

**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
7. Test objectives
8. Test location and date of test
9. Equipment and instrumentation with accuracy and calibration data
10. Test criteria including test setup with circuit diagrams and test sequence
11. Test criteria including data evaluation procedures
12. Test data requirements including forms and format for recording data
13. 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
14. Test objectives
15. Summary and conclusions
16. Location and date of test
17. Results including tables, curves, photographs, and any additional test data required to support the test results

18. Descriptions of all failures and modifications including reasons for such failures and modifications and names of individuals approving such modifications
19. Abbreviations and references
20. 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
21. Production tests
22. Field tests
23. Individual systems
24. 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
25. Emergency response program
26. Spares and spare parts requirements & inventory
27. System Safety and Security Program Plan
28. Public Education and Safety Awareness

The MTAC will confirm the Grantee has received the following items:

1. Safety certification tests
29. Warranties and O&M manuals
30. 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