor at Notice to Proceed (NTP). If not, confirm that the contract documents, including plans, clearly identify those parcels that are not immediately available, when each parcel will be available for use by the contractor and any associated contract conditions for further delays. Compare the Real Estate requirements in the contract documents with the approved Real Estate Acquisition and Management Plan (RAMP).
Procurement Policies and Procedures	To 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. Review project sponsor's policies and procedures.
Project Staffing Plan	To ensure that the Grantee has adequately implemented a project staffing plan that ensures the necessary qualified staff will be available at an appropriate time to manage and support the work that is being bid. Review staffing plan to ensure it is consistent with the PMP approved for construction.
Risk Register, Risk and Contingency Management Plan (RCMP)	To confirm the Grantee has incorporated appropriate risk mitigation measures into the contract plans and specifications. To confirm the Grantee has a plan to mitigate project budget and schedule risks if they come to fruition. Review Risk Register and RCMP and compare to contract documents
Financing Plan	To ensure that money will be available to pay the contractor for the work on a timely basis.

APPENDIX A
Preliminary Engineering and Final Design - Additional Information / Requirements

Additional Information and Requirements		Preliminary Engineering	Final Design
Description	**MP**	Refer to Monitoring Procedures listed	
Legal Authority			
		Grantee's review of State statutes to demonstrate its authority to implement the project, and its knowledge of requirements and constraints flowing from State law that may impact project cost and schedule if not addressed proactively. If the Grantee is planning to use a project delivery method other than Design-Bid-Build, the Grantee must establish its legal authority to do so under State law.	
PMP and subplans			
	20	Project Management Plan	Project Management Plan
	21	Management & Technical Capacity/Capability	Management & Technical Capacity/Capability
	22	Safety and Security Management Plan	Safety and Security Management Plan
	23	Real Estate Acquisition and Management Plan	Real Estate Acquisition and Management Plan
	24	QA/QC Plan	QA/QC Plan
	38	Vehicle Acquisition and Management Plan	Vehicle Acquisition and Management Plan
	49	Finance Plan	Finance Plan
Service Planning	32A		
Service Planning Refinements		Service Planning Refinements - ridership/revenue forecasts, railroad and train capacity analysis - detailed operations modeling w timetables - operations and maintenance cost estimate - confirmation of entities responsible for services such as equipment maintenance, maintenance of way, and train operations - development/finalization of agreements with host railroads/other rail/transport providers	

APPENDIX A
Preliminary Engineering and Final Design - Additional Information / Requirements

Additional Information and Requirements		Preliminary Engineering	Final Design
Description	**MP**	Refer to Monitoring Procedures listed	
Service Outcome Agreements (SOA)		When construction funding is identified, the SOA should be negotiated/finalized with the involved parties for train frequencies, run times, and host railroad delay minutes. Finalize plans for performance improvement through strategies such as: - Revision to contract language to improve performance of vendors to train - Additional marketing to attract riders - Capital Investments to improve infrastructure capacity - Operational changes to improve schedule efficiency	Implement terms of SOA regarding performance objectives; taking corrective action where necessary. Implement strategies for performance improvement through the FD/contract documents, operational agreements.
Environmental Review	32B		
		Project level NEPA - completion of project environmental evaluation and public participation and finalization of CE, FONSI, or Record of Decision	
Design Level	32C	**Level of Design Expected for PE (30%)**	**Level of Design Expected for FD (evolution from 30% to 100%)**
General Requirements		The project design satisfies the capacity and operational objectives established in the Service Plan and approved environmental document. Documents should be brought to a level of completion sufficient for the related capital cost estimate to be reliable enough to remain unchanged through construction. - Design, construction, system and vehicle interfaces are known, defined, including vehicle dynamic clearance and structure clearances. - Design Reports, Concept of Operations Report, and configuration studies are adequate and complete. - The documents possess an appropriate level of definition, clarity, presentation and cross-referencing. - The project is constructible. Adequate construction access and staging areas are identified.	Design / Contract Documents are developed to an appropriate level of completion. - The work to be constructed is consistent with that shown in the environmental documents and scope established in PE. - Plans and specifications completely and clearly define the required work. - Civil, structural, architectural, electrical, mechanical, communications, trackwork, and sitework documents have a comparable level of definition, clarity, presentation, and cross-referencing. - Consistency exists between the project schedule, bid packages, and applicable Federal requirements, including Buy America/n and ADA. - QA/QC checks and reviews have been performed in accordance with the approved Quality Assurance Plan.

APPENDIX A
Preliminary Engineering and Final Design - Additional Information / Requirements

Additional Information and Requirements		Preliminary Engineering	Final Design
Description	**MP**	Refer to Monitoring Procedures listed	
Design Criteria		Grantee accepted design standards and performance requirements - Civil engineering criteria - Safety and security criteria; results of hazard and threat and vulnerability analyses are incorporated into design criteria and the scope of work - ADA criteria	Fully prepared Basis of Design Reports Fully prepared analyses for track and structures, utilities, safety, security, FRA Safety regulation compliance, ADA compliance General Design Criteria Survey and Mapping Criteria Track Way Clearances, Geometry and Work Criteria Civil, Drainage, and Utility Criteria Geotechnical Criteria Seismic and Structural Criteria Criteria for Mechanical, Plumbing, and Electrical incl. Motive Power, signal, communications, safety, security Rolling Stock Criteria Other safety and security Criteria
Outline Specifications		Draft General and Special Conditions Outlines specifications	Fully developed specifications, instructions to bidders, general and special conditions of the contract
Documentation of Existing Conditions		Digitized aerial photogrammetry, aerial photo background, planimetric and topographic mapping Photos, photosimulations, schematic renderings As is survey and mapping of existing area, including topography, infrastructure, track, ROW, structures ROW/environmental footprint is clearly identified	Full survey of project area
Guideway - Plans and Sections	32C	Guideway (track and roadbed), general notes, standard abbreviations, symbols, key; - Appropriately scaled track geometry (spirals, curves, tangents), points of switch, existing track, new track, track to be removed, future track work, etc.; horizontal and vertical controls; alignment geometry in plan and profile; curve data in table and drawing	Guideway - Fully developed drawings with all horizontal and vertical controls, full geometry including plan and profile, complete curve information on table and drawings, all typical and special sections

Additional Information and Requirements		Preliminary Engineering	Final Design
Description	**MP**	Refer to Monitoring Procedures listed	
		Other - Guideway drainage plans; grade crossings, general layout - Pedestrian connections to the public way - Transit accessways, auto parking, railroad crossings	
Guideway Structures	32C	Bridge and wall nomenclature, symbols and abbreviations, and general notes; - Bridge and wall general plans and sections - Bridge foundation, abutment, bent plans, and deck plans - Load diagrams for structures (e.g., aerial guideway) - Retaining walls, including typical wall sections	Fully developed seismic and gravity load calculations and completed structural design for all structures
		Tunnel layout plans, structural plans, typical sections, excavation plans, approach wall plans and sections; - Other tunnel detail optional: emergency walkway, groundwater control and tunnel drainage, safety and security, fire protection, communications, lighting, ventilation	
Stations and Finishes	32C	Station design characteristics including station locations and station sizing. Should identify platform lengths and support spaces for mechanical/electrical equipment	Complete station documents
		General information, including notes and legend	
		Architectural design of building/facilities plans, including footprint, floor plans, sections, elevations, platform detail demonstrating compliance with ADA	
		Grading, drainage plans, site cross sections, urban design, utilities, landscaping, paving for ped, transit, auto parking, bikes	
		For stations on elevated or underground, show structure	

APPENDIX A
Preliminary Engineering and Final Design - Additional Information / Requirements

Additional Information and Requirements		Preliminary Engineering	Final Design
Description	**MP**	Refer to Monitoring Procedures listed	
Real Estate and Right of Way Plans	32C	Right of way limits Parcel/property acquisitions and easements, if known	Fully detailed parcel maps; for acquisition or sale
Roadways	32C	Roadway/pedestrian access plans and profiles; typical sections; drainage plans; signing plans; intersection traffic signal plans	Key map showing roadways plan with signalized and other intersections
Utility Plans	32C	Utilities key map, list of owners, symbols, and notes, utility plans	Fully detailed utilities plans, utilities report
Environmental Mitigation Plans		Mitigations committed to in the ROD, when involving a physical or operational feature, are incorporated into project documents. Examples: changes in design, use of different material, modification to traffic, restriction on construction activities, etc.	Mitigations fully incorporated into contract documents
Third party requirements		Third-party agreements in draft form / at least an outline or term sheet. If not, issues and obstacles are identified. Types of agreements and information: - utility relocation agreements, public-water, sewer, etc. - intergovernmental agreements with local entities - agreements with host railroads and Amtrak for design, construction, operations - third-party franchise agreements - gas, telephone, cable TV, other communications, power; - public/private funding arrangements - master permitting plan and schedule Agreements should be negotiated and completed to the extent possible prior to start of FD; where incomplete, a defined process for achieving completion should be in place.	Necessary third party agreements are in place to support the construction and revenue operations. Permitting report and permits
Geotechnical Baseline		Geotechnical baseline report based on geotechnical investigations, subsurface exploration and laboratory testing. Requirements for additional geotechnical investigations are defined. Buried structures, utilities, contaminated soils, hazmat are identified.	Additional geotech studies as needed. Full geotechnical design complete.

APPENDIX A
Preliminary Engineering and Final Design - Additional Information / Requirements

Additional Information and Requirements		Preliminary Engineering	Final Design
Description	**MP**	Refer to Monitoring Procedures listed	
Systems		Traction power plans, including location of substations and feeds; OCS layouts, as relevant	Complete Systems plans
		Train/vehicle control plans, including schematic guideway layout (e.g., circuits/block diagrams)	
		Signal design considering signal locations, particularly at stations, to maximize platform length and pockets; and speed, considering different classes of track, and braking distances	
		Operations control center plan, including basic layout and space allocations	
		Communications plans, including equipment locations, and provisions for station message signs, phones, cameras, other	
Maintenance Facility		Overall site plan (existing and proposed conditions)	Complete Maintenance Facility plans
		Grading and drainage plans, site cross sections	
		Urban design/general landscaping features	
		Utilities	
		Paving for pedestrian access, transit access, and parking plans	
		Yard/lot layout, with typical sections	
		Access (roadway, parking) plans compliant with ADA	
		Demolition plans	
		Architectural design of building/facilities plans, including footprint, floor plans, sections	
		Foundation and foundation section plans	
		Safety and security, fire protection plans	
		Basic equipment lists	
		Traction power (OCS, substation locations) plans for rail systems	
Vehicle Acquis & Mgmt	38	criteria, specifications	Detailed drawings for Vehicle manufacturing

APPENDIX A
Preliminary Engineering and Final Design - Additional Information / Requirements

Additional Information and Requirements		Preliminary Engineering	Final Design
Description	**MP**	Refer to Monitoring Procedures listed	
Value Engineering	30	Conduct VE review about half-way through PE	
Constructability Review		Grantee's PE work has conducted a constructability review, has considered Buy America/n compliance for materials, products, and availability of domestic labor to produce custom work, and related costs.	Full constructability review performed including consideration for adequate construction access and staging areas, temporary construction to maintain operations.
Project Delivery Methods	32D		
		Cogent rationale provided for selection of project delivery method (design-bid-build, design-build, etc.) Design packages and contract packages are defined and delineated. - Procedures for Procurement (advertising, bidding, awarding of contracts for consultants and construction contractors, procurement for equipment, etc.) are established	The Grantee's organization is fully prepared to manage contract packages through procurement, construction and start-up, or in the case of a D/B or CM/GC contract, through the design/construction and start-up phase. - Grantee has a project staffing plan that ensures the necessary qualified staff will be available to manage and support the work. - The Grantee has established a plan for contractor qualification, bid and award that follows accepted best industry practices - The Grantee has procedures in place to deal with unexpected procurement issues (e.g., no bids, single bid, high bids, protests)
Capital Cost Estimate	33		
		Cost estimating methods memo and cost estimate (ref MP 33)	The construction cost estimate is consistent with plans, specifications, contract general and special conditions, and is based on contemporary cost information. It includes appropriate contingencies and fits within overall project budget.

APPENDIX A
Preliminary Engineering and Final Design - Additional Information / Requirements

Additional Information and Requirements		Preliminary Engineering	Final Design
Description	**MP**	Refer to Monitoring Procedures listed	
Project Schedule	34	**Level of detail to be included in Schedule during PE**	**Level of Detail to be included in Schedule during FD**
Representation of PE Activities		All major PE activities including main tasks for each design discipline (civil, structural, systems, other)	
Reviews		Identification and duration of all reviews by FRA and others	
Agreements		Identification of agreements that are on critical path (e.g. real estate transactions, utility relo, railroad and interagency agreements, procurement agreements (such as for mfr of vehicles, long lead items, grantee purchased items)	
Environmental Clearance		Detailed activities/milestones for completion of environmental document, including FRA, public and agency review periods	
		FRA Record of Decision / Finding of No Significant Impact or other actions at close of environmental review phase	
		Approvals at completion of environmental review and PE, e.g., permits, interagency and third party agreements, funding	
Representation of FD Activities		Major design packages identified	All contract packages identified and sequenced properly
		Milestones for 60%, 90% and 100% complete (or similar %) Key dates for funding and approvals	Milestones for 60%, 90% and 100% (or similar) percent complete indicated
Advertise and Bid		Includes adequate time for bid and award, with contingency time for rebidding. Construction milestones indicated, including advertise/bid dates, start construction, substantial completion targets.	
Construction		Outline level of detail, indicating construction segments and contract units	Schedule clearly showing sequencing of segments, critical path and major construction packages for each segment
Utilities		Outline level of detail, which utilities, with durations	Detailed level of information
Real Estate		Key activities such as appraisals, acquisitions, relocations, sales, tie to specific segments or construction packages	Detailed level of information with tie to construction access and funding if applicable
Final Testing and Startup		Placeholder information, indicating duration and predecessor logic; for phased openings include milestones and start of revenue service	

APPENDIX A
Preliminary Engineering and Final Design - Additional Information / Requirements

Additional Information and Requirements		Preliminary Engineering	Final Design
Description	**MP**	Refer to Monitoring Procedures listed	
Risk and Contingency	40		
		Risk is addressed through identification, quantification, and mitigation, with three types of mitigation: - proactive project management (primary mitigation); - pre-planned, potential scope or process changes that may be triggered when risk events occur (secondary mitigation); - cost and time set-asides to overcome events for which no other mitigation is available (contingencies.)	Updated risk assessment, risk register, and mitigation strategies; Control of risk through active management with all three types of mitigation.
Finance Plan	49		
		Financial Plan is developed to identify costs, funding requirements (initial capital funding and cash flow, and ongoing operational expenses) and sources (non-Federal and Federal).	Finance Plan is complete. Funding is fully committed to be available through cash flow consistent with the timing in the project schedule.
Before and After Study	27	gather and preserve required information	gather and preserve required information

Monitoring Procedure 40a – Risk and Contingency Review (Sponsor-led)

1.0 PURPOSE

This Monitoring Procedure (MP) describes FRA requirements for the Monitoring and Technical Assistance Contractor (MTAC) when evaluating the Grantee's (Sponsor's) plan for mitigating and managing project risks. This MP does not require an independent MTAC risk assessment; its intent is to rely primarily on the risk assessment and contingency plans developed by the Sponsor. See Appendix D.

Risk management helps to improve the reliability of project delivery. The MTAC's evaluation of the Sponsor's risk plans provides FRA with critical information related to the potential success of the Sponsor's project. In addition, it provides a basis for FRA decisions regarding project advancement and funding. It also helps to build the professional credibility of the rail industry including FRA.

2.0 KEY PRINCIPLES

This review requires an evaluation of the Sponsor's process for development of its Risk and Contingency Management Plan, including its identification of uncertainties and risks; assessment of project risk; and consideration of risk response options and alternatives including the use of cost and schedule contingencies.

Under this review, heavy reliance is placed upon the Sponsor's work. To best achieve confidence in Sponsor-led plans, the MTAC is highly encouraged to participate in the Sponsor's risk workshops and other meeting s in which the Sponsor's planning and methods for dealing with risk are demonstrated.

This review is applicable to projects using any project delivery method: Design-Build-Build (DBB), Design-Build (DB), Construction Manager/General Contractor (CM/GC), etc.

3.0 REQUIRED DOCUMENTS AND PREPARATION FOR THE REVIEW

Where possible and before the Sponsor undertakes its risk management process, the MTAC should initially review the Sponsor's risk-related organization and proposed processes for development of its Risk and Contingency Management Subplan (RCMP). The purpose of this initial review is to develop an opinion regarding the Sponsor's readiness to perform its risk identification, assessment, and mitigation plans. The MTAC shall notify the FRA of its opinion regarding the Sponsor's readiness for the risk planning tasks.

This initial review should consider the following:

- Appropriate technical experts are identified for inclusion in the risk identification process;
- Appropriate technical experts are identified for developing the risk modeling;

- Sufficient management plans have been developed to establish the basis of scope, estimate, and schedule; and
- Sufficient management plans have been developed for successfully completing all important elements of the Risk and Contingency Management Plan.

In advance of reviewing the completed Sponsor RCMP, the MTAC should obtain the Sponsor's Project Management Plan (including the Risk and Contingency Management Plan). The Risk and Contingency Management Plan (RCMP) should at a minimum include the following. Reference also Appendix G below.

- A risk register that sufficiently describes the individual risks with likelihood of occurrence and magnitude of outcome;
- Appropriate characterization of total project risk, including whether total project risk is sufficiently modeled through individual risk events;
- A description of the cost and schedule risk mitigation measures;
- The progress-reporting intervals for tracking the performance of mitigation actions;
- Clear identification of cost and schedule contingencies; the process for tracking and managing current and minimum levels of contingency; and the policies for use and custody of contingencies;
- Other items as the MTAC may, in consideration of the project specifics, deem appropriate for a thorough review.

The Sponsor's schedule risk mitigation recommendations should specifically treat both critical path and non-critical path activities.

Supporting documents shall include appropriate design, cost, and schedule information sufficient to establish the basis of the project upon which the risk management process was developed.

The MTAC should perform an initial review of these submittals and notify the FRA of important discrepancies in the project information that would hinder the review; an example would be insufficient detail or a mismatch between drawings and cost estimate in which the drawings are current and the cost estimate is significantly older.

4.0 SCOPE OF WORK

4.1 Overview

The risk management review builds upon reviews of scope, schedule, cost, and Sponsor management capacity and capability in other MPs that may have been previously performed. The risk management review includes evaluation and recommendations regarding the Sponsor's project risk identification and assessment, mitigation, and contingency plans, as reflected in its Risk and Contingency Management Subplan.

The MTAC will comprehensively address and report findings, conclusions, professional opinions, and recommendations, according to the format in MP 01. If necessary and upon significant findings of concern, the FRA may require the MTAC to independently develop other review products to provide a thorough analysis of the Sponsor's project.

4.1.1 Sponsor interface

MTAC interface with the Sponsor during its risk review facilitates and expedites the process and provides the MTAC with the background necessary to recommend revisions, if any, to the Sponsor's Project Management Plan and Risk and Contingency Management Subplan. Where possible and subject to FRA approval, the MTAC should encourage the Sponsor to involve the MTAC in the processes for development of its risk identification, risk assessment, and risk mitigation. A typical structure for Sponsor interface meetings is presented in Appendix C.

4.2 Project Status Evaluation: Sponsor's Efforts to Validate Basic Project Elements

While the basic goal of the risk review is to identify and quantify uncertainties and their potential impacts on a project's estimate and schedule, the necessary first step of the risk review is to understand the status and soundness of the project's basic—and known—elements. These elements (such as scope, design quality, cost estimates, and schedule) serve as the starting points for identifying risks and opportunities. It is, therefore, crucial that these known project elements be validated or, if necessary, adjusted before attempting to address a project's uncertain elements. The MTAC should review and comment upon the Sponsor's efforts at such validation of the basic project elements.

4.3 Identification and Categorization of Risks: Sponsor's Efforts

Risk identification plays a significant role in the overall risk management process. Sufficient efforts should be made by the Sponsor to ensure that adequate resources and processes have been used to develop a thorough listing of risk events, appropriate to the current project phase. This "Risk Register" shall include at a minimum a description of the potential risk event; its qualitatively-evaluated potential consequences and likelihood of occurrence; its SCC category (refer to MP 33) and risk category; the contract package in which it falls (where appropriate); a method for prioritizing among risks; and potential actions to mitigate the risk.

4.3.1 Example of risk register

A simplified example partial risk register is included in Appendix E.

4.4 Not used.

4.5 Risk Assessment: Sponsor's Efforts

4.5.1 Sponsor-developed Cost Risk Assessments

Where a Sponsor has independently developed a cost-risk assessment, the MTAC shall review the risk assessment submittal and comment as to whether the Sponsor has:

- Sufficiently described the individual risks for adequate assessment of likelihood of occurrence and magnitude of outcome;
- Established appropriate risk range and distribution functions for any given individual risk event;
- Adequately modeled project risk using stochastic (Monte Carlo), risk range, or expected value methods;

- Applied appropriate methods to characterize total project risk if not sufficiently modeled through individual risk events; and
- Provided a reasonable analysis of model results, sufficient for evaluating adequacy of budget, contingencies, and secondary mitigations.

4.5.2 Sponsor-developed Schedule Risk Assessments

Where a Sponsor has independently developed a schedule risk assessment, the MTAC shall review the assessment submittal and comment whether the Sponsor has:

- Sufficiently described the individual risks for adequate assessment of likelihood of occurrence and magnitude of outcome;
- Established appropriate risk distribution functions and duration ranges for the modeled schedule activities;
- Adequately modeled schedule risk using stochastic (Monte Carlo), risk range, or expected value methods;
- Applied appropriate methods to characterize total project risk; and
- Provided a reasonable analysis of model results for evaluating sufficiency of schedule and schedule contingencies.

4.6 Not used

4.7 Risk Mitigation: Sponsor's Efforts

The MTAC shall review and make recommendations regarding Sponsor risk mitigation plans, as documented in its Risk and Contingency Management Plan—a part of the Project Management Plan. Areas of review and comment shall include the development and management of:

- Primary mitigation;
- Secondary mitigation; and
- Contingencies and contingency draw-down curves.

4.7.1 Risk Mitigation Recommendations

The review and recommendations shall be organized appropriately by Mitigation Structure (defined below), SCC, and Risk Type. Each mitigation recommendation shall include an indication of the Mitigation Type(s) (defined below) that best describe the mitigation recommendation.

4.7.2 Mitigation Structure

Mitigation structure refers to varying levels by which the Sponsor and its consultants and contractors may respond to the risk events identified through the review processes described above. This structure consists of three parts: Primary Mitigation, Secondary Mitigation, and Contingencies.

Primary Mitigation occurs throughout the various project phases and is the result of the planned actions of the Sponsor and its consultants and contractors as described in the Risk Management Subplan of the Project Management Plan, as supplemented with the MTAC's recommendations resulting from

this review. Such activities are scheduled at the earliest phase during which the mitigation activity may occur, and are expected to be completed on a timely basis to achieve the cost- and schedule-risk parameter targets at the end of that phase. Examples of mitigation might be completing design, or a geotechnical survey, etc.

Secondary Mitigation consists of pre-planned, potential scope or process changes that may be triggered when risk events occur that cause overuse of project contingencies. Example events that may incur secondary mitigation include construction bids that are significantly over the estimate, or unexpected geotechnical hazards that are encountered, etc., such that the change is likely to cause a significant over-budget condition. Such "triggered" mitigation enables the Sponsor to make cost reductions in a planned and orderly process and preserves contingencies for use later in the project. Secondary Mitigation is fundamentally different than value engineering, which is a formal, systematic, multi-disciplined process designed to optimize the value of each dollar spent.

Contingencies are set-aside estimated amounts (monetary set-asides for cost and time set-asides for schedule) that are included within the overall cost or schedule targets for the project. The amounts are to be used to overcome increases in cost or schedule that are due to potential risks, and for which no other mitigation measure is available. These contingency amounts may be associated with a particular activity or category of cost, or may be set aside in a general fund. In most cases, the amount of risk a project experiences reduces as the project progresses toward completion; similarly, it is expected that the amount of contingencies required for a project also decreases over time; however, at no time should the contingency be totally consumed until all project risk is removed—usually only at project completion or beyond.

4.8 Sponsor's Risk and Contingency Management Plan (RCMP)

The MTAC shall ensure that the Sponsor's RCMP considers all aspects of potential risk, including management capacity and capability, project performance, cost and schedule risk. A recommended structure for the Risk and Contingency Management Plan is included in Appendix G.

Upon FRA approval, the MTAC shall make available to the Sponsor the assessments and recommendations developed in this MP for inclusion in the Sponsor's Risk and Contingency Management Plan (RCMP), a subplan of the Project Management Plan. The MTAC shall work collaboratively with the Sponsor, as the Sponsor prepares and/or revises the Risk and Contingency Management Plan (RCMP) to reflect the recommendations and considerations provided by the MTAC.

4.9 MTAC's Monitoring of Sponsor's Risk and Contingency Management Plan

Post-assessment monitoring by the MTAC is intended to assess the Sponsor's performance in risk management and ensure that the Sponsor's project implementation achieves its risk management objectives and targets. The MTAC shall use the Sponsor's RCMP, which has been collaboratively amended with the MTAC's recommendations, as its guide for post-risk review monitoring.

Monitoring shall consist of evaluation and reporting of:

- The Sponsor's prosecution of the Primary Mitigation action items, including the effectiveness of the action to mitigate the potential risk event and the timeliness of the completion of the action item;
- The occurrence of risk events on the project, whether or not previously identified, and their estimated effect on the project's cost and schedule goals;
- The use of cost and/or schedule contingencies and whether such use threatens minimum levels of contingency required for future phases;
- Successful implementation of other major initiatives noted in the RCMP; and
- The effectiveness of the Sponsor's organization to fully manage its Risk and Contingency Management Plan.

Appendix C (A & B not used)
Sponsor Risk Interface

Due to the reliance on the Sponsor's process, reflected through its Project Management Plan, RCMP, scope, schedule, and cost documents, interface with the Sponsor during the risk review—wherever possible—is important to understand and build confidence in the Sponsor's risk process. Formal establishment of this interface ensures a robust Sponsor review.

A suggested structure for the joint MTAC and Sponsor interface is as follows: the MTAC shall assess the level of project completion and familiarity of the Sponsor with the risk review process to determine whether adjustment to the following structure is appropriate. It is emphasized that the meetings described as follows are not intended to be the only risk management-related interface with the Sponsor. Wherever possible, the MTAC should seek to attend Sponsor-led internal risk meetings and workshops.

Kickoff meeting:

- Introduce MTAC team and Sponsor team;
- Sponsor presents the project to MTAC team:
    - Agency organization, including project team and plan for staffing;
    - Description of work and reviews over the previous year;
    - Discussion of schedule, cost estimate, Sponsor's RCMP and risk register;
- Risk review of the project by discipline, organized by SCC;
    - Review the status of Sponsor's risks listed on its Risk Register, and discuss and record any additional risks discovered during the workshop, including qualitative characterization of likelihood and magnitude of cost and/or schedule impact for the identified risks;
- Summarize findings, conclusions, recommendations, questions, and enter into discussions with the Sponsor's project team to resolve open questions;
- Discuss actions required to facilitate the MTAC risk review; and
- Inform the Sponsor of next steps in the risk review process.

Risk Review Workshop: This workshop should occur after MTAC team has reviewed the documentation provided by the Sponsor and has developed opinions regarding Sponsor's organization, scope, schedule, budget, contingency, and risk mitigation.

- Introduce MTAC team and Sponsor team;
- Describe the process used to review and establish scope, schedule, cost, and risk opinions;
- Summarize the key findings of the review and recommendations;
- Review specific suggested revisions to the Sponsor's risk processes, risk register, or other risk-related items; and
- Discuss action items and next steps in the risk management and FRA review process.

APPENDIX D
Risk and Contingency Review Levels

The following generally depicts differences between MP40a and 40b. The FRA will determine in its sole discretion the level of risk and contingency review to apply to any project, and the level of review may change at any time during a project.

	Activity	MP 40a Sponsor-led	MP 40c Full
A	Review of management capacity and capability, scope, cost, schedule	Soonsor presents organization, scope, schedule, and estimate; MTAC reviews and comments	Perform full MTCC, scope, cost, schedule reviews. Generally 2-3 month process.
B	Review Sponsor's risk identification	Sponsor presents risk register; MTAC reviews and comments	Review, comment on, and provide amendments to sponsor's risk register
C	Review Sponsor's assessment	Review and comment on Sponsor's assessment	Review and comment on Sponsor's assessment process; contrast against MTAC risk assessment
D	Develop or refresh MTAC's Beta Range assessment and develop or refresh schedule risk model	No PMOC risk assessment required	Usually requires a separately scheduled risk workshop
E	Review Sponsor's risk response plans (primary mitigation)	Sponsor presents mitigation management; MTAC reviews and provides comment	Review, comment on, and provide amendments to Sponsor's primary mitigation plans
F	Review Sponsor's contingency and contingency management	Sponsor presents contingency planning; MTAC reviews and provides comment	Provide modeled contingency recommendations; compare to Sponsor's contingency. Review and comment on Sponsor's contingency management planning.
G	Review Sponsor's RCMP	Sponsor presents its RCMP; MTAC reviews and provides comments	Review and comment on Sponsor's PMP and RCMP Subplan. Focus on risk organization and levels of contingency authority

APPENDIX E
Example Risk Register

The following is provided only as an example of a risk register used for risk identification; the intention is to convey the basic content for a robust risk register. Other more detailed formats have been found useful in practice, depending on professional experience and project-specific requirements. The Risk Register developer is encouraged to obtain the most recent examples before establishing his or her own Risk Register format.

RISK REGISTER

Grantee:
Project:
Date:

1-Requirements
2-Design
3-Market
4-Construction

Rating	Low (1)	Med (2)	High (3)	Very High (4)	Significant (5)
Probability	<10%	10><50%	>50%	75%><90%	>90%
Cost	<$250K	$250K><$1M	$1M><$3M	$3M><$10M	>$10M
Schedule	<1 Mths	1><3 Mths	3><6 Mths	6><12 Mths	>12 Mths
Rankinig	<=3	3.1-9.49		>=9.5	

					Risk Ranking				
					Probability	Cost	Schedule	Risk Rating	
SCC	ID	Risk Cat.	Risk Description	Outcome	[P]	[C]	[S]	(P) X (C+S)/2	Mitigation Action
10.01	3	1-Requirements	Third parties may influence the alignment in an untimely manner.	Delay and cost.	2	1	0	1	Obtain municipal consent buy-in at 30% design.
10.01	5	1-Requirements	Delays may occur in reconfiguring Railroad connection project.	If Railroad connection is not completed in time, entire Agency project could be subject to indefinite delay.	3	2	5	10.5	Agency undertake design
10.01	6	1-Requirements	The drawings indicate that there are freight tracks close to the LRT guideway. Is clearance an issue at any of these locations? Is there the possibilty of crash walls or something similar required?	Could cause additional costs and studies involved with providing greater physical separation between light rail and freight rail lines.	3	4	0	6	Evaluate whether the current estimate reflects this scope for crash walls. May be an estimate reduction
20.01	43	1-Requirements	As all stations have center island platforms at grade, if a decision, for safety or operations reasons, is made to avoid pedestrian grade crossings, all stations will need tunnels or bridges along with multiple vertical circulation elements to replace them.	Much greater cost per station.	1	5	0	2.5	History indicates a very low probability
20.01	153	2-Design	Potential elevated pedestrian connection between park-and-ride and LRT station (814)		3	3	0	4.5	
30.02	55	1-Requirements	Failure to identify economical, environmental-suitable, and practical location for maintenance facility could cause excessive project costs.	Much higher costs, both for real estate acquisition and construction cost and for O&M costs when the project goes into operation.	1	3	0	1.5	Is currently under choice selection, among final 4 sites. Re-evaluate costs when a site is chosen.
40.01	61	1-Requirements	Balance of earthwork is unknown at this time, although it would appear that there may be more fill than cut. Lack of economical embankment material could be a problem.	Higher cost if material is hard to find.	4	4	3	14	Evauate as an estimate adjustment. Figure out more during design.
40.02	62	1-Requirements	Since a number of the "tunnels" are only shallow cut & cover grade separations under existing streets (where the utilities are usually buried), there are likely to be utility issues to be dealt with.	Costly relocations of utilities. Short construction season may require expedited advance utiliy relocation packages to avoid delaying project.	2	3	0	3	Perform utility location studies during early PE
60.01	139	1-Requirements	Potential impact to loading dock access of existing commercial building (124)		5	4	0	10	Evaluate for estimate adjustment

Risk and Contingency Management Plan (RCMP) Structure

Note: the following narrative for potential structure of the RCMP contains elements or details that may not be appropriate for all phases of the project. For example, early in the design phase, some details may be undeveloped and only broad characterization of project elements or risk management plans may be available. The MTAC's review of the Sponsor's RCMP should appropriately consider the phase of the project development, and the MTAC should adjust its review accordingly.

The Risk and Contingency Management Plan (RCMP) is a subplan of the Sponsor's Project Management Plan (PMP); its successful implementation depends upon a fully updated and active PMP. It is the purpose of the RCMP to highlight specific areas of management focus as identified through the risk evaluation process, which should be implemented along with Sponsor's normal project operations as described elsewhere within the PMP. Further, the RCMP provides a means for monitoring Sponsor's progress as it moves the project forward to its next phase. These areas of management focus may include actions to strengthen management capacity and capability, project performance, cost and schedule analyses, mitigations of identified project risks, and others.

Information contained within the RCMP should complement and not be in conflict with information contained elsewhere within the PMP or in other FRA guidance documents. Such areas of concordance should include, for example, the project estimate and schedule, and FRA's completion criteria for planning, preliminary engineering, or final design.

Successful implementation of the RCMP is important to the goals of both the Sponsor and the FRA, and monitoring of the RCMP implementation will be undertaken by both the Sponsor and the FRA (through the MTAC). It is important, therefore, that the FRA, MTAC, and Sponsor work collaboratively and develop agreement on the substance of the RCMP.

A potential structure for the RCMP follows:

Overview

This section should indicate that the RCMP is a subplan of the over-arching PMP, including an indication of the latest version of the PMP upon which the RCMP is based. If the RCMP depends specifically on other sections of the PMP, those sections should be noted, including an indication of their latest versions.

A brief description of the important, actionable findings of the RCMP should be included in the overview. If further actions are required to finalize the current draft of the RCMP, those should also be indicated along with expected completion dates.

A brief summarization of topics covered within the RCMP should be included, including such topics as:

Primary Mitigation, organized by significant project activities, such as:

- Management Capacity and Capability

- Project Scoping and Design;
- Delivery Methods and Contracting;
- Construction Process;
- Project Tracking, including:
    - Cost Estimating, Financing and Financial Management; and
    - Project Schedule Management.

Insurance:

- Professional services, construction phase, wrap-up, or other specialized insurances purchased for reduction of risk exposure.

Contingency Management:

- Cost Contingency Management Plan; and
- Schedule Contingency Management Plan.

Secondary Mitigation:

- Establishment of Secondary Mitigation actions and cost targets which may trigger the implementation of Secondary Mitigation.

Risk Management:

- Risk management and mitigation monitoring, change identification, and management controls.

Goals and Objectives

The major goals of the RCMP should be stated, including establishment of measures to complete the project within budget and on schedule, implementation of project cost and time contingency procedures, risk mitigation, and development of available risk mitigation capacity.

Broad goals expected to be accomplished prior to the next stage of RCMP revision (including revisions required at FRA milestones) should be noted. For example, for a project in preliminary engineering or final design, such goals may include (similar, phase-appropriate goals would apply to other project phases):

- Adherence to environmental requirements, such as the National Environmental Policy Act ("NEPA") requirements;
- Mitigation of design risks where possible, or appropriate transfer of such risks;
- Mitigation of other identified risk events;
- Reasoned analysis and assessment of likely market risks to be encountered;
- Cost and schedule risk mitigation capacity developed and implemented as needed, including targets to be achieved during the current phase and forecasted cost and schedule risk management mitigation capacity for subsequent phases;
- Uncertainty in cost estimates and forecasts and project schedules, including tracking mechanisms to identify trends in known costs and risk reduction; and
- Maintenance of minimum cost contingency and schedule contingency targets.

A description of each goal and associated metrics should be set forth in the RCMP; the level of success should be measured using the metrics in project evaluation.

The RCMP should note that the Sponsor and its local and state partners understand that the plan was developed with FRA's concurrence (if it is so), that implementation of the RCMP is an important consideration in further FRA approvals, and that the RCMP describes processes and requirements that must be adhered to, in addition to current FRA grant contracts and related FRA Circulars, regulations and guidance.

Risk Review Process:

This section should include a description of procedures used to develop the Risk and Contingency Management Plan, including procedures for development of risk identification, risk assessment, risk response recommendations, risk protection measures (including Secondary Mitigation and minimum contingencies) and risk management and control.

[Note: In the following sections, the Sponsor should provide an outline of its strategic, performance-based project management activities to identify, assess and respond to the project risks. It is the intent of the following to view risk management as a process of continual risk reduction; i.e., while the mitigation of any specific identified risk is an important activity, the identification, addition and mitigation of newly-discovered risks forms a process that provides both the Sponsor and the FRA (through its MTAC) with the means and methods to best ensure satisfactory outcomes for the project. The goal of the RCMP is to provide a plan to take the Sponsor through the upcoming phase, and prepare it for subsequent phases, with:

- *Cost estimates and forecasts and project schedules continuing to be developed as planned;*
- *Reasoned analysis and assessment of likely upcoming risks, including risks associated with Sponsor's management capacity;*
- *Mitigation of risks at the earliest possible time;*
- *Completion of all mitigation actions scheduled for the upcoming phase;*
- *Cost and schedule risk mitigation capacity developed, implemented as needed, and targets achieved; and*
- *Minimum cost and schedule contingency targets continuing to be achieved.]*

Insurance

This section should summarize current or future major insurances provided to the project to respond to identified risk, including unusual, highly likely, or high exposure risk identified through the risk review process. Such insurances may include professional services, builder's risk, wrap-up, or other specialized insurances purchased for reduction of risk exposure. Detailed insurance information should be included as an appendix to the RCMP or reflected elsewhere in the PMP.

Primary Mitigation

The primary mitigation section should include the process used to develop the Risk Register, which outlines risks and mitigations that require Sponsor managerial, administrative, and technical action. The section should be organized as follows; each area below should include a brief summary of key risks and action items as of the date of the latest RCMP update. A detailed listing of all identified risks and proposed mitigations should be included as a separate report, or attached as an appendix, as further indicated below; this separate report should be updated at the frequency noted in the RCMP.

Management Capacity:

The RCMP should summarize key management capacity risks identified in the Risk Register. A plan should be indicated for additional resource commitments, additional requirements for methods and resources, and improved management strategies to address the findings of risk. Management strategies should include specific plans or products, project control, responsibilities, authorities, and measures of performance.

Detailed risk issues related to Management Capacity should be specifically cited in an appendix, and should be noted as *Management Capacity Risks and Mitigations*. This list should include proposed mitigation activities, responsibility for action and targeted date for completion.

Project Scoping and Design:

Requirements: A summary of key requirements risks and proposed mitigations should be discussed in the body of the report to provide a succinct overview of the outstanding risk mitigation work to be accomplished. In addition, all outstanding project requirements risks, including undefined project goals, third party requirements, and environmental considerations should be listed in an appendix, indicated as Requirements Risks and Mitigations. Such activities should also include risk associated with all compliance of NEPA activities consistent with the NEPA Final Determination; and public and governmental reviews and critiques.

Design: A summary of important design risks and proposed mitigations should be discussed in the body of the report to provide a succinct overview of the outstanding design risk mitigation work to be accomplished. In addition, all design activities indicated in the risk review as potential risk events, including activities associated with unproven project technologies, unresolved alternate design approaches, late design, and others should be listed in an appendix, indicated as Design Risks and Mitigations. As appropriate, statements of subconsultant responsibilities for risk mitigation should be included.

Where value engineering efforts have been or will be undertaken, a summarized discussion of the effect on project risk should be discussed, including plans for closure of the value engineering process. Detailed value engineering items should be referenced elsewhere in the PMP, or included in an appendix.

Delivery Methods and Contracting:

The purpose of this section is to illustrate the Sponsor's plans for efficient risk allocation through choice of delivery method and through contractual risk allocation; such risks so considered should include common design, market, and construction risks as well as those risks identified in the risk review. All contracts should be considered, including design, vendor, and construction contracts. The Sponsor should discuss the following:

- Strategies for contractual risk allocation or risk sharing through explicit contract language, ordinary custom/commercial/trade practices, or statutory authority such as the Uniform Commercial Code. The risk allocation plan should include allocations of future and prior contracted work, should complement other PMP sub-plans, such as the Project Delivery/Contract Package Plan and future individual contracts, the Real Estate Acquisition Management Plan ("RAMP"), and all NEPA-related documentation;
- The effect of the chosen strategy on market pricing for the various contracts;
- Assessment of the contracted party's capacity to efficiently mitigate its allocated project risk exposure, including market risk, such that the risk allocation represents the best value for the project; and
- Actions to implement the strategy.

Detail for the proposed allocation strategy should be referenced elsewhere in the PMP or should be included in an appendix. Individual risks identified in the risk review should be indicated as *Delivery Methods and Contracting Risks and Mitigations*.

Construction Process:

This section should demonstrate the Sponsor's plans for effective management of risk during the construction process. It should summarize the key construction phase risks identified in the risk review and plans to mitigate and respond to those risks. Special attention should be placed on those risks that have not been wholly transferred to a contracted party. In addition, all outstanding project construction risks identified in the risk review should be listed in an appendix, indicated as Construction Risks and Mitigations.

Project Tracking:

This section should discuss the tracking and forecasting of cost and schedule changes to enable measurement of potential increased cost or time due to project risk. Such increases may require actions, such as use of contingencies or may trigger the implementation of Secondary Mitigation. This section should complement and may reference other related sections of the PMP. Where the risk review has identified risks associated with project cost and time tracking, a detailed listing of all identified risks and proposed mitigations should be included in an appendix, indicated as *Project Tracking Risks and Mitigations*. The section should be organized as follows; each area below should include a brief summary of key risks and action items:

Cost Estimating and Forecasting: Discussion should include the process used for development and management of project cost and project cost uncertainty, including the effect of schedule risk uncertainty on cost risk results.

The following efforts for reduction of cost uncertainty should be indicated or referenced elsewhere in the PMP:

- Continuous administrative and management efforts for increased detailed development of the cost estimate;
- Internal quality control to ensure adequate technical provision of all estimating and forecasting work;
- Methods for adjustment of cost schedules in reaction to realized schedule risks.

Detailed cost and cost risk information should be referenced as available elsewhere in the PMP or made available in an appendix to the RCMP.

Project Schedule Management: Discussion should include the process used for development and management of project schedule forecasts and project schedule uncertainty, including any effect of cost risk uncertainty on the schedule risk results. Such external requirements as NEPA compliant related work and community involvement should be considered in the discussion of risk-related schedule management.

Plans to maintain schedule tracking should be discussed, including both design and construction schedules, to detect schedule deviation through techniques such as earned value. Such plans should indicate responsibility and frequency of reporting (usually monthly). Where appropriate, the RCMP should indicate efforts made to ensure that consultants and contractors comply with similar measures. Such tracking is important for the establishment of risk response actions, such as potential use of schedule contingency; this discussion shall rely upon and complement schedule control discussions contained within the scheduling section of the PMP.

Contingency Management

The purpose of this section is to discuss the Sponsor's plans for establishment and management of cost and schedule contingency protections. The section should be organized as follows:

Cost Contingency Management Plan:

- Results of cost contingency recommendations developed, including minimum contingency hold points by milestone and reflected in a minimum cost contingency draw-down curve;
- Sponsor plans to reach substantial conformance with the contingency recommendations on a timely basis;
- Procedures in place to implement and maintain throughout the project, a Cost Contingency Management Plan as an identifiable element in the RCMP, including authorities and procedures for distribution, transfer and use of all cost contingency in conformance with the requirements of this plan and sufficient documentation as each transfer occurs. This Cost Contingency

Management Plan should also describe the manner in which the Sponsor will forecast and trend the project contingency; and
- Sponsor plans to recover in those cases where cost estimate forecasts indicate contingency levels have fallen below the minimum planned contingency hold points, including as necessary implementation of a formal Recovery Plan or adjustment of the expected project final cost with FRA approval.

Schedule Contingency Management Plan:
- Results of schedule contingency recommendations developed, including minimum contingency hold points by milestone and reflected in a minimum schedule contingency draw-down curve;
- Sponsor plans to reach substantial conformance with the contingency recommendations on a timely basis;
- Procedures in place to implement and maintain a Schedule Contingency Management Plan as an identifiable element in the RCMP, including authorities and procedures for distribution, transfer and use of all schedule contingency in conformance with the requirements of this plan and sufficient documentation as each transfer occurs. This Schedule Contingency Management Plan should also describe the manner in which the Sponsor will forecast and trend the project contingency; and
- Sponsor plans to recover in those cases where schedule estimate forecasts indicate contingency levels below the minimum planned contingency hold points, including as necessary a formal Recovery Plan or adjustment of the expected completion date for the project or appropriate milestones.

Secondary Mitigation

This section should discuss the Sponsor's plans for establishment and management of Secondary Mitigation protections. The section should discuss the following:

- Results of Secondary Mitigation recommendations developed and the process for reviewing and developing future items;
- A summary discussion of such Secondary Mitigation, including a brief description of a prioritized list of identified Secondary Mitigation items and the timing necessary for their implementation, especially including dates beyond which the items may no longer be effective;
- A discussion of those points of project completion at which Secondary Mitigation items are no longer available to be triggered for implementation; and
- Procedures in place to track such trigger points and to implement available Secondary Mitigation, including authority and responsibility for such actions.

If the project has progressed to a stage at which no available Secondary Mitigation has been identified, this condition should be discussed in the report.

Risk Management and Risk Mitigation

The Sponsor should describe its plans to implement, administer and maintain throughout the project, a

APPENDIX G (F not used)
Risk and Contingency Management Plan (RCMP) Structure

Risk and Contingency Management plan for:

- Assessing (identifying and analyzing) project cost and schedule risk;
- Developing risk-handling options inclusive of primary risk mitigation;
- Developing a secondary mitigation plan to handle risk events or "triggered" mitigation activities;
- Monitoring risks to determine how risks have been handled or changed; and
- Documenting and reporting to the FRA the risk management program.

The risk management description should include such considerations as:

- Design control processes to detect potential consultant failure, such as scope, schedule, and budget "earned value" metrics;
- Clearly established Sponsor, consultant, and contractor responsibilities for risk management;
- 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 Sponsor and the FRA; and
- Plans and timing for systematically updating the RCMP.

APPENDIX H
MTAC's Risk Report Format

Reporting should occur soon after conclusion of the risk workshops; timely reporting will facilitate Sponsor's early adoption of the recommended risk mitigation measures into its Project Management Plan.

In the conduct of this report, the MTAC shall use its professional judgment to identify and categorize, assess and evaluate the uncertainties in the Sponsor's project information, considering the project's administrative, management, political, legal, financial and physical conditions. The MTAC will document and report its professional opinions and its recommendations for responding to identified risk, including recommendations for mitigations including contingencies. Unless otherwise directed, the report will be sectioned as follows:

Title Page

Include disclaimer, below.

> **Disclaimer** *Insert:* This Monitoring and Technical Assistance Contractor (MTAC) report and all supporting reports and back-up materials contain the findings, conclusions, professional opinions and recommendations stemming from a risk-informed evaluation and assessment, prepared solely for the Federal Railroad Administration (FRA). This report should not be relied upon by any party, except FRA or the project Sponsor, in accordance with the purposes of the evaluation and assessment as described below. For projects funded through FRA's capital program, FRA and its MTACs use a risk-informed process to review and reflect upon a Sponsor's scope, schedule, and cost, and to analyze the Sponsor's project development and management. This process is iterative in nature. The results represent a "snapshot in time" for a particular project under the conditions known at that point. The evaluation or assessment and related results may subsequently change due to new information, changes in circumstances, additional project development, specific measures a Sponsor may take to mitigate risks, Sponsor's selection of strategies for project execution, etc.

Table of Contents

List of Figures and Tables

Executive Summary

The MTAC should provide an executive summary in three pages or less that includes the following:

1) Purpose
2) Project Description
3) Results and Recommendations - MTAC's professional opinion regarding:
   a) Contract packaging review and assessment, including construction work by railroads
   b) Total project cost, including statement of potential range of cost (lower reporting range, conditioned estimate and upper reporting range) and recommended cost contingency where a separate MTAC risk assessment has been performed;
   c) Project schedule and schedule contingency, including statement of separate MTAC findings where a MTAC assessment has been performed; and
   d) Top Risks, mitigations, and recommended actions.

APPENDIX H
MTAC's Risk Report Format

Project Background

Project descriptions and data shall be consistent with MP 25; also include description of project purpose; intended service and infrastructure improvements; railway relation to grade throughout the alignment; project delivery method.

Summary of Project Status from other OPs

Summary-level information from MP 21Sponsor Management Capacity and Capability, MP 32C Project Scope, MP 33 Project Estimate, and MP 34 Project Schedule reviews if performed. Specifically cite elements from prior reviews that help to reader to understand the issues presented later in the report.

Risk Identification

Provide a summary of the process used for identification of risks, and provide a narrative discussion of key risk events (categorized by SCC), including their potential impact on the project. Characterize the remaining elements of the Risk Register, which is to be attached as an appendix.

Risk Assessment

For projects with prior risk reviews, include comparisons of the currently-assessed project risk to the prior-assessed project risks and comment on the changes indicated.

Sponsor-developed Cost and/or Schedule Risk Assessments

Where the MTAC's review is based on a Sponsor-developed cost and/or schedule risk assessment, the purpose of this section is to present the Sponsor-developed risk assessment models, including a narrative and appropriate graphics that explain the primary findings from the project cost or schedule risk models.

MTAC Cost Risk Assessment

Where the cost risk review is based on an independent MTAC risk assessment, describe the methodology used to deliver the risk assessment products. Further, present any cost estimate adjustments and selection of cost range factors; especially discuss any factors that vary from standard recommendations. Provide a summary of key risks that influence MTAC's characterization of level of project risk by SCC. The MTAC shall present detailed data and analysis in a separate appendix as necessary in order to maintain readability of the report.

MTAC Schedule Risk Modeling

Where the schedule risk review is based on an independent MTAC risk assessment, describe the methodology used to deliver the risk assessment products. This section shall present the findings resulting from the schedule risk modeling, including development of the summary schedule activities, ranges for activity durations in the summary schedule, and characterization of specific risks that influence important schedule activities; characterization of the results of the schedule risk modeling, including confidence levels for achieving the Sponsor's Revenue Service Date target; the MTAC's professional opinion regarding the most likely schedule for Revenue Service Date; and MTAC's recommended actions.

Risk Mitigation

The purpose of this section is to present the MTAC's review and recommendation for any adjustment of risk mitigation efforts by the Sponsor. The MTAC's narrative should allow FRA management and the Sponsor to maintain focus upon these risk mitigation efforts as the means to maintain the baseline cost estimate and avoid potential cost escalation from these potential project risks.

The report should include separate subsections for Primary Mitigation, Secondary Mitigation and Contingency Recommendations.

Primary Mitigation Specific mitigation recommendations shall be presented, including appropriate timeframes for completion of the mitigation activity, especially focused on those mitigations considered necessary for successful advancement into the next project phase. Where an MTAC assessment has been performed, link the mitigation activity to the risk register and/or the assignment of exceptional risk factors. Such mitigation recommendations shall be segregated by SCC and Risk Category.

For projects with prior risk reviews, include discussions (as appropriate for project phase) of Sponsor's historic mitigation efforts by Risk Category.

Secondary Mitigation Provide recommendations for adjustments to amounts of Secondary Mitigation capacity developed by the Sponsor. Where the risk review has provided such, include suggested additional areas for potential Secondary Mitigation.

Contingency Provide a narrative indicating minimum recommended levels of both cost and schedule contingency, including a summary of the basis for development of the recommended minimums. Further, provide graphical or tabular representations of the Sponsor's contingency draw-down curves, including review comments and MTAC's recommendations for adjustment, if any.

Monitoring Plan Basis

Indicate a plan for testing the implementation and effectiveness of Sponsor mitigation measures on the project.

Conclusion

Appendices As required, include the following or other additional information:

Risk Register

Sponsor Data Characterization Provide a descriptive listing of documents used in this analysis, including a narrative characterization of their completeness and sufficiency as appropriate for the project phase during which this review was conducted.

Monitoring Procedure 40c – Risk and Contingency Review (Full)

1.0 PURPOSE

This Monitoring Procedure (MP) describes FRA requirements for the Monitoring and Technical Assistance Contractor (MTAC) when evaluating the Grantee's (Sponsor's) plan for mitigating and managing project risks. This MP describes the procedure for a full MTAC risk assessment. See Appendix D.

Risk management helps to improve the reliability of project delivery. The MTAC's evaluation of the Sponsor's plan for mitigating and managing project risks provides FRA with critical information related to the potential success of the Sponsor's project. In addition, it provides a basis for FRA decisions regarding project advancement and funding. It also helps to build the professional credibility of the rail industry including FRA.

2.0 KEY PRINCIPLES

This review requires an evaluation of the reliability of the Sponsor's project scope, cost estimate, and schedule, with special focus on the elements of uncertainty associated with the effectiveness and efficiency of the Sponsor's project implementation and within the context of the surrounding project conditions.

This MP requires the MTAC to synthesize available project information including the Sponsor's separate Risk and Contingency Management Plan; evaluate, explore, and analyze uncertainties and risks; establish that an appropriate qualitative and quantitative assessment of ranges of forecasted cost and schedule has been developed; describe and evaluate the analytical methods used; consider risk mitigation options and alternatives including use of cost and schedule contingencies; draw conclusions; and provide recommendations for adjustment to scope, cost, schedule, project delivery method, construction methodology, and project management and risk planning in order to respond to project risk.

FRA may direct the MTAC to conduct this review prior at various points in a project's life. This review is applicable to projects using any project delivery method: Design-Build-Build (DBB), Design-Build (DB), Construction Manager/General Contractor (CM/GC), etc.

3.0 REQUIRED DOCUMENTS AND PREPARATION FOR THE REVIEW

In advance of performing the review, the MTAC should obtain and study documents similar to those listed in Appendix B, as appropriate for the particular project phase and level of review, including the Sponsor's Project Management Plan (including especially the Risk and Contingency Management Plan) and supporting documents. Supporting documents shall include appropriate design, cost, and schedule information sufficient to establish the basis of the project. Many of these documents will have been

obtained through the review of scope, schedule, cost, and Sponsor management capacity and capability in other MPs. The MTAC should perform an initial review and notify FRA of important discrepancies in the project information that would hinder the review; an example would be insufficient detail or a mismatch between drawings and cost estimate in which the drawings are current and the cost estimate is significantly older.

4.0 SCOPE OF WORK

4.1 Overview

The scope of this review includes evaluation and recommendations for amendment of the Sponsor's project risk identification and assessment, mitigation recommendations, and contingency assessment, as reflected in its Risk and Contingency Management Plan, where available. The MTAC shall independently develop a risk analysis to provide a thorough analysis of the Sponsor's project. This risk management review builds upon reviews of scope, schedule, cost, and Sponsor management capacity and capability in other MPs that may have been previously performed.

The MTAC will comprehensively address and report findings, conclusions, professional opinions, and recommendations, according to the format in MP 01.

4.1.1 Sponsor interface

MTAC interface with the Sponsor during its risk review facilitates and expedites the process and provides the MTAC with the background necessary to efficiently evaluate risk and provide recommendations for revisions, if any, to the Sponsor's Project Management Plan and Risk and Contingency Management Subplan. A typical structure for Sponsor interface meetings is presented in Appendix C.

4.1.2 Organizing the Risk Assessments by FRA Milestones

Forecasted levels of project risk should be developed consistently around points in time when level of project development typically indicates changes in project risk. The following FRA Milestones reflect common FRA approval points and important percentages of construction completion:

- Completion of Planning and Concept Design
- Completion of Preliminary Engineering
- Completion of Final Design
- Ready to Bid Construction;
- Start of construction;
- 50% physically complete for construction;
- 75% physically complete for construction;
- 90% physically complete for construction.

The FRA Milestones may be modified to reflect important milestones in the Sponsor's schedule, especially those points where significant changes in risk occur. If FRA Milestones and MTAC-added milestones are more than one year apart, the MTAC should consider developing supplemental milestones.

4.2 Project Status Evaluation: MTAC's Efforts

The MTAC project status evaluation is a precursor to the detailed risk review. The completeness and accuracy of the risk review is highly dependent on the completeness and accuracy of the project status evaluation. The project status evaluation typically includes evaluation of Sponsor management capacity and capability (MTCC)), scope, cost and schedule (all reviewed under separate MPs); as well as evaluation of the Sponsor's contract packaging strategies. Other review elements may be included at the discretion of the FRA.

4.3 Identification and Categorization of Risks: Sponsor's Efforts

Risk identification plays a significant role in the overall risk management process. Sufficient efforts should be made by the Sponsor to ensure that adequate resources and processes have been used to develop a thorough listing of risk events, appropriate to the current project phase. This "Risk Register" shall include at a minimum a description of the potential risk event; its qualitatively-evaluated potential consequences and likelihood of occurrence; its SCC category (refer to MP 33) and risk category; the contract package in which it falls (where appropriate); a method for prioritizing among risks; and potential actions to mitigate the risk.

4.3.1 Example of risk register

A simplified example partial risk register is included in Appendix E.

4.4 Identification and Categorization of Risks: MTAC's Efforts

The MTAC shall obtain current documents, reports, and observations developed through prior analysis of the Sponsor's organization, the project's scope, cost estimate, schedule, and contract packaging to develop a synthesized, enumerated list of MTAC-identified risk events. This list shall be compared with risk events as independently developed by and identified in the Sponsor's "Risk Register".

4.4.1 Risk Events

Risk Events are individually identified contingent, or unplanned, events that may occur and which may create a plan variance and may be cause for special management scrutiny or action. Such events, or a combination of such events, do not represent all risk present on a project, and the identification or disposal of risk events may only become possible as the project proceeds through its various phases. Therefore, risk event identification will require frequent updates as a project progresses.

4.4.2 Risk Categories

Risk shall be characterized as belonging to any of the following categories, which are listed in chronological order; generally, risk is categorized as associated with the category during which the risk may be earliest and best mitigated. The categories are listed below, and are related to traditional sequential phases of project development. If a risk event is not disposed of during a particular phase, it may survive into the following phase. See Appendix F for application of the risk category to risk assessment principles for capital and non-capital construction project elements.

Requirements Risk relates to the establishment and variability of fundamental goals and conditions of a project to which the design or construction process must respond, as well as the activities of the Sponsor to actively identify these goals and conditions. Generally, requirements risk is associated with all project development activities from earliest concept through Alternatives Analysis. A significant portion of Requirements Risk can be attributed to the potential influence of project stakeholders and third parties (such as regulatory agencies) if project goals and requirements are not fully defined.

Design Risk is associated with the performance and variability of design-related activities occurring after Alternatives Analysis. Substantially complete design risk is indicated when no material design-related assumptions or likely variations are detected through the scope review; the estimate review indicates that 95% of all construction direct cost activities are shown on both design deliverables and cost estimate; and the schedule review indicates that no project level critical path element or procurement activity exceeds 45 calendar days (or other reasonable minimum) in duration.

Market Risk is related to the procurement of project management, administrative, right-of-way, design, or construction services; materials; and equipment and the variability associated therewith. This risk refers to both the effects of the open-market pricing of goods and services, as well as the effects of the Sponsor's contract packaging strategies.

Construction Risk includes both risks that are due to the inevitable variability of the project's environment—including such items as unusual weather, unexpected subsurface conditions, and unexpected construction contractor failure—as well as performance risk that is manageable by the Sponsor and its consultants and contractors—for example uncertainty surrounding mobilization of a tunnel boring machine and its planned production rates. Capital construction risk may be subdivided into: Early-Range Construction Risk (composed generally of site activities such as Geotechnical or Utility activities, usually associated with up to 20% complete), Mid-Range Construction Risk (associated with coordination of contractors, etc., from 20% to 50%), and Late-Range Construction Risk (associated with 50% to substantial completion).

4.5 Not Used

4.6 Risk Assessment: MTAC's Efforts

4.6.1 Project Cost Risk Overview

Two approaches to cost risk assessment are recommended which when used together capture both project specific risk and uncertainty. Input data is derived from historic parametric sources and project specific risk registers, estimating basis and schedule basis. FRA recommends the MTAC use both approaches which should provide similar results at around the 50^{th} percentile confidence level. If results are significantly different then the MTAC shall establish the cause which may highlight input inaccuracies or specific or unusual project uncertainty or risk which requires further research to verify and then quantify and manage accordingly. The two approaches are as described as follows:

1. **Bottom-up Cost Risk Assessment** - The Bottom-up methodology is the term used to describe the traditional Monte Carlo-based approach to risk quantification, requiring consideration of

uncertainty around individual estimating components and specific project risk. This approach requires the establishment of source and range of variability around that source, such as historical data, supplier quotations or bottom-up quantitative and pricing detail. The Monte Carlo approach uses both the project basis of estimate and the projects Risk Register as a basis for ascertaining current uncertainty supporting a clear traceability through to the risk model results.

2. **Top-down Cost Risk Assessment – Beta Range Model -** The Top Down methodology for evaluating cost-risk uses broad parameters derived from historic project information. These parameters are applied to reflect the reducing risk profile as a project moves through the delivery cycle from conception to start-up. Risk is applied sequentially across the project delivery stages as risk-based ranges of potential cost at a summarized category level, and this process is referred to as a top-down cost risk assessment model. Also called the Beta Range Model, the top-down cost risk assessment method has been developed through implementation on many transportation projects. Its features have become accepted as common starting points for project-specific cost risk assessments.

4.6.2 Pre-assessment Adjustments of the Sponsor Estimate

Stripped Cost Estimate - Based upon analyses performed in accordance with MP 33 for the review of the cost estimate, the MTAC shall ensure that Sponsor has identified all contingency funds embedded within its cost estimate. Such contingency funds may include both unallocated funds (usually applied as a percentage of summary costs) and allocated funds (usually applied as increases to individual estimate line items). Both patent (or exposed) contingency funds and latent (or hidden) contingency funds shall be identified; the identification of latent contingency funds will likely involve interviews with the Sponsor. Further, particular attention should be paid to contingent funds that may be embedded within estimates for inflation or escalation risk.

Once these contingency funds have been quantified, they shall be removed from the estimate to form a Stripped Cost Estimate.

Adjusted Cost Estimate - Utilizing scope, cost, schedule, contract packaging, etc. information developed through prior-performed analyses prescribed by MPs and/or workshops with the Sponsor, the MTAC shall evaluate the Stripped Cost Estimate, suggesting changes to the various estimate line items to produce an Adjusted Cost Estimate. Care should be taken to identify whether items so adjusted should also become elements of the Risk Register. Any such adjustments and their rationale shall be fully documented. Note that the adjusted estimate, at a minimum, shall include one level of breakdown below the standard SCC Cost Elements [e.g.10.01, 10.02, etc.] The estimate shall be inflated to the year of expenditure (YOE), which becomes the basis for the ensuing risk assessment. Note that the inflation rate used for developing the Adjusted Cost Estimate should be a rate that is a reasonably-expected value without significant hidden contingency, in a similar manner that occurs with other estimate line items.

Subsequent analyses of risk depend upon accurate estimate adjustments. Where possible, and especially in the case of significant adjustments, the MTAC should strive for consensus of the FRA, MTAC, and Sponsor in such adjustments before moving forward with the risk assessment.

This Adjusted Cost Estimate, appropriately stripped of contingencies, establishes a highly optimistic level of cost forecast for the various estimate line items, useful for assessing the range of risk for the line item.

4.6.3 Risk Profiles

Many large transportation projects, especially those in latter stages of development, consist of multiple phases or contract packages that are delivered using differing project methods or that are staged with differing timing. For example, Phase I of a project may begin a year or more earlier than Phase II; alternatively, the corridor railway alignment may be delivered using design-build methods, while the stations may use design-bid-build delivery. These circumstances may create project portions that exhibit different risk profiles, characterized by widely varying risk ranges factors.

Where practical and reasonable for accurate assessment of project risk or application of contingencies, the project may be apportioned based on these different risk profiles; risk and mitigations, including contingencies assessed independently by project portion; and the portions subsequently combined using appropriate techniques into an overall project risk recommendation.

4.6.4 Cost Risk Assessment – Beta Range Model

The MTAC shall develop an independent top-down project cost risk assessment using the Beta Range Model method. The following generally describes its procedures; actual implementation of the Beta Range Model method should be undertaken by those thoroughly familiar with the process and able to use judgment as necessary to fine-tune the process for specific project conditions.

Standard Cost Category (SCC) Risk Assessment

SCC Cost Element Ranges - Utilizing the procedures outlined below, the MTAC shall establish likely ranges of cost for estimated line items, or elements, at the minor SCC level, spanning the range of lower bound to upper bound, to which a Beta probability distribution function will be applied, allowing the application of risk across the entire project. The Beta probability distribution function has been derived from historical transportation project outcomes, and may be adjusted from time-to-time. These ranges shall be established as follows:

- **Lower Bound SCC Cost Element Range Establishment** - The Adjusted Cost Estimate for each minor SCC is established as the lower bound value of the SCC element.

- **Upper SCC Cost Element Range Establishment** - The MTAC shall establish the upper bound minor SCC value through multiplying the Lower Bound value by a range factor (hereinafter referred to as the Beta Range Factor or BRF); i.e., Upper Bound = BRF*Lower Bound.

Beta Range Factor Establishment - The MTAC shall establish the Beta Range Factor (BRF) values through a process of initially utilizing the guidelines indicated below and in Appendix F, and then varying the developed Beta Factors based upon specific project situations (especially including those noted in the Risk Register), considering discussion with the Sponsor and FRA.

Beta Range Factors are sums of Risk Category factors; i.e., total risk for an SCC element is the sum of the individual Risk Category Factors for Requirements Risk, Design Risk, Market Risk, and Construction Risk, added to a base factor of 1.05. The base factor of 1.05 provides for a 5% end-of-project risk range allowance, which recognizes that risk generally remains, even at the end of construction.

Methods for establishing the BRFs are presented in Appendix F.

SCC Cost Item Risk Curve Establishment - The median, mean, and variance of the suggested range distribution for the SCC cost item are fully determined using the Lower Bound, the BRF, and the historically-derived Beta distribution. These calculations are modeled in the Beta Range Model Workbook.

Project Delivery Method Influence - Differing project delivery methods may generally affect the timing and scope of risk retained by the Sponsor but not necessarily the magnitude of risk nor the sequence of risk mitigation until contracting has occurred. Traditional project delivery methods (Design-Bid-Build) transfer or share much of the construction risk at the completion of design and market risk mitigation. Alternative project delivery methods such as Design-Build may transfer or share some components of requirements, design, market, and construction risk prior to the completion of design activities. The extent and effectiveness of risk transfers and risk retained by the Sponsor inherent in such alternative project delivery methods should be considered when developing recommendations for BRF assignment.

Project Level Cost Risk Assessment

Project-level risk is an aggregated amount of the risk associated with all of the SCC Category Cost Ranges. The Beta Range Model Workbook develops these calculations.

The Beta Range Model Workbook has been developed to illustrate the method's common features and to serve as a starting point for a particular project. This workbook is based on the summary organizational structure of the FRA Standard Cost Categories (SCC) 10 through 80 for the capital cost elements of a project; SCC category 90 (contingency) is specifically excluded as a duplicate measure of risk. Risk for SCC category 100 (finance charges) is not covered in the standard BRFs for categories 10 through 80; opinion of finance cost risk is provided separately through other FRA reviews. The Beta Range Model Workbook illustrates the formats and bases of calculations to properly execute the cost risk assessment described herein. The MTAC shall become fully familiar with the Beta Range Model Workbook prior to undertaking the work of this section. The MTAC shall adjust the FRA Beta Range Model Workbook as appropriate to meet specific project conditions.

The MTAC shall produce, using the Beta Range Model Workbook, a summary table that lists the Sponsor's estimated values, and the MTAC's recommended project cost elements with its assessment data—including the reportable range of variability determined in the risk assessment and its effect on the overall budget. The MTAC will then identify, in a narrative format, the key risk drivers through an analysis of those project elements with large cost risk impact.

The FRA may direct the MTAC to perform additional analyses as appropriate to provide further

insight into the project-level risk assessment.

Conditioned Estimate - The MTAC shall evaluate contingency amounts identified for the project and shall comment on the sufficiency of the contingency, establishing a recommended contingency amount for the project in accordance with this MP. A Conditioned Estimate may be developed by adding the recommended contingency to the Adjusted Estimate, which forms the MTAC's recommendation for the project budget. Note that contingency recommendations, regardless of method of analysis, are applied at the project level only, regardless of whether and how the Sponsor may allocate the contingency among the various project elements.

4.6.5 Project Schedule Risk Overview

The MTAC shall use its professional judgment and objective schedule data to evaluate the Sponsor's assessment of schedule risk, and to provide an independent assessment of schedule risk.

Schedule Risk is risk to the project schedule critical path directly delaying the project, or to any other significant activity, the delay of which may reduce schedule float, schedule contingency or threaten the project estimate. Note that schedule risk may also indicate cost risk.

Pre-assessment Adjustments of the Sponsor Schedule

Stripped Schedule - Based upon analyses performed in accordance with MP 34 for review of the Schedule and/or workshops with the Sponsor, the MTAC shall to render an opinion whether the Sponsor has exposed all contingency durations embedded therein. Such contingency durations to be removed may include both unallocated (usually applied as a dummy activity at the end of the project or sub-network) and allocated (usually applied as increases to individual activity durations). Both patent (or exposed) contingency durations and latent (or hidden) contingency durations shall be identified; the identification of latent contingency durations will likely involve interviews with the Sponsor. Further, particular attention should be paid to contingent durations that may be embedded as lag time hidden within the activity logic ties or artificially applied constraints.

Once identified, these contingency durations shall be quantified and removed from the schedule to form a Stripped Schedule.

Adjusted Schedule - Utilizing scope, cost, schedule, etc. information developed in prior-performed MPs or joint MTAC and Sponsor workshops, the MTAC shall appropriately provide suggested revisions to the Stripped Schedule, increasing or decreasing the various activity durations. When applied to the Stripped Schedule, the suggested changes will develop an Adjusted Schedule. Any such adjustments and their rationale shall be fully documented.

The Adjusted Schedule forms a highly optimistic schedule for the project.

Subsequent analyses of risk depend upon accurate schedule adjustments. Where possible, and especially in the case of significant adjustments, the MTAC should strive for consensus of the FRA, MTAC, and Sponsor in such adjustments before moving forward with the schedule risk evaluation.

4.6.6 Schedule Risk Assessment

Summary Schedule Development

To aid in efficient and effective attribution of risk, the MTAC shall review, or independently develop, a summary schedule based upon the Adjusted Schedule that will be used for modeling project schedule risk. The summary schedule shall be a mechanically-correct critical-path method schedule that adequately reflects the interrelationships among its activities so as to model the effect of a variation in any activity upon the other activities. The number of activities modeled should be commensurate with the Adjusted Schedule and level of detail available at the time of analysis; very large models are, however, generally difficult to assess and the principles underlying risk attribution may be difficult for all audiences to understand. Therefore, the MTAC shall review, or independently establish, a summary schedule for risk assessment purposes which, in its professional judgment, strikes a reasonable balance between transparency and level of detail required for sufficient risk assessment.

Schedule Activity Risk Assessment

Duration ranges for the activities of the Summary Schedule shall be established through a process of evaluating the specific project attributes (especially including those noted in the Risk Register); the reasonableness of these duration ranges shall be determined considering discussion with the Sponsor and the FRA. The Adjusted Schedule durations shall be used to establish the optimistic estimate for the summarized activity durations. The MTAC shall determine that appropriate technical experts have been consulted to establish the most likely and pessimistic estimates for the activity duration, or other parameters required for the stochastic analysis. The choice of probability functions or other technical parameters used in the analysis should be clearly documented. Methods used in the analysis should be made clear to all parties, in order that each may review, comment upon, and ultimately embrace the results of the schedule risk assessment.

The schedule activity risk assessment shall utilize a commercially-available project scheduling system that is capable of critical path scheduling and stochastic modeling for probabilistically-described activity durations. This system will be used for capturing and reporting activity risk duration ranges, as well as reporting the resulting project-level schedule risk assessment.

Project Level Schedule Risk Assessment

The likelihood of project completion within the timeframes estimated on Sponsor's master schedule shall be assessed using a commercially available scheduling software program capable of stochastic schedule risk modeling ("Monte Carlo" modeling). The schedule modeling shall successively and randomly develop alternate forecasted project completion dates, based upon the activity duration range input described above. Such modeling shall be undertaken by individuals fully capable of establishing modeling parameters and capable of interpreting the modeling results. This assessment shall include an evaluation of the predicted range of completion dates compared to the Sponsor's scheduled milestones; evaluation of assigned activity duration ranges, including statistical information such as range, median, mean, minimum and maximums; and identification of critical and near-critical paths and the relationship between those paths and identified risk events. The FRA

may direct other similar analyses.

The Project Schedule Risk Assessment shall consider whether non-construction activities, such as vehicle procurement, may introduce a relationship that creates a critical path that in turn masks critical paths for construction activities; in such case, it may be prudent to temporarily remove the non-construction activities and perform a separate analysis on the thus-altered schedule.

Based upon its findings, the MTAC shall assess the sufficiency of the Sponsor's base sequencing and schedule to adequately reflect the modeled interim and final milestone completion dates. The MTAC shall provide recommendations for adjustment to the Sponsor's schedule and Project Management Plan to reduce the risk of not meeting the project's schedule goals.

Conditioned Schedule - The MTAC shall evaluate the contingency amounts identified for the project and shall comment on the sufficiency of the contingency, establishing a recommended amount for the project in accordance with this MP. A Conditioned Schedule is developed when the recommended contingency is integrated with the Adjusted Schedule.

4.7 Risk Mitigation: Sponsor's Efforts

The MTAC shall review and make recommendations regarding Sponsor risk mitigation plans, as documented in its Risk and Contingency Management Plan—a part of the Project Management Plan. Areas of review and comment shall include the development and management of:

- Primary mitigation;
- Secondary mitigation; and
- Contingencies and contingency draw-down curves.

4.7.1 Risk Mitigation Recommendations

The review and recommendations shall be organized appropriately by Mitigation Structure (defined below), SCC, and Risk Type. Each mitigation recommendation shall include an indication of the Mitigation Type(s) (defined below) that best describe the mitigation recommendation.

Mitigation Structure

Mitigation structure refers to varying levels by which the Sponsor and its consultants and contractors may respond to the risk events identified through the review processes described above. This structure consists of three parts: Primary Mitigation, Secondary Mitigation, and Contingencies.

Primary Mitigation occurs throughout the various project phases and is the result of the planned actions of the Sponsor and its consultants and contractors as described in the Risk Management Plan portion of the Project Management Plan, as supplemented with the MTAC's recommendations resulting from this review. Such activities are scheduled at the earliest phase during which the mitigation activity may occur, and are expected to be completed on a timely basis to achieve the cost- and schedule-risk parameter targets at the end of that phase. Examples of mitigation might be completing design, or a geotechnical survey, etc.

Secondary Mitigation consists of pre-planned, potential scope or process changes that may be triggered when risk events occur that cause overuse of project contingencies. Example events that may incur secondary mitigation include construction bids that are significantly over the estimate, or unexpected geotechnical hazards that are encountered, etc., such that the change is likely to cause a significant over-budget condition. Such "triggered" mitigation enables the Sponsor to make cost reductions in a planned and orderly process and preserves contingencies for use later in the project. Secondary Mitigation is fundamentally different than value engineering, which is a formal, systematic, multi-disciplined process designed to optimize the value of each dollar spent.

Contingencies are set-aside estimated amounts (monetary set-asides for cost and time set-asides for schedule) that are included within the overall cost or schedule targets for the project. The amounts are to be used to overcome increases in cost or schedule that are due to potential risks, and for which no other mitigation measure is available. These contingency amounts may be associated with a particular activity or category of cost, or may be set aside in a general fund. In most cases, the amount of risk a project experiences reduces as the project progresses toward completion; similarly, it is expected that the amount of contingencies required for a project also decreases over time; however, at no time should the contingency be totally consumed until all project risk is removed—usually only at project completion or beyond.

Mitigation Types

The MTAC shall indicate whether the four Mitigation Types— Risk Avoidance, Risk Transfer, Risk Reduction, or Risk Acceptance—have been sufficiently considered in the Sponsor's list of proposed mitigation measures.

Risk Avoidance is available when a project element that is associated with certain potential risk events may be alternatively delivered through a less-risky process or design, or may be eliminated altogether.

Risk Transfer occurs when the mitigation and the consequences resulting from a risk event become the responsibility of a party other than the Sponsor; this may include a partial transfer (or risk sharing). Risk transfer measures involve sharing or transference to a third party such as a contractor, consultant, or other governmental organization in the form of contract requirements, warranties, or insurance policies, etc.. The recommendation may also be to reallocate scope in such a manner as to transfer risks to parties that are better suited to mitigate risk.

Risk Reduction is a planned action that will either reduce the consequence or the likelihood of a risk event. The root cause of the risk event, how the root cause or its consequences will be reduced by implementing the mitigation action, and who within the Sponsor organization or project team will carry out the mitigation should be included.

Risk Acceptance results from the recognition that further reduction of a particular risk would only come at the expense of the project's fundamental goals, such as unacceptable service loss or cost increase, etc. Risk acceptance may also be a preferred method to deal with those risks that are of a high level of impact yet low level of probability and that mitigating them would put undue financial

burden on the project. Risk Acceptance often involves the potential consumption of project cost or schedule contingencies, project schedule float, or an increase in either project estimate or schedule.

In its review, the MTAC shall recognize that there is a point in the implementation of the Sponsor's project ("break point") where non-contingency mitigation becomes increasingly difficult to effect and beyond which Risk Acceptance through the use of project contingency funds is the only effective means to treat project risk. This "break point" between risk reduction and risk acceptance typically occurs at the point where all construction has been procured, whether through Design-Bid-Build or Design-Build delivery methods. Prior to this "break point," secondary mitigation may be additionally available to preserve a minimum contingency balance that provides sufficient funds for the completion of the project.

4.7.2 Primary Risk Mitigation Recommendations

The MTAC shall review the Sponsor's Primary Risk Mitigation process and mitigation activities, and comment on the sufficiency of the list of prioritized cost and schedule risk mitigation measures within the Sponsor's Risk and Contingency Management Plan (RCMP), including scope, deliverables, outcomes, and recommended completion dates. These measures should include those management activities directly related to performance by the Sponsor as well as its consultants. This list will serve as a means to provide recommendations and to monitor the reduction of project cost risk. The RCMP should indicate progress-reporting intervals for tracking the performance of mitigation actions. All material assumptions shall be identified along with their rationales. The mitigation plans should develop priorities such that mitigation activities associated with high-risk project work elements are to be executed as early as possible to reduce the potential for loss.

Mitigation measures should include actions related to partial risk transference, especially those risks transferred through construction contracting, ensuring that risk remaining with the Sponsor is fully recognized and an effective risk response plan has been developed. The Sponsor's project delivery methods and contracting plans, including its proposed terms and conditions, should offer a comprehensive approach to ensuring that all costs due to risk transference are reflected in the project estimate.

Schedule risk mitigation recommendations should specifically treat both critical path and non-critical path activities. One role of schedule mitigation is to protect the critical path from non-critical path activities becoming critical themselves through two main objectives. The primary objective of schedule risk mitigation is keeping a necessary amount of path float between the project critical paths and all of the intersecting (or potentially intersecting) paths, i.e. to "buffer" the critical paths and thus preserve their stability. The secondary objective of schedule risk management is to keep significant risk (such as technical construction process risk) off of the project critical path, or minimize their schedule variance if critical path activities are involved. The general principle is that activities with high schedule risk should start and complete as soon as feasible.

4.7.3 Project Cost Contingency

The MTAC shall fully identify, describe, and analyze the adequacy of the Sponsor's cost contingencies. This analysis shall be developed in consideration of four models:

1) the generalized contingency level recommendations (described below);
2) a Cost Contingency Draw-down curve (described below);
3) a Sponsor-provided risk assessment model (if undertaken); and
4) a MTAC-developed risk assessment model.

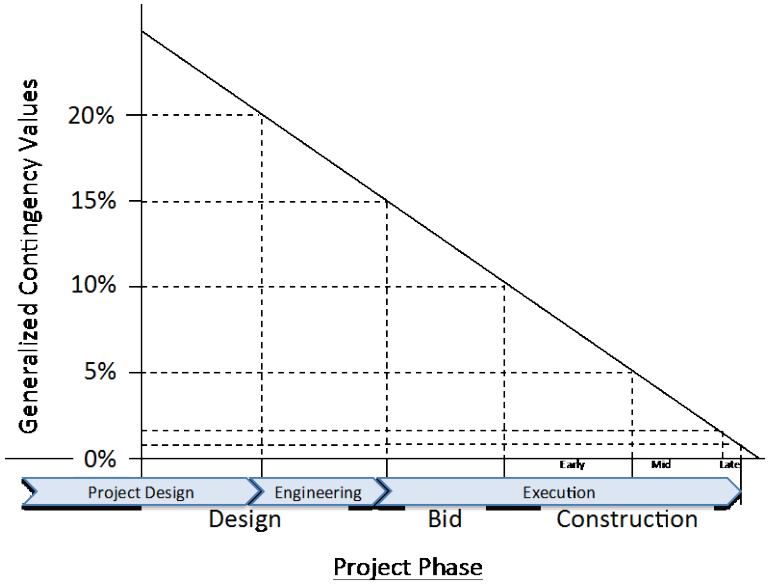
The MTAC shall use its professional judgment to evaluate the contingency requirements estimated by these four approaches, and shall establish an overall recommended minimum contingency level, as described below.

Generalized Contingency Levels

The FRA has determined, from historic project information, that the following minimum levels of contingency (the aggregate of allocated and unallocated cost contingency) are generally prudent:

Milestone	**Contingency**	The amount of contingency depends on many things. One of them is the comprehensiveness of the project cost estimate. Does the estimate include just what is on the drawings, or does it "fill in the blanks," and consider what is really needed for the complete job?
Completion of Planning and Concept Design	30-40%	
Completion of Preliminary Engineering (Assumes minimum 30% design completion (not 15%!))	20-30%	
Ready to Procure Construction	15-20%	
Start of Construction	10-15%	
At 50% Physically Complete for Construction	5-7%	

The above contingency recommendations may be interpolated at points of completion between the above milestones (see figure below).



The generalized contingency levels reflect historic risk undertaken through a design-bid-build delivery method. Where alternate delivery methods, especially design-build (DB), are used and where the DB contract has been bid and the bid price incorporated into the Adjusted Estimate, then Sponsor risk associated with design and procurement (Design and Market Risk Categories) will likely have been significantly transferred to the design-builder. An analysis of the actual contracting document is necessary to determine the extent of the risk transference and the resulting extent of reduced contingency requirements in this circumstance.

4.7.4 Cost Contingency Draw-down Curve

The MTAC shall review and make recommendations regarding adjustments to the Sponsor's Cost Contingency Draw-down Curve, and shall use its professional judgment to consider the currently-recommended contingency as well as a Forward Pass analysis (and Backward Pass analysis as appropriate) in development of its recommendations. The Cost Contingency Draw-down Curve shall indicate by phase, the recommended minimum contingency levels that most reasonably reflect the specific project conditions. These minimum levels should be indicated for each of the FRA milestones, including additional milestones as identified by the Sponsor and MTAC for points of time at which significant changes in risk may occur. These milestones and minimum contingency amounts define a cost contingency drawdown curve, indicating a minimum level of contingency that must remain in the project budget at any given point in time. This draw-down curve is used to protect from inappropriately early draw down of contingency funds.

Forward Pass Cost Contingency Analysis

The Cost Contingency Draw-down Curve is evaluated in consideration of a "forward pass" set of minimum recommended cost contingency values for each of the Project Milestones beyond that under current review and for additional points of significant changes of project risk, utilizing the Generalized Contingency Levels above.

Where the Sponsor or MTAC has identified additional milestone points, the MTAC shall use its judgment to establish forward-pass contingency recommendations, based on interpolated Generalized Contingency recommendations above.

In the case of multiple project phases that are staged at differing levels of development, or significant portions that exhibit differing risk profiles, a project contingency curve may be constructed as the addition of several contingency curves reflecting each significant project portion.

Backward Pass Cost Contingency Analysis

Projects, or portions of projects, may face extraordinary levels of risk during specific project points in time. In such case, the MTAC may establish a Cost Contingency Draw-down Curve in consideration of a "backward pass" set of recommended cost contingency values that represent the minimum amount of total cost contingency expected to be necessary at Project Milestones, which may be used to adjust forward pass contingency/milestone recommendations. The Backward Pass method considers estimates of minimum total cost contingencies based upon an assessment of the project status and project risk at the milestone under consideration. Items of high risk, especially

those identified with the Mitigation Type of "Risk Acceptance", shall be specifically reviewed when performing the backward pass analysis.

This process begins by considering the final stages of the project (say 95% complete) and determining how large of a contingency fund should remain in the project budget to solve potential risk-laden events. This amount—often established through the judgment of project experts—becomes the minimum amount of contingency that should be maintained at that point. The next step is to consider another point in time when the project is less complete (say at 75% completion) and to similarly determine the size of contingency fund that should remain available until the next milestone. This process is completed—moving stage by stage toward the beginning of the project—until the current phase is reached.

The following considerations shall be made in development of the backward pass contingency values:

- At the Revenue Operations Date (ROD), the demand for total cost contingency has been reduced to a minimum requirement for scope changes or clarifications and schedule delays or changes. The establishment of required contingency at this point should carefully consider conditions such as the Sponsor's experience and experience on other similar FRA projects to identify an amount sufficient to close out punch list work, additional work orders, etc. The working target for this point is generally 1-3% total contingency, including 0-1% for schedule delay costs and the remainder for other costs;
- At the point that the project construction procurement is "substantially complete" (90-100% bid for either Design-Bid-Build or 90-100% subcontracted for alternative project delivery methods), the project is exposed to cost changes in the range of 10% of project costs, which includes 4-6% to reflect schedule delays that at this point can average 20% of the construction phase duration;
- For any potential delay duration greater than 9 months, the contingency amounts shall assume 3 months each of demobilization and remobilization with a variable standby period in between.
- Consideration should be made to appropriately reflect contingency needs under design-build contracts, where the cost of the contracted design-build portion is accurately reflected in the Adjusted Estimate. In this circumstance, Sponsor contingency needs for Design and Market risks may be significantly reduced, and Sponsor contingency needs for Construction risks may also be significantly reduced, though to a lesser extent. A thorough analysis of the design-build contract is necessary to establish these amounts.

4.7.5 Secondary Cost Risk Mitigation Recommendations

The MTAC shall review the Sponsor's schedule of Secondary Risk Mitigation items, and comment whether such Secondary Mitigation results in sufficient protection for the project; evaluation of which shall include consideration of levels of risk reflected within the risk register, as well as any risk analyses available for the project. The schedule of Secondary Mitigation shall include the targeted magnitude of the cost or time savings expected, as well as a description of the scope, deliverables, and outcomes of the activity. The MTAC will also review and comment on scheduled progress-reporting intervals for Sponsor's tracking of the utilization and management of such mitigation capacities; as well as any integration with the Sponsor's overall program schedule and resource loading. All important assumptions shall be identified along with their rationales.

The Secondary Mitigation recommended amount in the Beta Range Model is calculated as the Secondary Mitigation Target, less the Conditioned Estimate. This target is developed using the Beta Range Model Workbook. The MTAC may, with the FRA's approval, modify this amount based upon overlapping Sponsor milestones, actual progress beyond a given phase, or other project-specific factors. It is noted that as a project progresses toward completion, it may become increasingly difficult to develop substantial amounts of Secondary Mitigation capacity, especially as the project construction is contracted. Early identification of Secondary Mitigation items helps to preserve their availability in later stages of the project. The MTAC shall carefully take into consideration the current status of design efficiency, the stage of project progression, and the effect that development of Secondary Mitigation may have on the project scope or the agreed level of service when making its opinion regarding Secondary Mitigation.

In the case of design-build contracting, Secondary Mitigation elements may be preserved by contractually causing the design-builder to provide for Secondary Mitigation design options in its work, subject to Sponsor's option.

4.7.6 Project Schedule Contingency Review

The MTAC shall fully identify, describe, and analyze the adequacy of the Sponsor's schedule contingencies. The MTAC shall make recommendations as to what minimum amounts of schedule contingency are recommended for inclusion in the Sponsor's Project Management Plan and supporting schedules.

Schedule Contingency Analysis and Recommendation

The MTAC shall evaluate the schedule contingency available within the Sponsor's schedule, and provide recommendations as appropriate. Such recommendation shall be made in consideration of the following:

- The project should follow the general guideline that sufficient schedule contingency is available at the completion of preliminary engineering to absorb a project schedule delay equivalent to 25% of the duration from start of final design through the Revenue Service Date, calculated by adding the schedule contingency to the Adjusted Schedule;
- Any available schedule risk assessment histogram indicates a confidence level of at least 65% of reaching the proposed Revenue Service Date (RSD); and
- The general assessment of risk is not in conflict with the risk contingency requirements established in development of the Schedule Contingency Draw-down Curve, below.

Schedule Contingency Draw-down Curve

The Sponsor shall develop a forecasted amount of minimum total schedule contingency to be available for the project at the current and each future major milestone; the MTAC shall review this analysis and comment and make recommendations about its sufficiency. Premature use of significant amounts of schedule contingency reduces the ability of the project to withstand schedule change. These minimum levels should be indicated for each of the FRA milestones, including additional milestones as identified by the Sponsor and MTAC for points of time at which significant changes in risk may occur. These milestones and minimum schedule contingency amounts define a

schedule contingency drawdown curve indicating a minimum level of contingency that must remain in the project schedule at any given point in time. This draw-down curve is used to protect from inappropriately early draw down of schedule contingency durations.

The Schedule Contingency Draw-down curve shall be evaluated by sequentially "stepping back" through various completion milestones for the project and estimating the minimum amount of schedule contingency required to complete the project on schedule from that point forward, in consideration of risks identified in this MP. The MTAC shall evaluate this draw-down curve and comment on its appropriate allocation of risk over time, including recommendations for adjustment as appropriate.

4.8 Sponsor's Risk and Contingency Management Plan (RCMP)

The MTAC shall ensure that the Sponsor's RCMP considers all aspects of potential risk, including management capacity and capability, project performance, cost and schedule risk. A recommended structure for the Risk and Contingency Management Plan is included in Appendix G.

Upon FRA approval, the MTAC shall make available to the Sponsor the assessments and recommendations developed in this MP for inclusion in the Sponsor's Risk and Contingency Management Plan (RCMP), a section of the Project Management Plan. The MTAC shall work collaboratively with the Sponsor, as the Sponsor prepares and/or revises the Risk and Contingency Management Plan (RCMP) section of its Project Management Plan to reflect the recommendations and considerations provided by the MTAC.

4.9 MTAC's Monitoring of Sponsor's Risk and Contingency Management Plan

Post-assessment monitoring by the MTAC is intended to assess the Sponsor's performance in risk management and ensure that the Sponsor's project implementation achieves its risk management objectives and targets. The MTAC shall use the Sponsor's Risk and Contingency Management Plan (RCMP), which has been collaboratively amended with the MTAC's recommendations, as its guide for post-risk review monitoring.

Monitoring shall consist of evaluation and reporting of:

- The Sponsor's prosecution of the Primary Mitigation action items, including the effectiveness of the action to mitigate the potential risk event and the timeliness of the completion of the action item;
- The occurrence of risk events on the project, whether or not previously identified, and their estimated effect on the project's cost and schedule goals;
- The use of cost and/or schedule contingencies and whether such use threatens minimum levels of contingency required for future phases;
- Successful implementation of other major initiatives noted in the RCMP; and
- The effectiveness of the Sponsor's organization to fully manage its Risk and Contingency Management Plan.

Appendix B (A is not used)
Sponsor's Submittals

In advance of performing the review, the MTAC should obtain and study the following, as appropriate for the particular project phase and level of review required. Many of these documents will have been obtained through the review of scope, schedule, cost, and Sponsor management capacity and capability in other MPs. The MTAC should perform an initial review and notify the FRA of important discrepancies in the project information that would hinder the review; an example would be insufficient detail or a mismatch between drawings and cost estimate in which the drawings are current and the cost estimate is significantly older.

Programmatic

Alternatives Analysis Final Report
State Rail Plan includes the project for PE, Final Design, and Construction phases
Environmental documents and NEPA determination

Agreements

FRA Grant Agreement/Cooperative Agreement
Service Outcome Agreement
Agreements with other third parties

Project Management Plan and sub-plans (refer to MP 20)

Scope / Project Definition

Basis of Design Reports, Design Criteria Reports
Project Plans, Drawings, and Specifications
Master Permitting Plan and Schedule
Geotechnical Baseline Report
Vehicle specifications /design documentation
Capacity and Operations Modeling; Operating Plan
Documentation of changes to scope that have occurred since last FRA review

Schedule

Project schedule in original and SCC format
Schedule narrative describing critical path, expected durations, and logic

Cost Estimate

Capital cost estimate in original and SCC format
Capital cost estimate backup documentation
Capital cost estimating methodology memo
Summary of O&M Cost Assumptions/Productivities
Before and After Study Documentation

Interface with the Sponsor prior to and during the risk review facilitates the process and provides the MTAC with project background information necessary to identify new risk events or amendments to the existing Sponsor Risk Register.

Through a two to five-day kickoff meeting with the Sponsor, the MTAC focuses on significant MTCC, schedule, scope, and cost risk drivers. Prior to this meeting, the MTAC team is provided with a tour of the alignment, including station and support facility locations. During the meeting, the MTAC assesses the level of project completion and familiarity of the Sponsor with the risk review process to determine whether adjustment to the following suggested structure is appropriate:

Kickoff meeting:

- Introduce MTAC team and Sponsor team;
- Sponsor presents the project to MTAC team:
    - Agency organization, including project team and plan for staffing;
    - Description of work and reviews over the previous year;
    - Discussion of schedule, cost estimate, Sponsor's RCMP and risk register;
- Risk review of the project by discipline, organized by SCC;
    - Review the status of Sponsor's risks listed on its Risk Register; discuss/record additional risks, including qualitative characterization of likelihood and magnitude of cost and/or schedule impact for the identified risks;
- Summarize findings, conclusions, recommendations, questions, and enter into discussions with the Sponsor's project team to resolve open questions;
- Discuss actions required to facilitate the MTAC risk review; and
- Inform the Sponsor of next steps in the risk review process.

Follow-up meetings may be required to review specific issues discovered. As soon as possible after the kickoff, the MTAC should develop a risk analysis and risk review recommendations, and schedule the Risk Workshop:

This Risk Workshop should occur after MTAC team has reviewed the risk listing, has developed its cost and schedule risk assessments, and has developed recommendations regarding Sponsor's target budget, contingency and risk mitigation. Suggested workshop structure:

- Introduce MTAC team and Sponsor team;
- Describe the process used to review and establish quantitative risk recommendations;
- Summarize the key findings of the review and recommendations;
- Provide recommendations regarding risk mitigation options and alternatives including possible changes to scope, budget, schedule, project delivery method, construction methodology, and/or use of cost and schedule contingencies;
- Review detail of individual risks, as appropriate, regarding the method of quantification of risk and which risks strongly influence overall project risk;
- Review specific recommended mitigation measures and solicit completion dates;
- Discuss action items and next steps in the risk management and FRA review process.

APPENDIX D
Risk and Contingency Review Levels

The following generally depicts differences between MP40a and 40c. The FRA will determine in its sole discretion the level of risk and contingency review to apply to any project, and the level of review may change at any time during a project.

	Activity	MP 40a Sponsor-led	MP 40c Full
A	Review of management capacity and capability, scope, cost, schedule	Soonsor presents organization, scope, schedule, and estimate; MTAC reviews and comments	Perform full MTCC, scope, cost, schedule reviews. Generally 2-3 month process.
B	Review Sponsor's risk identification	Sponsor presents risk register; MTAC reviews and comments	Review, comment on, and provide amendments to sponsor's risk register
C	Review Sponsor's assessment	Review and comment on Sponsor's assessment	Review and comment on Sponsor's assessment process; contrast against MTAC risk assessment
D	Develop or refresh MTAC's Beta Range assessment and develop or refresh schedule risk model	No PMOC risk assessment required	Usually requires a separately scheduled risk workshop
E	Review Sponsor's risk response plans (primary mitigation)	Sponsor presents mitigation management; MTAC reviews and provides comment	Review, comment on, and provide amendments to Sponsor's primary mitigation plans
F	Review Sponsor's contingency and contingency management	Sponsor presents contingency planning; MTAC reviews and provides comment	Provide modeled contingency recommendations; compare to Sponsor's contingency. Review and comment on Sponsor's contingency management planning.
G	Review Sponsor's RCMP	Sponsor presents its RCMP; MTAC reviews and provides comments	Review and comment on Sponsor's PMP and RCMP Subplan. Focus on risk organization and levels of contingency authority

APPENDIX E
Example Risk Register

The following is provided only as an example of a risk register used for risk identification; the intention is to convey the basic content for a robust risk register. Other more detailed formats have been found useful in practice, depending on professional experience and project-specific requirements. The Risk Register developer is encouraged to obtain the most recent examples before establishing his or her own Risk Register format.

RISK REGISTER

Grantee:
Project:
Date:

1-Requirements
2-Design
3-Market
4-Construction

Rating	Low (1)	Med (2)	High (3)	Very High (4)	Significant (5)
Probability	<10%	10><50%	>50%	75%><90%	>90%
Cost	<$250K	$250K><$1M	$1M><$3M	$3M><$10M	>$10M
Schedule	<1 Mths	1><3 Mths	3><6 Mths	6><12 Mths	>12 Mths
Rankinig	<=3	3.1-9.49		>=9.5	

					Risk Ranking				
					Probability	Cost	Schedule	Risk Rating	
SCC	ID	Risk Cat.	Risk Description	Outcome	[P]	[C]	[S]	(P) X (C+S)/2	Mitigation Action
10.01	3	1-Requirements	Third parties may influence the alignment in an untimely manner.	Delay and cost.	2	1	0	1	Obtain municipal consent buy-in at 30% design.
10.01	5	1-Requirements	Delays may occur in reconfiguring Railroad connection project.	If Railroad connection is not completed in time, entire Agency project could be subject to indefinite delay.	3	2	5	10.5	Agency undertake design
10.01	6	1-Requirements	The drawings indicate that there are freight tracks close to the LRT guideway. Is clearance an issue at any of these locations? Is there the possibilty of crash walls or something similar required?	Could cause additional costs and studies involved with providing greater physical separation between light rail and freight rail lines.	3	4	0	6	Evaluate whether the current estimate reflects this scope for crash walls. May be an estimate reduction
20.01	43	1-Requirements	As all stations have center island platforms at grade, if a decision, for safety or operations reasons, is made to avoid pedestrian grade crossings, all stations will need tunnels or bridges along with multiple vertical circulation elements to replace them.	Much greater cost per station.	1	5	0	2.5	History indicates a very low probability
20.01	153	2-Design	Potential elevated pedestrian connection between park-and-ride and LRT station (814)		3	3	0	4.5	
30.02	55	1-Requirements	Failure to identify economical, environmental-suitable, and practical location for maintenance facility could cause excessive project costs.	Much higher costs, both for real estate acquisition and construction cost and for O&M costs when the project goes into operation.	1	3	0	1.5	Is currently under choice selection, among final 4 sites. Re-evaluate costs when a site is chosen.
40.01	61	1-Requirements	Balance of earthwork is unknown at this time, although it would appear that there may be more fill than cut. Lack of economical embankment material could be a problem.	Higher cost if material is hard to find.	4	4	3	14	Evaluate as an estimate adjustment. Figure out more during design.
40.02	62	1-Requirements	Since a number of the "tunnels" are only shallow cut & cover grade separations under existing streets (where the utilities are usually buried), there are likely to be utility issues to be dealt with.	Costly relocations of utilities. Short construction season may require expedited advance utiliy relocation packages to avoid delaying project.	2	3	0	3	Perform utility location studies during early PE
60.01	139	1-Requirements	Potential impact to loading dock access of existing commercial building (124)		5	4	0	10	Evaluate for estimate adjustment

APPENDIX F
Beta Range Factor Guidelines

The following guidelines apply for cumulative Beta Range Factors (BRFs). Note that:

1) the following BRF amounts are the sum of the individual risk category factors;

2) failure to remove a category of risk at a given phase indicates that some amount of that risk survives to the next phase—for example, Design Risk may exist during the construction phase if a design decision has been delayed; and

3) the cumulative factors here represent a range of observed risk across many transportation projects and therefore increases to the suggested BRFs should only occur where exceptional risks are involved, beyond what would be expected by a "normal" project. The MTAC shall appropriately suggest BRFs, depending upon the complexity of and risk inherent in the element under analysis.

SCC10 through 50:

- A BRF above 2.50 implies uncertainty associated with the completion of the alternatives analysis process; after completion of alternatives analysis, some level of Requirements Risk remains;
- A BRF between 2.50 and 2.25 implies reduction of remaining Requirements Risk, and increasing mitigation of Design Risk. The fundamental premise is that risk reduction, and hence BRF reduction, proceeds rapidly through the design phase. As design proceeds into final design, risk is reduced, yielding a net BRF of 2.00. At completion of final design, design risk should virtually be eliminated, yielding a BRF at completion of final design of 1.75;
- A BRF between 1.75 and 1.50 recognizes the existence and reduction of Market Risk (bid risks; uncertainties associated with reliable information on market conditions, short of a project specific firm price, etc.);
- A BRF between 1.50 and 1.35 generally recognizes uncertainties related to construction associated with geotechnical/utility, other underground, or other construction activities occurring during the first 20% of construction "Early Construction").
- A BRF of 1.25 indicates reduction of risk to the level of 50% of construction;
- A BRF between 1.25 and 1.05 indicates uncertainty associated with late construction activities, including activities through start-up and substantial completion.
- A BRF of 1.05 implies that no unresolved risk events are identified for this item and only unknown risk events remains.

SCC10 through 40:

- Where exceptional geotechnical conditions exist, especially deep excavations and/or tunneling, the MTAC shall provide a separate analysis and explanation of the BRFs that apply to the corresponding estimate elements. Such BRFs may significantly exceed standard BRFs.

The standard BRFs are presented in Table 1 and Figure 1 in this appendix. Note that at any given point in a project, BRFs for the SCC elements may be comprised of cumulative factors of risk from any or all of the categories shown.

Table 1 – SCC 10-50 Beta Range Factors by Risk Category

Risk Category	Risk Category Factor	Construction Risk Sub-Factor
Requirements Risk	Evaluated on a case-by-case basis	
Design Risk in Preliminary Engineering	0.35	
Design Risk in Final Design	0.25	
Market Risk	0.25	
Construction Risk	0.45	
Early Construction		0.25
Mid Construction		0.15
Late Construction		0.05
Post Construction	0.05	

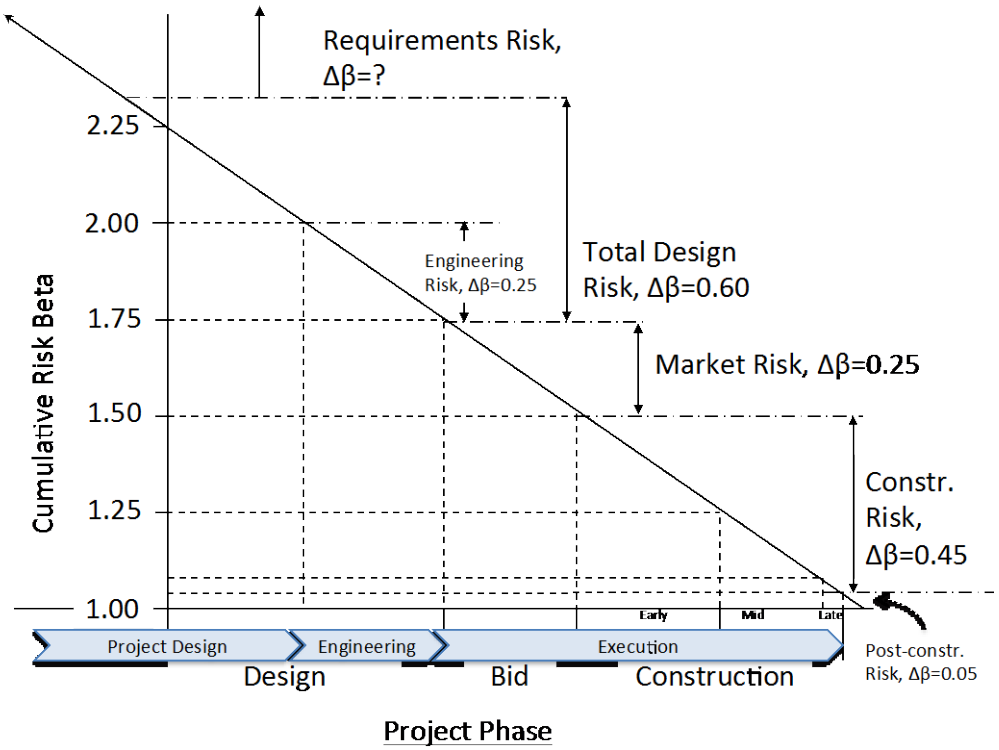


Figure 1 – SCC 10-50 Beta Risk Factors by Level of Development

SCC60 through 80:

SCCs 60 through 80 represent project elements that are not traditional construction elements. As such, the risk categories shall be interpreted as follows:

- Requirements risk is similar to that defined above, wherein it is related to uncertainty of environmental conditions, uncertainty of third party requirements or regulations, or uncertainty of project goals;
- Design risk is related to the sufficiency and potential error of development of plans for execution of the element. For example, for SCC80, this may relate to the development of staffing plans for project management staffing;
- Market risk is similar to that defined above. It is related to the potential variance in price for acquisition of the property, equipment, or staffing necessary to complete the element; and
- Construction risk relates to the actual act of completing the element itself, including any variances that result from conditions only evident at the time of acquisition of property or equipment, or at the time of execution of management or technical activities, such as design or construction management.

SCC60:

- Risk for Right-of-Way tends to survive later in time and suffer higher risk than for those items in SCC 10 through 50 due to large uncertainties and delayed resolution of ROW acquisition; therefore cumulative BRFs are generally estimated larger than that of SCCs 10 through 50 until ROW acquisition is substantially complete. See Figure 2.

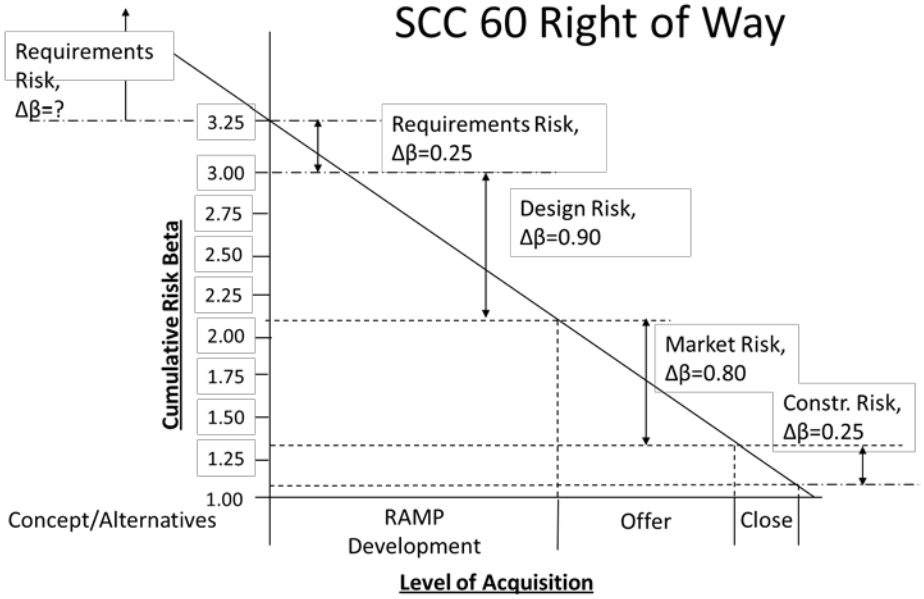


Figure 2 - SCC 60 Beta Range Factors by Level of Development

SCC70:

- Risk for vehicles tends to be removed more quickly in time than for those items in SCC 10 through 50 due to reduced design uncertainties and early vehicle purchasing; therefore cumulative BRFs are generally less than that of SCCs 10 through 50 during early phases of the project. See Figure 3.

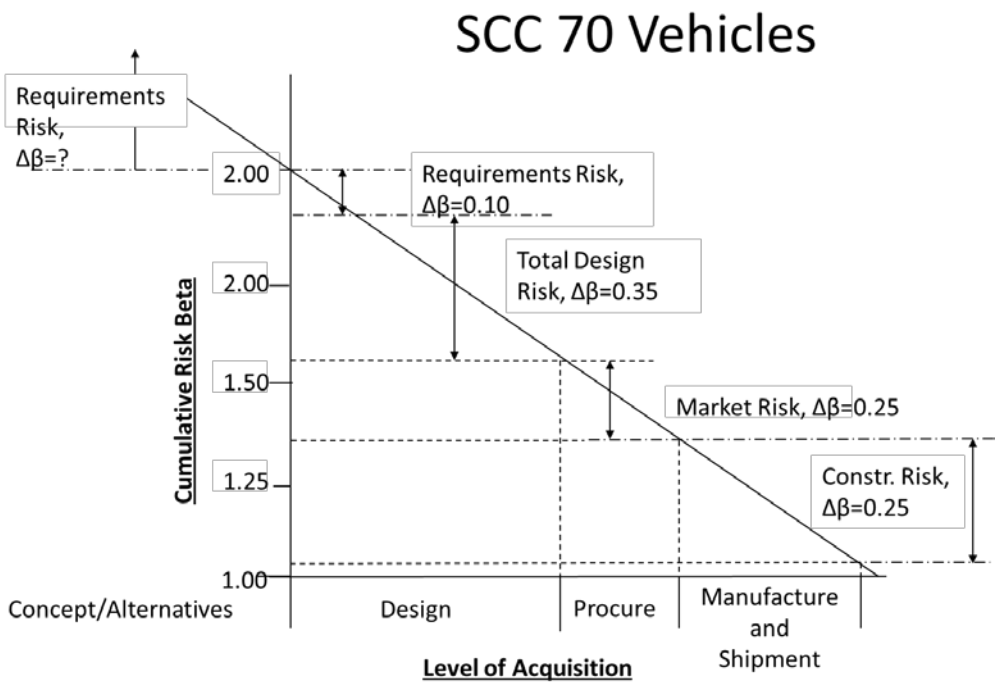


Figure 3 - SCC 70 Beta Range Factors by Level of Development

SCC80:

- Risk for each minor SCC for professional services is highly dependent upon the phase in which it is performed. For professional services, the cumulative BRFs should be mostly drawn down at the point at which the category of services has been largely completed. BRFs for other services (i.e., insurance, etc.) in this category shall be estimated in consideration of the commensurate risk factors. See Figure 4 for standard BRF values for professional services.

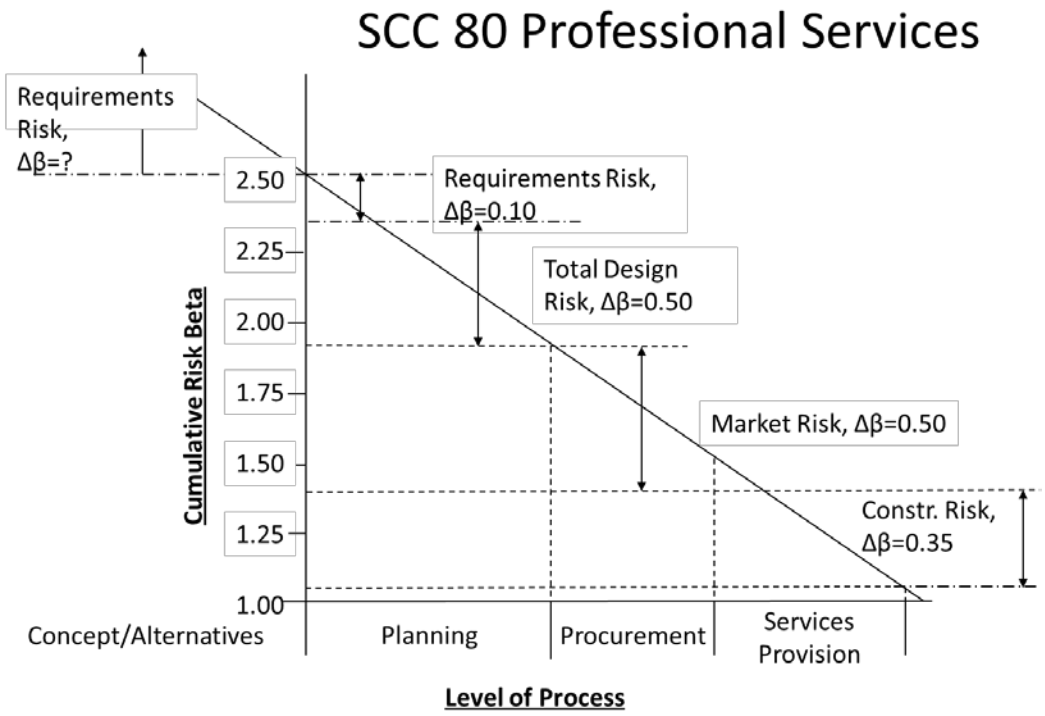


Figure 4 - SCC 80 Beta Range Factors by Level of Development

Risk and Contingency Management Plan (RCMP) Structure

Note: the following narrative for potential structure of the RCMP contains elements or details that may not be appropriate for all phases of the project. For example, early in the design phase, some details may be undeveloped and only broad characterization of project elements or risk management plans may be available. The MTAC's review of the Sponsor's RCMP should appropriately consider the phase of the project development, and the MTAC should adjust its review accordingly.

The Risk and Contingency Management Plan (RCMP) is a subplan of the Sponsor's Project Management Plan (PMP); its successful implementation depends upon a fully updated and active PMP. It is the purpose of the RCMP to highlight specific areas of management focus as identified through the risk evaluation process, which should be implemented along with Sponsor's normal project operations as described elsewhere within the PMP. Further, the RCMP provides a means for monitoring Sponsor's progress as it moves the project forward to its next phase. These areas of management focus may include actions to strengthen management capacity and capability, project performance, cost and schedule analyses, mitigations of identified project risks, and others.

Information contained within the RCMP should complement and not be in conflict with information contained elsewhere within the PMP or in other FRA guidance documents. Such areas of concordance should include, for example, the project estimate and schedule, and FRA's completion criteria for planning, preliminary engineering, or final design.

Successful implementation of the RCMP is important to the goals of both the Sponsor and the FRA, and monitoring of the RCMP implementation will be undertaken by both the Sponsor and the FRA (through the MTAC). It is important, therefore, that the FRA, MTAC, and Sponsor work collaboratively and develop agreement on the substance of the RCMP.

A potential structure for the RCMP follows:

Overview

This section should indicate that the RCMP is a subplan of the over-arching PMP, including an indication of the latest version of the PMP upon which the RCMP is based. If the RCMP depends specifically on other sections of the PMP, those sections should be noted, including an indication of their latest versions.

A brief description of the important, actionable findings of the RCMP should be included in the overview. If further actions are required to finalize the current draft of the RCMP, those should also be indicated along with expected completion dates.

A brief summarization of topics covered within the RCMP should be included, including such topics as:

Primary Mitigation, organized by significant project activities, such as:
- Management Capacity and Capability
- Project Scoping and Design;
- Delivery Methods and Contracting;
- Construction Process;
- Project Tracking, including:
    - Cost Estimating, Financing and Financial Management; and
    - Project Schedule Management.

Insurance:
- Professional services, construction phase, wrap-up, or other specialized insurances purchased for reduction of risk exposure.

Contingency Management:
- Cost Contingency Management Plan; and
- Schedule Contingency Management Plan.

Secondary Mitigation:
- Establishment of Secondary Mitigation actions and cost targets which may trigger the implementation of Secondary Mitigation.

Risk Management:
- Risk management and mitigation monitoring, change identification, and management controls.

Goals and Objectives

The major goals of the RCMP should be stated, including establishment of measures to complete the project within budget and on schedule, implementation of project cost and time contingency procedures, risk mitigation, and development of available risk mitigation capacity.

Broad goals expected to be accomplished prior to the next stage of RCMP revision (including revisions required at FRA milestones) should be noted. For example, for a project in preliminary engineering or final design, such goals may include (similar, phase-appropriate goals would apply to other project phases):
- Adherence to environmental requirements, such as the National Environmental Policy Act (“NEPA”) requirements;
- Mitigation of design risks where possible, or appropriate transfer of such risks;
- Mitigation of other identified risk events;
- Reasoned analysis and assessment of likely market risks to be encountered;
- Cost and schedule risk mitigation capacity developed and implemented as needed, including targets to be achieved during the current phase and forecasted cost and schedule risk management mitigation capacity for subsequent phases;

- Uncertainty in cost estimates and forecasts and project schedules, including tracking mechanisms to identify trends in known costs and risk reduction; and
- Maintenance of minimum cost contingency and schedule contingency targets.

A description of each goal and associated metrics should be set forth in the RCMP; the level of success should be measured using the metrics in project evaluation.

The RCMP should note that the Sponsor and its local and state partners understand that the plan was developed with FRA's concurrence (if it is so), that implementation of the RCMP is an important consideration in further FRA approvals, and that the RCMP describes processes and requirements that must be adhered to, in addition to current FRA grant contracts and related FRA regulations, guidance, and instructions.

Risk Review Process:

This section should include a description of procedures used to develop the Risk and Contingency Management Plan, including procedures for development of risk identification, risk assessment, risk response recommendations, risk protection measures (including Secondary Mitigation and minimum contingencies) and risk management and control.

[Note: In the following sections, the Sponsor should provide an outline of its strategic, performance-based project management activities to identify, assess and respond to the project risks. It is the intent of the following to view risk management as a process of continual risk reduction; i.e., while the mitigation of any specific identified risk is an important activity, the identification, addition and mitigation of newly-discovered risks forms a process that provides both the Sponsor and the FRA (through its MTAC) with the means and methods to best ensure satisfactory outcomes for the project. The goal of the RCMP is to provide a plan to take the Sponsor through the upcoming phase, and prepare it for subsequent phases, with:

- *Cost estimates and forecasts and project schedules continuing to be developed as planned;*
- *Reasoned analysis and assessment of likely upcoming risks, including risks associated with Sponsor's management capacity;*
- *Mitigation of risks at the earliest possible time;*
- *Completion of all mitigation actions scheduled for the upcoming phase;*
- *Cost and schedule risk mitigation capacity developed, implemented as needed, and targets achieved; and*
- *Minimum cost and schedule contingency targets continuing to be achieved.]*

Insurance

This section should summarize current or future major insurances provided to the project to respond to identified risk, including unusual, highly likely, or high exposure risk identified through the risk review process. Such insurances may include professional services, builder's risk, wrap-up, or other specialized insurances purchased for reduction of risk exposure. Detailed insurance information should be included as an appendix to the RCMP or reflected elsewhere in the PMP.

Primary Mitigation

The primary mitigation section should include the process used to develop the Risk Register, which outlines risks and mitigations that require Sponsor managerial, administrative, and technical action. The section should be organized as follows; each area below should include a brief summary of key risks and action items as of the date of the latest RCMP update. A detailed listing of all identified risks and proposed mitigations should be included as a separate report, or attached as an appendix, as further indicated below; this separate report should be updated at the frequency noted in the RCMP.

Management Capacity:

The RCMP should summarize key management capacity risks identified in the Risk Register. A plan should be indicated for additional resource commitments, additional requirements for methods and resources, and improved management strategies to address the findings of risk. Management strategies should include specific plans or products, project control, responsibilities, authorities, and measures of performance.

Detailed risk issues related to Management Capacity should be specifically cited in an appendix, and should be noted as *Management Capacity Risks and Mitigations*. This list should include proposed mitigation activities, responsibility for action and targeted date for completion.

Project Scoping and Design:

Requirements: A summary of key requirements risks and proposed mitigations should be discussed in the body of the report to provide a succinct overview of the outstanding risk mitigation work to be accomplished. In addition, all outstanding project requirements risks, including undefined project goals, third party requirements, and environmental considerations should be listed in an appendix, indicated as *Requirements Risks and Mitigations*. Such activities should also include risk associated with all compliance of NEPA activities consistent with the NEPA Final Determination; and public and governmental reviews and critiques.

Design: A summary of important design risks and proposed mitigations should be discussed in the body of the report to provide a succinct overview of the outstanding design risk mitigation work to be accomplished. In addition, all design activities indicated in the risk review as potential risk events, including activities associated with unproven project technologies, unresolved alternate design approaches, late design, and others should be listed in an appendix, indicated as *Design Risks and Mitigations*. As appropriate, statements of subconsultant responsibilities for risk mitigation should be included.

Where value engineering efforts have been or will be undertaken, a summarized discussion of the effect on project risk should be discussed, including plans for closure of the value engineering process. Detailed value engineering items should be referenced elsewhere in the PMP, or included in an appendix.

Delivery Methods and Contracting:

The purpose of this section is to illustrate the Sponsor's plans for efficient risk allocation through choice of delivery method and through contractual risk allocation; such risks so considered should include common design, market, and construction risks as well as those risks identified in the risk review. All contracts should be considered, including design, vendor, and construction contracts. The Sponsor should discuss the following:

- Strategies for contractual risk allocation or risk sharing through explicit contract language, ordinary custom/commercial/trade practices, or statutory authority such as the Uniform Commercial Code. The risk allocation plan should include allocations of future and prior contracted work, should complement other PMP sub-plans, such as the Project Delivery/Contract Package Plan and future individual contracts, the Real Estate Acquisition Management Plan ("RAMP"), and all NEPA-related documentation;
- The effect of the chosen strategy on market pricing for the various contracts;
- Assessment of the contracted party's capacity to efficiently mitigate its allocated project risk exposure, including market risk, such that the risk allocation represents the best value for the project; and
- Actions to implement the strategy.

Detail for the proposed allocation strategy should be referenced elsewhere in the PMP or should be included in an appendix. Individual risks identified in the risk review should be indicated as *Delivery Methods and Contracting Risks and Mitigations*.

Construction Process:

This section should demonstrate the Sponsor's plans for effective management of risk during the construction process. It should summarize the key construction phase risks identified in the risk review and plans to mitigate and respond to those risks. Special attention should be placed on those risks that have not been wholly transferred to a contracted party. In addition, all outstanding project construction risks identified in the risk review should be listed in an appendix, indicated as *Construction Risks and Mitigations.*

Project Tracking:

This section should discuss the tracking and forecasting of cost and schedule changes to enable measurement of potential increased cost or time due to project risk. Such increases may require actions, such as use of contingencies or may trigger the implementation of Secondary Mitigation. This section should complement and may reference other related sections of the PMP. Where the risk review has identified risks associated with project cost and time tracking, a detailed listing of all identified risks and proposed mitigations should be included in an appendix, indicated as *Project Tracking Risks and Mitigations*. The section should be organized as follows; each area below should include a brief summary of key risks and action items:

Cost Estimating and Forecasting: Discussion should include the process used for development and management of project cost and project cost uncertainty, including the effect of schedule risk uncertainty on cost risk results.

The following efforts for reduction of cost uncertainty should be indicated or referenced elsewhere in the PMP:

- Continuous administrative and management efforts for increased detailed development of the cost estimate;
- Internal quality control to ensure adequate technical provision of all estimating and forecasting work;
- Methods for adjustment of cost schedules in reaction to realized schedule risks.

Detailed cost and cost risk information should be referenced as available elsewhere in the PMP or made available in an appendix to the RCMP.

Project Schedule Management: Discussion should include the process used for development and management of project schedule forecasts and project schedule uncertainty, including any effect of cost risk uncertainty on the schedule risk results. Such external requirements as NEPA compliant related work and community involvement should be considered in the discussion of risk-related schedule management.

Plans to maintain schedule tracking should be discussed, including both design and construction schedules, to detect schedule deviation through techniques such as earned value. Such plans should indicate responsibility and frequency of reporting (usually monthly). Where appropriate, the RCMP should indicate efforts made to ensure that consultants and contractors comply with similar measures. Such tracking is important for the establishment of risk response actions, such as potential use of schedule contingency; this discussion shall rely upon and complement schedule control discussions contained within the scheduling section of the PMP.

Contingency Management

The purpose of this section is to discuss the Sponsor's plans for establishment and management of cost and schedule contingency protections. The section should be organized as follows:

Cost Contingency Management Plan:

- Results of cost contingency recommendations developed, including minimum contingency hold points by milestone and reflected in a minimum cost contingency draw-down curve;
- Sponsor plans to reach substantial conformance with the contingency recommendations on a timely basis;
- Procedures in place to implement and maintain throughout the project, a Cost Contingency Management Plan as an identifiable element in the RCMP, including authorities and procedures for distribution, transfer and use of all cost contingency in conformance with the requirements of this plan and sufficient documentation as each transfer occurs. This Cost Contingency

Management Plan should also describe the manner in which the Sponsor will forecast and trend the project contingency; and

- Sponsor plans to recover in those cases where cost estimate forecasts indicate contingency levels have fallen below the minimum planned contingency hold points, including as necessary implementation of a formal Recovery Plan or adjustment of the expected project final cost with FRA approval.

Schedule Contingency Management Plan:

- Results of schedule contingency recommendations developed, including minimum contingency hold points by milestone and reflected in a minimum schedule contingency draw-down curve;
- Sponsor plans to reach substantial conformance with the contingency recommendations on a timely basis;
- Procedures in place to implement and maintain a Schedule Contingency Management Plan as an identifiable element in the RCMP, including authorities and procedures for distribution, transfer and use of all schedule contingency in conformance with the requirements of this plan and sufficient documentation as each transfer occurs. This Schedule Contingency Management Plan should also describe the manner in which the Sponsor will forecast and trend the project contingency; and
- Sponsor plans to recover in those cases where schedule estimate forecasts indicate contingency levels below the minimum planned contingency hold points, including as necessary a formal Recovery Plan or adjustment of the expected completion date for the project or appropriate milestones.

Secondary Mitigation

This section should discuss the Sponsor's plans for establishment and management of Secondary Mitigation protections. The section should discuss the following:

- Results of Secondary Mitigation recommendations developed and the process for reviewing and developing future items;
- A summary discussion of such Secondary Mitigation, including a brief description of a prioritized list of identified Secondary Mitigation items and the timing necessary for their implementation, especially including dates beyond which the items may no longer be effective;
- A discussion of those points of project completion at which Secondary Mitigation items are no longer available to be triggered for implementation; and
- Procedures in place to track such trigger points and to implement available Secondary Mitigation, including authority and responsibility for such actions.

If the project has progressed to a stage at which no available Secondary Mitigation has been identified, this condition should be discussed in the report.

Risk Management and Risk Mitigation

The Sponsor should describe its plans to implement, administer and maintain throughout the project, a Risk and Contingency Management plan for:

- Assessing (identifying and analyzing) project cost and schedule risk;
- Developing risk-handling options inclusive of primary risk mitigation;
- Developing a secondary mitigation plan to handle risk events or "triggered" mitigation activities;
- Monitoring risks to determine how risks have been handled or changed; and
- Documenting and reporting to the FRA the risk management program.

The risk management description should include such considerations as:

- Design control processes to detect potential consultant failure, such as scope, schedule, and budget "earned value" metrics;
- Clearly established Sponsor, consultant, and contractor responsibilities for risk management;
- 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 Sponsor and the FRA; and
- Plans and timing for systematically updating the RCMP.

Reporting should occur soon after conclusion of the risk workshops; timely reporting will facilitate Sponsor's early adoption of the recommended risk mitigation measures into its Project Management Plan.

In the conduct of this report, the MTAC shall use its professional judgment to identify and categorize, assess and evaluate the uncertainties in the Sponsor's project information, considering the project's administrative, management, political, legal, financial and physical conditions. The MTAC will document and report its professional opinions and its recommendations for responding to identified risk, including recommendations for mitigations including contingencies. Unless otherwise directed, the report will be sectioned as follows:

Title Page

Include disclaimer, below.

> **Disclaimer** *Insert:* This Monitoring and Technical Assistance Contractor (MTAC) report and all supporting reports and back-up materials contain the findings, conclusions, professional opinions and recommendations stemming from a risk-informed evaluation and assessment, prepared solely for the Federal Railroad Administration (FRA). This report should not be relied upon by any party, except FRA or the project Sponsor, in accordance with the purposes of the evaluation and assessment as described below. For projects funded through FRA's capital program, FRA and its MTACs use a risk-informed process to review and reflect upon a Sponsor's scope, schedule, and cost, and to analyze the Sponsor's project development and management. This process is iterative in nature. The results represent a "snapshot in time" for a particular project under the conditions known at that point. The evaluation or assessment and related results may subsequently change due to new information, changes in circumstances, additional project development, specific measures a Sponsor may take to mitigate risks, Sponsor's selection of strategies for project execution, etc.

Table of Contents

List of Figures and Tables

Executive Summary

The MTAC should provide an executive summary in three pages or less that includes the following:

1) Purpose
2) Project Description
3) Results and Recommendations - MTAC's professional opinion regarding:
   a) Contract packaging review and assessment, including construction work by railroads
   b) Total project cost, including statement of potential range of cost (lower reporting range, conditioned estimate and upper reporting range) and recommended cost contingency where a separate MTAC risk assessment has been performed;
   c) Project schedule and schedule contingency, including statement of separate MTAC findings where a MTAC assessment has been performed; and
   d) Top Risks, mitigations, and recommended actions.

APPENDIX H
MTAC's Risk Report Format

Project Background

Project descriptions and data shall be consistent with MP 25; also include description of project purpose; intended service and infrastructure improvements; railway relation to grade throughout the alignment; project delivery method.

Summary of Project Status from other MPs

Summary-level information from MP 21Sponsor Management Capacity and Capability, MP 32C Project Scope, MP 33 Project Estimate, and MP 34 Project Schedule reviews if performed. Specifically cite elements from prior reviews that help to reader to understand the issues presented later in the report.

Risk Identification

Provide a summary of the process used for identification of risks, and provide a narrative discussion of key risk events (categorized by SCC), including their potential impact on the project. Characterize the remaining elements of the Risk Register, which is to be attached as an appendix.

Risk Assessment

For projects with prior risk reviews, include comparisons of the currently-assessed project risk to the prior-assessed project risks and comment on the changes indicated.

Sponsor-developed Cost and/or Schedule Risk Assessments

Where the MTAC's review is based on a Sponsor-developed cost and/or schedule risk assessment, the purpose of this section is to present the Sponsor-developed risk assessment models, including a narrative and appropriate graphics that explain the primary findings from the project cost or schedule risk models.

MTAC Cost Risk Assessment

Where the cost risk review is based on an independent MTAC risk assessment, describe the methodology used to deliver the risk assessment products. Further, present any cost estimate adjustments and selection of cost range factors; especially discuss any factors that vary from standard recommendations. Provide a summary of key risks that influence MTAC's characterization of level of project risk by SCC. The MTAC shall present detailed data and analysis in a separate appendix as necessary in order to maintain readability of the report.

MTAC Schedule Risk Modeling

Where the schedule risk review is based on an independent MTAC risk assessment, describe the methodology used to deliver the risk assessment products. This section shall present the findings resulting from the schedule risk modeling, including development of the summary schedule activities, ranges for activity durations in the summary schedule, and characterization of specific risks that influence important schedule activities; characterization of the results of the schedule risk modeling, including confidence levels for achieving the Sponsor's Revenue Service Date target; the MTAC's professional opinion regarding the most likely schedule for Revenue Service Date; and MTAC's recommended actions.

Risk Mitigation
The purpose of this section is to present the MTAC's review and recommendation for any adjustment of risk mitigation efforts by the Sponsor. The MTAC's narrative should allow FRA management and the Sponsor to maintain focus upon these risk mitigation efforts as the means to maintain the baseline cost estimate and avoid potential cost escalation from these potential project risks.

The report should include separate subsections for Primary Mitigation, Secondary Mitigation and Contingency Recommendations.

Primary Mitigation Specific mitigation recommendations shall be presented, including appropriate timeframes for completion of the mitigation activity, especially focused on those mitigations considered necessary for successful advancement into the next project phase. Where an MTAC assessment has been performed, link the mitigation activity to the risk register and/or the assignment of exceptional risk factors. Such mitigation recommendations shall be segregated by SCC and Risk Category.

For projects with prior risk reviews, include discussions (as appropriate for project phase) of Sponsor's historic mitigation efforts by Risk Category.

Secondary Mitigation Provide recommendations for adjustments to amounts of Secondary Mitigation capacity developed by the Sponsor. Where the risk review has provided such, include suggested additional areas for potential Secondary Mitigation.

Contingency Provide a narrative indicating minimum recommended levels of both cost and schedule contingency, including a summary of the basis for development of the recommended minimums. Further, provide graphical or tabular representations of the Sponsor's contingency draw-down curves, including review comments and MTAC's recommendations for adjustment, if any.

Monitoring Plan Basis
Indicate a plan for testing the implementation and effectiveness of Sponsor mitigation measures on the project.

Conclusion
Appendices As required, include the following or other additional information:

Risk Register

Sponsor Data Characterization Provide a descriptive listing of documents used in this analysis, including a narrative characterization of their completeness and sufficiency as appropriate for the project phase during which this review was conducted.

Monitoring Procedure 49 - Financial Plan Review

1.0 PURPOSE

This Monitoring Procedure (MP) describes FRA requirements for the Monitoring and Technical Assistance Contractor (MTAC) when evaluating a Grantee's financial plan. The MTAC's evaluation will inform FRA's decisions regarding a Grantee's readiness to receive Federal funds for capital rail projects.

2.0 KEY PRINCIPLES

The financial plan timeframe is 5 + 20 -- five years of financial history for the Grantee's transportation agency and twenty years of projected costs and revenues for the proposed project, the agency's existing system, and its other planned projects. For this timeframe, the agency's financial health should be demonstrated by its ability to fund capital and operation and maintenance (O&M) costs, and by the supporting documentation for the assumptions behind projected costs and revenues.

The general content of the financial plan will remain the same throughout a project's life however the level of development of the plan will reflect the project development stage. Details will evolve as project scope, cost estimates, and funding strategies are defined, and fund sources transition from planned to budgeted to committed.

The cost and revenue forecasts in the financial plan are useful at many points in a project's life but are especially useful when the Grantee and stakeholders are deciding among alignments or projects in alternatives analysis.

Prior to initiation of final design, the Grantee is expected to have non-federal funds committed to complete project construction. Prior to initiation of construction, the Grantee is expected to have all funds committed for construction and to support operation, maintenance, and necessary recapitalization for the first twenty years of operation.

3.0 REQUIRED DOCUMENTS

The MTAC should obtain from the Grantee the financial plan, the project cost estimate and schedule, and if available, the market analysis, and regional economic condition study.

4.0 SCOPE OF WORK

The MTAC should evaluate the Grantee's financial plan to confirm the Grantee's capacity and capability to:

- undertake the project – to identify and obtain capital funding on a schedule that reflects the cash flow needs of the project schedule;

- meet the requirements for ongoing operations, management, and maintenance for the project and the agency as a whole for a 20-year period;
- identify, analyze, manage, and mitigate project risks to the finance plan.

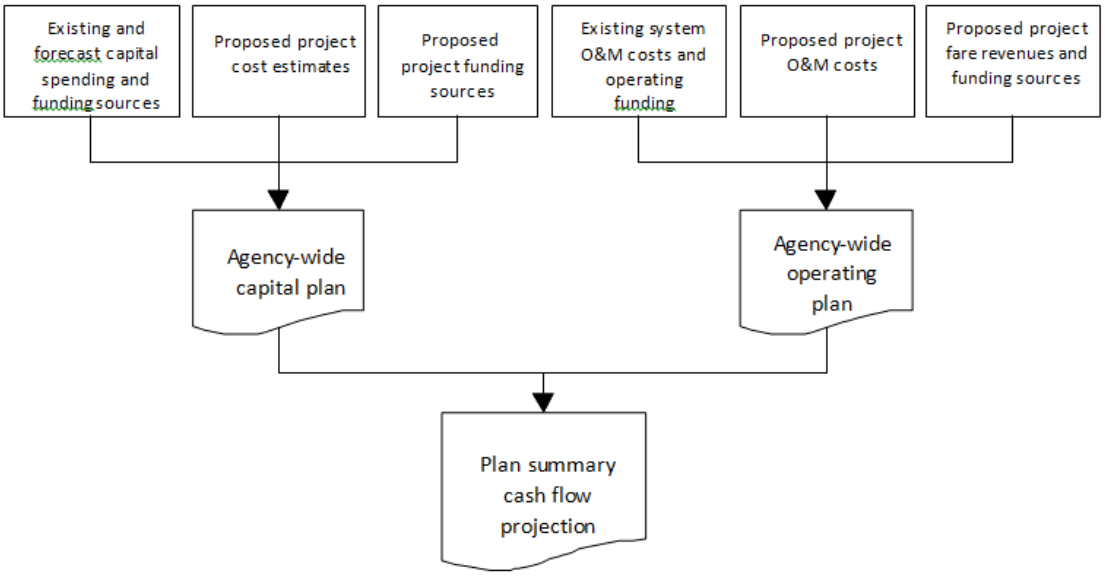
The MTAC will review revenue and expenditure projections including the assumptions described and any supporting documentation. If the MTAC determines that the Grantee's assumptions or its capacity to generate revenue is inadequate or weak, the MTAC should make recommendations for corrective action, along with a time frame for the action.

The MTAC will verify that the Grantee has completed and submitted the required documents on a timely basis. As the project progresses, the MTAC will ensure that the Grantee updates or modifies the information when necessary, typically annually. The updates should document significant changes in project costs or revenues, provide explanations for the changes, and describe the actions to address potential shortfalls.

4.1 Financial plan

The financial plan is constructed by bringing several elements together into an integrated model, as shown in Figure 1 below:

Figure 1: Components of a Financial Plan



The financial plan includes a 20-year cash flow projection covering both capital and operating revenues and expenses for the agency as a whole, as well as for the proposed project. The assumptions and inputs that support the cash flow projection include:

- Funding sources and revenue forecasts;
- Proposed project capital budget;

- Other planned capital projects; and
- Annual operating and maintenance (O&M) expenses for the project as well as the existing and future system.

The financial plan should conform to this outline:

1) Introduction
   a) Description of the Grantee and Funding Partners
   b) Description of the Project
   c) Summary of the Financial Plan

2) Capital Costs and Revenues
   a) Project Plan
   b) Agency-Wide Plan

3) Operating and Maintenance (O&M) Costs and Revenues
   a) Project Plan
   b) Agency-Wide Plan

4) Cash Flow Analysis
   a) Twenty-Year Cash Flow Projection
   b) Financial Evaluation

5) Appendix
   a) Summary of Market Analysis and Regional Economic Condition Study
   b) Summary of Financial Condition of the Grantee
   c) Summary of Fleet Management Plans if applicable

4.2 Capital Costs and Revenues

4.2.1 Project Capital Plan

This plan includes a high level of detail regarding the proposed sources and uses of funding for the planning, design, and construction, and start-up of the project. It demonstrates the Grantee's ability to manage capital costs, and identify, obtain, and manage capital funding for the 5 + 20 timeframe (five years of financial history for the Grantee's transportation agency and twenty years of projected costs and revenues.)

It documents the commitment level for each funding source, schedule for funding availability, financing arrangements, and cash flow to cover project costs for the activities in the project schedule. In project planning and design, the costs and revenues can be shown in annual increments. Before bidding for construction, costs and revenues should be shown in quarter-year increments.

Capital Cost Estimating and Scheduling:

The cost estimate at each project stage should be retained for historical record, and for the "Before and After" report (refer to MP 27 Before and After Study.) Refer to MP 34 Project Schedule and MP 33 Cost Estimating for information on the kind of schedule and cost estimate required for various project stages. Note however, that for all stages, the cost estimate should be expressed as a range (low, medium, high) of potential project cost, in Year of Expenditure (YOE) dollars, and include costs for the following:

- Construction, real estate, vehicles, third party and force account work
- When applicable, construction in the context of an operating railroad, including shutdowns, rerouting, overtime, and work acceleration
- Professional services for the various phases of development and construction
- Financing
- Inflation -- the incremental increase in the cost of goods and services over time
- Allocated and unallocated contingencies for risks and unknowns
    - Refer to MP 40 Risk and Contingency Review for more information. The Grantee is responsible for cost increases and for fulfilling the terms of the grant agreement with FRA. Reduced service, delayed construction, or reductions in project scope are not acceptable contingencies.

For all stages, a narrative should accompany the cost estimate to describe the estimating methodology for project elements or units, inflation, interest rate forecasts for borrowing and earning, and in-kind contributions.

Funding:

The project capital plan identifies the proposed sources of funds for designing and constructing the project and indicates the degree of commitment of each non-federal funding source. At the completion of planning, the financial plan must identify a "realistic" strategy for providing non-federal "matching" funds. As the project advances, the level of commitment of non-federal funds must increase. Prior to initiation of final design, the Grantee is expected to have non-federal funds committed to complete project construction. Prior to initiation of construction, the Grantee is expected to have all funds committed for construction and funds to support operation, maintenance, and necessary recapitalization for the first twenty years of operation.

As shown in Table 1 below, evidence of commitment may include legislative documentation, resolutions approving funding, account balances, a bonding prospectus and agency debt covenants, signed joint development agreements, or legally binding agreements by State and other agencies to commit funds.

Table 1: Sources of Capital Funds, Year of Expenditure Dollars (Millions)

Sources of Funds	Funding	Share	Attach Evidence of Commmitment
Federal (Federal Railroad Administration)	1,000,000	37.04%	NA
Other Federal funds	200,000	7.41%	Statute to show the project is eligible for funding with this source
Total Federal Funds	**1,200,000**	**44.44%**	
Sales Tax	500,000	18.52%	Legislation and Revenue Forecast
Bond Proceeds	1,000,000	37.04%	Debt Coverage Analysis and Rating
Total Non-Federal Funds	**1,500,000**	**55.56%**	
Total Project Budget	**2,700,000**	**100.00%**	

A narrative should accompany such a table to describe each fund source -- the name, origins, dollar amount anticipated, amount currently expended, and share of total project capital costs in year-of-expenditure dollars. The total dollar amount across funding sources should sum to the project's total capital cost.

Funding Source Forecasts:

For each funding source, the plan should indicate whether the source exists, such as an active regional or State tax from which revenues are currently collected, or a new source requiring legislative approval, referendum, or other governmental action. For existing sources, the plan should outline the conditions of the funding agreement (e.g., funding formula, percent share of total revenues, etc.) and at least five years of historical revenue data. For major funding sources to the project, the plan should include 10 years of historical revenue data. For new sources, the plan should indicate when legislative approval or public referendum is expected and the date the source will become effective. For all sources, the plan must include a 20-year revenue forecast. The forecast should be supported by documents from the fund source, highlighting sunset clauses, and provisions to cover project funding beyond the sunset date.

For all revenue projections, the financial plan should use conservative rates of growth that do not exceed historical experience for that source.

Borrowing, Debt Levels and Ratings:

If the plan includes debt, a debt proceeds and service plan should be included to show outstanding debt levels, the gross amount of each debt issuance, net proceeds from each issuance, bond rating for each issuance, debt service requirements, and interest rates. The period includes the past five years and 20 years into the future. On at least a yearly basis, the Grantee should monitor and update the debt information against the Grantee agency's most restrictive debt covenants, such as debt service ratio

requirements, outstanding debt ceiling, or limits on debt expenditures during a specific time period, and should include the most recent bonding prospectus as supporting documentation.

Ref. Table 7 below. Using the 5 + 20 timeframe, the project capital plan includes for each existing, planned, and proposed project, the project name, description, capital cost, schedule, and detailed breakdown of funding sources is included. A narrative should accompany the table that indicates for each fund source the level of commitment, schedule for availability, and financing arrangements.

4.2.2 Agency-Wide Capital Plan

Ref. Table 8 below. The above project capital plan is incorporated into the agency- wide capital plan. The major funding categories are summarized in a 20-year agency-wide capital plan projection.

A State-of-Good-Repair (SOGR) Plan:

A state-of good-repair plan is an in-depth agency-wide capital plan, focused on improving the condition of existing transportation facilities and systems and minimizing life-cycle costs. The SOGR plan requires a detailed inventory of all agency assets for their condition and setting of target levels of repair for assets. For existing assets, the goal is reduction of the backlog of assets requiring rehabilitation. For new assets, the SOGR goal is achievement of the optimal useful life, by identifying maintenance requirements at procurement or creation, and linking maintenance budgets to the intended level of service or performance. Projects are prioritized according to criteria such as:

- Consistency with SOGR goals;
- If left unimproved, the poor asset condition will threaten network efficiency, mobility, or economic growth;
- Contributes to the "level of aesthetic, innovation and user experience . . ." [1]
- Can be capitalized and supported with sustainable revenue for O&M;
- Improves system resiliency, ability to withstand disaster/climate change;
- Contributes to a multimodal transportation system;

Various scenarios of priorities, costs, and funding are then modeled, leading to the selection of a scenario for implementation.

4.3 Operating and Maintenance (O&M) Costs and Revenues

4.3.1 Project Operating Plan

The operating plan documents how the agency intends to fund the operations and maintenance of the proposed project while maintaining existing agency-wide levels of service. To demonstrate capability, this plan documents operating revenues and O&M costs in the 5 + 20 timeframe.

[1] Brunel Awards 2014, http://watford-group.org/catalogus_def_lowres.pdf

Prior to initiation of construction, the Grantee is expected to have all funds committed for construction and to support operation, maintenance, and necessary recapitalization for the first twenty years of operation.

Operating Revenues:

Ref. Table 9 below. The operation and maintenance of the proposed project is likely to place additional burden on the agency's funding sources. Transportation agencies usually need to develop new funding sources or have existing sources that provide sufficient extra operating revenues to fund the proposed project. The plan should show the agency's fare revenues from its existing system plus fare revenues forecasted for the proposed project. Fare revenues are based on ridership forecasts and assumed fare levels. The plan should include supporting documentation for the assumptions used to develop the forecasts. Inflation assumptions in revenue forecasts should be explicitly documented. The plan should also document the commitment of proposed funds to their intended purpose.

Operating Costs:

Ref. Table 10 below. The plan should show that it has the financial capacity to cover additional O&M costs for the proposed project without reducing existing service levels. Impacts from the project to the existing operations, revenues and O&M costs should be described. The plan should include supporting information on service characteristics such as projected vehicle revenue miles, vehicles in service, and directional route miles, frequency of service. A narrative should explain the cost estimating methodology (including operating and maintenance labor, fuel, supplies, administration, inflation assumptions, etc.), and the service plan (planned system-wide operating/service characteristics, and productivity assumptions) to demonstrate that revenues to cover the proposed project's O&M costs are not due to service reductions or deferred maintenance on the existing system.

4.3.2 Agency-Wide Operating Plan

Ref. Table 11 below. Using the 5 + 20 timeframe, the project operating revenues and O&M cost estimates are incorporated into the agency-wide operating plan. The operating plan demonstrates that adequate additional funds are available to operate and maintain the proposed project and the rest of the system. The operating plan calculates the additional cost to operate and maintain the proposed project and the availability of additional operating revenues to cover the additional cost.

TABLES 7 and 8

Table 7:	**PROPOSED PROJECT Capital Plan - Funding Sources, YOE Dollars (X000,000)**																									
			Actual	Actual	Actual	Actual	Actual	Budget																		
Fiscal Year			1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2007	2009	2010	2011	2013	2014	2015	2016	2017	2018	2019
Non-Federal Funds			**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**
	Net Bond Proceeds	250	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Investment Income	25	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Federal Funds			**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**
	FRA - ARRA	1250	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
	HUD - Sustainability	250	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Total		**1775**																									

Table 8:	**Agency-wide Capital Plan - Expenditures and Revenue, YOE Dollars (X000,000)**																									
			Actual	Actual	Actual	Actual	Actual	Budget																		
Fiscal Year			1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2007	2009	2010	2011	2013	2014	2015	2016	2017	2018	2019
Total Expenditures		**1863**	**76**	**76**	**76**	**76**	**76**	**76**	**78**	**78**	**78**	**78**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**	**73**
	PROPOSED PROJECT	1775	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
	Rail System Rehab	38	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Debt Service Costs	50	5	5	5	5	5	5	5	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Revenue		**1775**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**	**71**
	PROPOSED PROJECT	1775	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
Beginning Cash Balance			2900	2895	2890	2885	2880	2875	2870	2863	2856	2849	2842	2840	2838	2836	2834	2832	2830	2828	2826	2824	2822	2820	2818	2816	2814
Revenues less Expenditures			-5	-5	-5	-5	-5	-5	-7	-7	-7	-7	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Change to Cash Balance			**2895**	**2890**	**2885**	**2880**	**2875**	**2870**	**2863**	**2856**	**2849**	**2842**	**2840**	**2838**	**2836**	**2834**	**2832**	**2830**	**2828**	**2826**	**2824**	**2822**	**2820**	**2818**	**2816**	**2814**	**2812**

TABLES 9, 10, 11

Table 9:	**Agency-wide Ridership and Revenue, Current Dollars (X000,000)**																										
			Actual	Actual	Actual	Actual	Actual	Budget																			
Fiscal Year			1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2007	2009	2010	2011	2013	2014	2015	2016	2017	2018	2019
Ridership		**155**	**4**	**4**	**4**	**4**	**4**	**4**	**5**	**5**	**5**	**5**	**5**	**5**	**5.5**	**5.5**	**5.5**	**5.5**	**6**	**6**	**6**	**8**	**10**	**10**	**10**	**11**	**12**
	Existing System	130	4	4	4	4	4	4	5	5	5	5	5	5	5.5	5.5	5.5	5.5	6	6	6	6	6	6	6	6	6
	PROPOSED PROJECT	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	4	4	5	6
	Annual % Change			*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*25.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*10.00%*	*0.00%*	*0.00%*	*0.00%*	*9.09%*	*0.00%*	*0.00%*	*33.33%*	*25.00%*	*0.00%*	*0.00%*	*10.00%*	*9.09%*
Fare Revenue		**$175.0**	**$4.2**	**$4.2**	**$4.2**	**$4.2**	**$4.2**	**$4.2**	**$5.3**	**$5.3**	**$5.3**	**$5.3**	**$5.3**	**$5.3**	**$5.8**	**$5.8**	**$5.8**	**$5.8**	**$6.3**	**$6.3**	**$6.3**	**$10.0**	**$12.5**	**$12.5**	**$12.5**	**$13.8**	**$15.0**
	Existing System	$143.7	$4.2	$4.2	$4.2	$4.2	$4.2	$4.2	$5.3	$5.3	$5.3	$5.3	$5.3	$5.3	$5.8	$5.8	$5.8	$5.8	$6.3	$6.3	$6.3	$7.5	$7.5	$7.5	$7.5	$7.5	$7.5
	PROPOSED PROJECT	$31.3	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$2.5	$5.0	$5.0	$5.0	$6.3	$7.5
Average Fare			*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.05*	*$1.25*	*$1.25*	*$1.25*	*$1.25*	*$1.25*	*$1.25*
	Annual % Change			*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*19.05%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*

Table 10:	**Agency-wide Operating Costs, YOE Dollars (X000,000)**																										
			Actual	Actual	Actual	Actual	Actual	Budget																			
Fiscal Year			1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2007	2009	2010	2011	2013	2014	2015	2016	2017	2018	2019
Vehicle Revenue Miles (million)		**119**	**2**	**2**	**2**	**2**	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**4**	**4**	**4**	**4**	**4**	**5**	**5**	**7**	**9**	**10**	**10**	**11**	**12**
	Existing System	96	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	5	5	6	6	6	6	6	6
	PROPOSED PROJECT	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	4	4	5	6
O&M Expenses		**$242.0**	**$7.0**	**$7.0**	**$7.0**	**$7.0**	**$7.0**	**$7.0**	**$7.5**	**$7.5**	**$7.5**	**$7.5**	**$7.5**	**$7.5**	**$7.8**	**$7.0**	**$7.8**	**$7.8**	**$7.8**	**$7.9**	**$12.9**	**$16.0**	**$16.0**	**$16.0**	**$16.0**	**$16.0**	**$16.0**
	Existing System	$189.0	$7.0	$7.0	$7.0	$7.0	$7.0	$7.0	$7.5	$7.5	$7.5	$7.5	$7.5	$7.5	$7.8	$7.0	$7.8	$7.8	$7.8	$7.9	$7.9	$8.0	$8.0	$8.0	$8.0	$8.0	$8.0
	PROPOSED PROJECT	$53.0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.00	$8.0	$8.0	$8.0	$8.0	$8.0	$8.0
	Annual % Change			*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*7.14%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*4.00%*	*-10.26%*	*11.43%*	*0.00%*	*0.00%*	*1.28%*	*63.29%*	*24.03%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*

Table 11:	**Agency-wide Operating Plan, YOE Dollars (X000,000)**																										
			Actual	Actual	Actual	Actual	Actual	Budget																			
Fiscal Year			1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2007	2009	2010	2011	2013	2014	2015	2016	2017	2018	2019
Operating Revenue		**240.45**	**$6.7**	**$6.7**	**$6.7**	**$6.7**	**$6.7**	**$6.7**	**$7.8**	**$7.8**	**$7.8**	**$7.8**	**$7.8**	**$8.3**	**$8.8**	**$8.8**	**$8.8**	**$8.8**	**$9.3**	**$8.8**	**$8.8**	**$12.5**	**$15.0**	**$15.0**	**$15.0**	**$16.3**	**$17.5**
	Existing System Fares	$143.7	$4.2	$4.2	$4.2	$4.2	$4.2	$4.2	$5.3	$5.3	$5.3	$5.3	$5.3	$5.3	$5.8	$5.8	$5.8	$5.8	$6.3	$6.3	$6.3	$7.5	$7.5	$7.5	$7.5	$7.5	$7.5
	PROPOSED PROJECT	$31.3	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$2.5	$5.0	$5.0	$5.0	$6.3	$7.5
	Other revenue	$65.5	$2.5	$2.5	$2.5	$2.5	$2.5	$2.5	$2.5	$2.5	$2.5	$2.5	$2.5	$3.0	$3.0	$3.0	$3.0	$3.0	$3.0	$2.5	$2.5	$2.5	$2.5	$2.5	$2.5	$2.5	$2.5
O&M Expenses		**$242.0**	**$7.0**	**$7.0**	**$7.0**	**$7.0**	**$7.0**	**$7.0**	**$7.5**	**$7.5**	**$7.5**	**$7.5**	**$7.5**	**$7.5**	**$7.8**	**$7.0**	**$7.8**	**$7.8**	**$7.8**	**$7.9**	**$12.9**	**$16.0**	**$16.0**	**$16.0**	**$16.0**	**$16.0**	**$16.0**
	Existing System	$189.0	$7.0	$7.0	$7.0	$7.0	$7.0	$7.0	$7.5	$7.5	$7.5	$7.5	$7.5	$7.5	$7.8	$7.0	$7.8	$7.8	$7.8	$7.9	$7.9	$8.0	$8.0	$8.0	$8.0	$8.0	$8.0
	PROPOSED PROJECT	$53.0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.00	$8.0	$8.0	$8.0	$8.0	$8.0	$8.0
Balance from Existing Operations			$5.00	$4.70	$4.40	$4.10	$3.80	$3.50	$3.20	$3.45	$3.70	$3.95	$4.20	$4.45	$5.20	$6.18	$7.95	$8.93	$9.90	$11.40	$12.30	$8.20	$4.70	$3.70	$2.70	$1.70	$1.95
Revenues less Expenditures			-$0.30	-$0.30	-$0.30	-$0.30	-$0.30	-$0.30	$0.25	$0.25	$0.25	$0.25	$0.25	$0.75	$0.98	$1.78	$0.98	$0.98	$1.50	$0.90	-$4.10	-$3.50	-$1.00	-$1.00	-$1.00	$0.25	$1.50
Surplus or (Subsidy)			**$4.70**	**$4.40**	**$4.10**	**$3.80**	**$3.50**	**$3.20**	**$3.45**	**$3.70**	**$3.95**	**$4.20**	**$4.45**	**$5.20**	**$6.18**	**$7.95**	**$8.93**	**$9.90**	**$11.40**	**$12.30**	**$8.20**	**$4.70**	**$3.70**	**$2.70**	**$1.70**	**$1.95**	**$3.45**

4.4 Cash Flow Analysis

4.4.1 Twenty-Year Cash Flow Projection

The cash flow statement combines the results of the capital plan and the operating plan to summarize the year-by-year financial condition of the project sponsor throughout the 5 + 20 timeframe.

Cash flow analysis is a valuable tool for project planning. Its application permits project sponsors to develop and test funding strategies, test alternative assumptions, and conduct risk analysis as part of the agency's continuing financial planning activities. The cash flow statement includes at least five prior years of actual costs and revenues to provide a clear picture of the historical financial position of the agency and to substantiate the growth rates assumed in the 20 future years. The accompanying narrative should cite applicable legal provisions that allow or disallow the use of fund sources for various purposes. Cash flow statements are structured to reflects the agency's restrictions on operating and capital funds. Many agencies have restrictions on the use of cash balances such as debt retirement, contractual obligations, lease deposits, uninsured losses or reserve accounts for specific projects. If an agency is subject to any of these restrictions, balances in these restricted accounts are identified in the cash flow statement and not included as "available" cash.

By year, operating revenues and expenses are summed, as are capital revenues and expenses. The difference is the "cash balance" that carries over to the following year.

4.4.2 Financial Evaluation

The cash flow projection should demonstrate that the agency has adequate resources to complete the project as planned and continue to operate the existing service. Evidence of this financial capacity could be cash balances or debt service ratios. In general, cash balances should be sufficient to fund at least three months of operations. The bond market typically requires gross debt service ratios to exceed 150 percent, which means that revenues pledged to cover debt service must exceed 150 percent of annual debt service. Many agencies are subject to more stringent debt ratio requirements.

The cash flow projection is often evaluated to determine the sensitivity of an agency's financial health to changes in the assumptions underlying the financial plan. If small changes in the financial planning or economic assumptions, such as economic growth, ridership or interest rates, result in financial difficulties for the agency, the financial capacity of the agency may be questionable.

4.5 Appendix

4.5.1 Summary of Market Analysis and Regional Economic Condition Study

The market analysis and regional economic condition study underpin the revenue projections in the financial plan. Parties to the analysis and study may include FRA, States, MPOs, cities, counties, private entities, and NGOs.

The market analysis is based on a projected period of 20 to 50 years and the establishment of goals for the rail network and individual rail station cities. Goals may include the enhancement of multimodal connections to centers of employment, education and services; long term mobility and access benefits

for major population centers; long-term economic benefits; improvements in economic efficiency/reliability/productivity of land, capital, or labor; or enhanced opportunities for economically distressed areas, small and disadvantaged businesses, workforce training, or railroad sector employment.

In the market analysis, alternative network configurations and cities are evaluated against the goals. Conclusions are drawn and network configurations and station cities are agreed among the stakeholders; strategies are recommended to foster growth in some sectors of selected cities, and plans for implementation are set forth, with associated funding sources identified. As part of the implementation plan for each city, station areas may be defined, and appropriate mechanisms for revenue generation/value capture may be identified for each station area.

In the regional economic condition study, historical data and forecasts of economic and demographic changes are developed to substantiate the reasonableness of revenue and cost estimates associated with the proposed project – the project that evolved as a segment of the selected network configuration. These forecasts provide a check on growth rate assumptions for the project's ridership, tax revenues, regional inflation and other key variables. Forecasts from independent institutions, such as universities, state agencies and private forecasting firms, are preferred sources of these data. These forecasts include:

- Population and employment growth estimates;
- Inflation and interest rate forecasts consistent with assumption in cash flow projections;
- Economic and land development projections; and
- The regional demographic or business trends to support 20-year revenue forecasts.

The forecasts should be portrayed in a table that includes, at a minimum, population, employment, personal income and inflation forecasts 20 years into the future, supported by current regional economic forecast reports.

4.5.2 Summary of Financial Condition of the Grantee

Documentation of the financial condition of the Grantee agency and other non-federal financial partners should be summarized. The documentation should include three years of audited financial statements, cash account balances, bond or liquidity test ratios, debt ratings and reports by debt rating agencies, the historical reaction to unexpected financial conditions, the extent of the ongoing capital rehabilitation and replacement program, and the condition of the agency's existing asset base (including age of fleet, track and agency's replacement rate.) In addition if applicable, evidence of the timely match, obligation, and draw-down of FRA funding over the past five to 10 years should be provided. The summary of the financial condition of the Grantee and major funding partners is substantiated and referenced to other reports and documents related to the agency.

4.5.3 Summary of Fleet Management Plans if applicable

5.0 REFERENCES – SEE MP 01

U.S. DOT Federal Railroad Administration
Office of Passenger and Freight Programs

Monitoring Procedure 54 – Readiness for Revenue Operations

1.0 PURPOSE

This Monitoring Procedure (MP) describes FRA requirements for the Monitoring and Technical Assistance Contractor (MTAC) when evaluating the Grantee's readiness for revenue operations.

2.0 KEY PRINCIPLES

The readiness objectives are as follows:

- All systems, subsystems, components, equipment, and materials furnished and installed conform to the requirements of the contract documents;
- The entire rail system, with all interfaces, operates as an integrated whole and is capable of functioning effectively to provide dependable service;
- The system is safe for use by patrons to the extent possible in conformance to industry standards, standard of care, and conformance with contractual requirements;
- The system will operate safely through the host communities; and
- The Grantee or Train Operator has the management capacity and capability to operate and maintain the system through hiring and training of sufficient numbers of experienced staff.

Considering the objectives above, the MTAC will evaluate the Grantee's system, and assess its level of readiness for revenue operations:

- Completion of system integration testing (SIT) of project components, equipment, subassemblies, assemblies, subsystems, and systems;
- Fulfillment safety and security certification requirements;
- Completion of pre-revenue operations (PRO);
- Confirmation that the Grantee or Train Operator has the management capacity and capability to operate and maintain the new service and facilities.

Through early performance of this MP, the MTAC can help the Grantee to avoid "11th hour" testing, untimely surfacing of operational, maintenance and safety problems, and related delays of the revenue service date. Planning for SIT and PRO should start at least 12 months prior to substantial completion of project construction.

3.0 REQUIRED DOCUMENTS

Before performing the review, the MTAC should obtain and study the following project documents. The MTAC should notify FRA of important discrepancies in the project information that would hinder the review.

1. Scope/project definition

a. Contract documents (plans, specifications)
b. Documentation of changes to scope that have occurred since the last milestone
c. Operating Plan, operating rules
d. Reference codes and regulations
e. Design criteria
f. Agency policies related to testing, operations

2. Systems Integration Testing (SIT) Plan and schedule/Facilities Integration Plan
   a. Plan
   b. Schedule
   c. Test procedures
   d. Test reports
3. Safety and Security (refer to MP 22 for more information)
   a. System Safety Program Plan (SSPP)
   b. System Emergency Management Plan (SEMP) if not included in SSPP
   c. Security and Emergency Preparedness Plan(s) and/or System Security Plan (SPP)
   d. Safety and Security Management Plan (SSMP)
   e. Safety and Security Certification Plan (SSCP)
   f. Safety Certifiable Items List (CIL)
   g. Preliminary Hazard Analysis (PHA), including updates
   h. Threat and Vulnerability Analysis (TVA), including updates
   i. Operation Hazard Analysis (OHA)
   j. Safety and Security related design criteria
4. Pre-Revenue Operations
   a. Rail Activation Plan (RAP)/ PRO Plan
   b. Fleet Management Plan if applicable
   c. Schedule for PRO Activities Training Program
   d. Rule Book
   e. Standard Operating Procedures (SOPs)
   f. Public Awareness / Outreach Plan
   g. Work-arounds
5. Project Management Plan (PMP) and sub-plans completed including but not limited to:
   a. Signed agreements with railroads, utilities, other third parties
   b. Risk Assessment, Risk and Contingency Management Plan
   c. Safety and Security Management Plan; safety certifications
   d. Quality Assurance/Quality Control Plan
6. Schedule:
   a. Project schedule; schedule narrative describing critical path, expected durations, and logic

4.0 SCOPE OF WORK

The MTAC will ensure the following:

- That early planning for SIT and PRO training and testing is done by the Grantee to avoid public safety concerns associated with conforming to industry standards, standard of care, and conformance with contractual requirements, impacts to construction and delays to the revenue service date;
- That all involved stakeholders including safety personnel, operations, maintenance, engineering, construction manager, and the construction contractors are made aware of the testing and PRO processes, and that if necessary, the surrounding communities are informed of safety and security concerns associated with the operation of the new rail system;
- That the Grantee, in the course of SIT and PRO, refers to the project hazard analyses and provides evidence that the hazard resolution process has been implemented, tracked and monitored throughout the project life cycle. Safety devices, warning devices, updated procedures and rules should all be in place before any train movement is allowed. If such items are outstanding prior to testing, the Grantee must review the hazards and provide detailed workarounds to mitigate these hazards until final resolution;
- That testing verifies that all systems, subsystems, components, equipment, and materials conform to the requirements of the contract documents, that the service will operate and can be maintained as an integrated whole at acceptable levels of safety and security.

The Systems Integration Testing (SIT) should be integrated into the project master schedule with time-phased activities showing the inter-dependencies between various activities and project milestones.

The tests should conform to the following sequence:

- Design Completions. All design affecting the respective equipment or work must have been approved prior to start of any test. Exceptions determined by design conformance reviews should be documented and mitigated as applicable.

- Inspection. All equipment, devices, and materials must be inspected for compliance to contractual requirements before commencement of any test. Exceptions determined by construction conformance reviews should be documented and mitigated as applicable.

- Test Plans, Procedures and Reports. All requirements in the contract documents regarding test plans, test procedures, and test reports must be completed prior to the commencement of the next phase of test for each respective equipment, device, subsystem, or system.

- Design / Component Tests. All design tests affecting the respective equipment, devices, and materials must be satisfactorily completed prior to proceeding to production tests.

- Production / Factory Acceptance Tests. All production tests affecting the respective equipment and devices must be satisfactorily completed prior to shipment of equipment from the factories.

- Field Tests. Field tests will be performed after installation of equipment, devices, and materials at the project site. All equipment will be verified that it is properly installed, connected, and in operable condition. No equipment will be energized or placed in the operating mode until approved;

- Startup Tests. Startup tests will be performed after satisfactory completion of all field tests to verify that all equipment, devices, and materials installed will function as an integrated system in accordance with the contractual requirements.

4.1 Testing Overview

The MTAC will assess and evaluate the adequacy, soundness, and timeliness of the Grantee's performance in testing the following systems:

- Tracks
- Stations
- Yards and shops
- Vehicles
- Traction power system (substations, contact rails, catenary)
- Train control system
- Signaling system
- Traffic signaling
- Communications system
- Supervisory control and data acquisition
- Operations control center
- Fare collection system

The MTAC will evaluate the Grantee's Systems Integration Testing (SIT) and Systems/Facilities Integration and Coordination Plan. This plan must coordinate stakeholders; take into account time constraints and access for testing; and incorporate supporting information as necessary.

The MTAC should ensure the Grantee avoids "11th hour" testing, untimely surfacing of operational problems, and related postponements of the revenue operations date. The MTAC will check areas where early coordination and testing may be critical to avoid delays to the remaining tests. As an example, railroads often require early coordination and testing in the following situations:

- Clearance testing for shared railroad/railroad track along the railroad corridor
- Pedestrian crossing warning system testing at stations and other locations
- Grade crossing warning system control testing at intersections with both roadway and railroad tracks

4.2 Plan for Systems Integration Testing (SIT)

The MTAC shall evaluate the Grantee's SIT as an effective work plan for - coordination of stakeholders; integration with the master schedule; procedures for public safety; protocols for document control; and other elements as necessary.

The test plan must include:

1) Title of each test with reference to the respective article or section number in the contract documents
2) Organization performing each test
3) Coordination with other stakeholders
4) Test location
5) Submittal date of each test procedure, test report, and certified test document;
6) Schedule – Starting and completion date for each test

4.3 Schedule for Testing

1) The MTAC will evaluate the Grantee's schedule for integrated testing.
2) The MTAC must integrate this schedule into the project master schedule with time-phased activities showing the inter-dependencies between various activities and project milestones. The master schedule should allow required testing to be performed efficiently with the minimum of disruption to construction contractor activities.
3) The MTAC will ensure that track access is coordinated with the contractors' and agency's operations to minimize interference and delay to construction;
4) The MTAC will ensure that "cutovers" to the existing system are coordinated and scheduled.
5) Since testing and startup activities at interface points between existing lines and future extensions can easily impact existing operations, the MTAC will ensure the Grantee's schedule minimizes impacts at cutover or interface points and the Grantee has coordinated appropriately with the existing system schedule and construction contractors' schedules.

4.4 Test Procedure

The MTAC will evaluate the Grantee's detailed test procedures for each test. Each test procedure will contain detailed step-by-step procedures for performing the test and include the following information:

1. Title of test
2. Test objectives
3. Test location and date of test
4. Equipment and instrumentation with accuracy and calibration data
5. Test criteria including test setup with circuit diagrams and test sequence
6. Test criteria including data evaluation procedures
7. Test data requirements including forms and format for recording data
8. Primary and supporting test agency

4.5 Test Reports

The MTAC will evaluate the Grantee's test reports and ensure they include the following information:

1. Title of test
2. Test objectives
3. Summary and conclusions
4. Location and date of test

5. Results including tables, curves, photographs, and any additional test data required to support the test results
6. Descriptions of all failures and modifications including reasons for such failures and modifications and names of individuals approving such modifications
7. Abbreviations and references
8. Signatures of test witnesses

4.6 Completion and Recording

The MTAC will confirm the Grantee has successfully completed and recorded the following tests:

1. Design tests
2. Production tests
3. Field tests
4. Individual systems
5. Integrated tests – static and dynamic

4.7 Other Pre-Revenue Operations Items

The MTAC will ensure the following items are implemented successfully:

1. Procedures and rules for operations and maintenance
    a. Completed Rule Book and Standard Operating Procedures
    b. Operator and Maintenance Staff Training
2. Emergency response program
3. Spares and spare parts requirements & inventory
4. System Safety and Security Program Plan
5. Public Education and Safety Awareness

The MTAC will confirm the Grantee has received the following items:

1. Safety certification tests
2. Warranties and O&M manuals
3. Permits for/from:
    a. Operating
    b. Safety and security (including coordination with local police department(s))
    c. State/county/city codes
    d. Fire department(s)

5.0 TIMELINE

5.1 Test Plans, Procedures and Reports

The Grantee must complete all requirements in the contract documents relating to test plans, test procedures, and test reports before starting the next test phase covering individual equipment, devices, subsystems, or systems.

5.2 Design Tests

The Grantee must complete all design tests affecting the individual equipment, devices, and materials satisfactorily before starting production testing.

5.3 Production Tests

The Grantee must satisfactorily complete all production tests affecting individual equipment and devices before shipping equipment from the factories.

5.4 Field Tests

The Grantee will perform field tests after installing equipment, devices, and materials at the project site and will verify all equipment is properly installed, connected, and in operable condition. No equipment will be energized or placed in the operating mode without FRA approval.

5.5 Startup Tests

The Grantee will perform startup tests after satisfactorily completing all field tests and verifying that all equipment, devices, and materials installed will function as an integrated system, in accordance with the contractual requirements.

6.0 REFERENCES – SEE MP 01