



Oversight Procedure 54 – Readiness for Service

1.0 PURPOSE

The purpose of this Oversight Procedure (OP) is to describe the review, analysis, and recommended procedures that the Federal Transit Administration (FTA) expects the Project Management Oversight Contractor (PMOC) when evaluating the Project Sponsor’s readiness for service. For the purposes of this OP, readiness to enter service is the 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); and confirmation that the Project Sponsor (or Operator, if different) has the management capacity and capability (MCC) to operate the new transit facility (collectively, this evaluation is referred to as a “Readiness Review”).

Through early performance of this OP, the PMOC can help the Project Sponsor 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. These planning activities should include the development of an Operation Hazard Analysis, System Integration Test Plan, and PRO Plan and work-arounds. Further, the Project Management Plan (PMP) and referenced sub-plans should be reviewed prior to revenue operations to ensure the processes are sufficient for operations.

2.0 BACKGROUND

Early planning for SIT and PRO training and testing is essential. This avoids 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. All involved stakeholders including safety personnel, operations, maintenance, engineering, construction manager, and the construction contractors should be aware of the testing and PRO processes. Further, the Project Sponsor is responsible for informing the affected community and public of the safety and security concerns associated with the operation of the new transit system. This is essential prior to and during the testing and PRO phase when the facilities represent new and unknown risks to the community, as well as to the workers.

It is important for Project Sponsors to continually refer to hazard analyses and provide 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 Project Sponsor must review the hazards and provide detailed workarounds to mitigate these hazards until final resolution. Safety certification should not be left for final approval until just days before a project opens for revenue service.

Testing verifies that all systems, subsystems, components, equipment, and materials conform to the requirements of the contract documents. Successful completion of the PRO testing, certifying, and permitting helps to assure that the transit project will operate and can be maintained as an integrated whole at acceptable levels of safety and security, to the extent possible in conformance to industry standards, standard of care, and conformance with contractual requirements, for the public at large as well as the work force.

3.0 OBJECTIVES

The objectives are to generally assess the following:

- All systems, subsystems, components, equipment, and materials furnished and installed conform to the requirements of the contract documents;
- The entire transit 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 Operator has demonstrated the MCC to safely operate and maintain the system to the extent possible through hiring sufficient numbers of experienced staff to operate and maintain the new system, and that all employees have been adequately trained and protected.

4.0 REFERENCES

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

4.1 Legislative

- The Moving Ahead for Progress in the 21st Century Act, or MAP-21, Public Law 112-141, July 6, 2012.

4.2 Regulations

- Project Management Oversight, 49 CFR Part 633
- State Safety Oversight, 49 CFR Part 659

4.3 Guidance

- Project and Construction Management Guidelines, 2011 Update
- Handbook for Transit Safety and Security Certification; Final Report November 2002

5.0 PROJECT SPONSOR'S SUBMITTALS

In advance of performing the Readiness Review, the PMOC should obtain and study the following project documents. The PMOC should notify FTA of important discrepancies in the project information that would hinder the review. An example would be a mismatch between drawings and actual construction in which the drawings do not reflect field conditions.

5.1 Project Documents:

- **Scope / Project Definition**
 - Contract Documents (Plans and Specifications)
 - Documentation of changes to scope that have occurred since last milestone
 - Operating Plan; Operating Rules
 - Applicable Standards, Codes and Regulations
 - Project Design Criteria
 - Quality Control Procedures
- **System Integration Testing (SIT)**
 - Agency Policies related to testing, operations
 - Systems/Facilities Integration and Coordination Plan
 - SIT Plan
 - Schedule for SIT Activities
 - Test Procedures Signed Test Reports
- **Safety and Security**
 - System Safety Program Plan (SSPP)
 - System Emergency Management Plan (SEMP) if not included in SSPP
 - Security and Emergency Preparedness Plan(s) and/or System Security Plan (SPP)
 - Safety and Security Management Plan (SSMP)
 - Safety and Security Certification Plan (SSCP)
 - Safety Certifiable Items List (CIL)
 - Preliminary Hazard Analysis (PHA), including updates
 - Threat and Vulnerability Analysis (TVA), including updates
 - Operation Hazard Analysis (OHA)
 - Safety and Security related design criteria
- **Pre-Revenue Operations**
 - Rail Activation Plan (RAP)/ PRO Plan
 - Fleet Management Plan
 - Schedule for PRO Activities Training Program
 - Rule Book
 - Standard Operating Procedures (SOPs)
 - Public Awareness / Outreach Plan
 - Work-arounds
- **Management Capacity and Capability**
 - PMP and sub-plans
 - Signed Agreements with Railroads, Utilities, other Third Parties
 - Quality Assurance / Quality Control (QA/QC) Plan

5.2 Timing of the Process

Figure 1 presents the ideal timeline for implementing the SIT, Safety and Security, and PRO processes. Ideally, the processes are complementary with the intent of completing the work comfortably in time for revenue operations. Prior to any trains operating on the alignment for PRO, all system safety and security elements or an effective work-arounds should be in place.

Depending on the project's scope and schedule, FTA and the PMOC may consider conducting the Readiness Review as (i) a single complete review, (ii) multiple complete reviews, or (iii) multiple partial reviews, as described below:

- i. When conducting a single review that completely addresses the Readiness Review scope, FTA and the PMOC should schedule the review prior to the start of SIT, typically three (3) to six (6) months prior to the start of revenue operations.
- ii. When conducting multiple readiness reviews, with each review completely addressing the Readiness Review scope, these reviews would be conducted as the SIT and PRO phases progress, and the project documents and activities are advanced. The PMOC Readiness Review Report would be revised or updated to reflect the subsequent review findings.
- iii. When conducting multiple readiness reviews, with each review partially addressing the Readiness Review scope, the PMOC would review a limited scope of the project documents and activities. An example may include conducting the partial Readiness Review to address the SIT activities, then scheduling another review to address the PRO activities, etc. as the project schedule advances.

Figure 1: Systems Integration and Pre-Revenue Operations Integrated Process

Activity/ Phase	Project Development	Engineering	Start Construction	50% Construction	90% Construction	Pre-Revenue Operations	Revenue Service
Project Management Plan (PMP)							
Update PMP & Sub-plans	Develop Outline	Finalize Plans			Update		
Quality Control Procedures		Develop	Finalize		Update		
Safety & Security							
SSMP	Develop Outline	Finalize Plan			Update		
Design Criteria	Develop	Finalize					Update
Preliminary Hazard Analysis		Finalize	Update				
Threat & Vulnerability Assessment		Finalize	Update				
Safety & Security Certification Plan	Develop Outline	Finalize Plan					
Safety Certifiable Items List (SCIL)	Develop	Finalize					
Operations Hazard Analysis					Develop	Finalize	
System Safety Program Plan (49 CFR 659)		Develop				Finalize	
SCIL Documentation							
System Integration Test (SIT) Planning							
SIT Plan			Develop	Finalize		Update	
Schedule for SIT Activities				Develop	Finalize	Update	
Test Procedures				Develop	Finalize	Update	
Testing							
Pre-Revenue Operations (PRO) Planning							
PRO Plan & Schedule				Develop - 12-months prior to substantial completion			
Emergency Preparedness Plan				Develop			
Update Rule Book					Finalize / Update		
Standard Operating Procedures					Finalize / Update		
Training Program							
Public Awareness Plan					Develop		
PRO							
Final Safety & Security Certification							
Safety & Security Certification Verification Report						Finalize	
SSO approvals (as applicable)						Complete	
Revenue Service							

6.0 SCOPE OF WORK

The PMOC shall assess and evaluate the adequacy, soundness, and timeliness of the Project Sponsor's:

- SIT
- Project System Safety and Security Validation
- PRO Plan and Work-arounds
- Management Capacity and Capability

In addition, the PMOC will coordinate and support, as directed, the implementation of other oversight procedures, such as OP 24 "Quality Assurance / Quality Control Review" and OP 22 "Safety and Security Management Review" to adequately assess the project's readiness for operations. FTA expects that review activities will be coordinated with other ongoing reviews by the FTA Office of Safety and Oversight (TSO) or the State Safety Oversight Agency (SSOA).

The PMOC will continue to provide updates on the Project Sponsor's activities to address the Readiness Review findings and recommendations in monthly reports or as directed.

The PMOC will reference the following appendices in completing the Readiness Review:

- Appendix A: Acceptable Quality Level
- Appendix B: Sample Pre-Revenue Activity Flow Chart
- Appendix C: Sample Rail Activation Plan Table of Contents
- Appendix D: OP 54 Readiness Review Worksheet

6.1 System Integration Testing

SIT validates that all fixed facilities, systems, and equipment perform as intended, both individually and as an overall system when integrated. The process also confirms that all personnel have the management capacity and capability to provide safe and dependable service, and that emergency drills have been completed prior to revenue operations.

For a well-managed project, SIT is integrated into the project master schedule with time-phased activities showing the inter-dependencies between various activities and project milestones. The tests should confirm 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 (FAT).** 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.

In its review the PMOC will complete the following subtasks:

6.1.1 Systems to be tested:

The PMOC shall assure all of the systems below (as applicable) are tested:

- Tracks
- Stations
- Yards and Shops
- Vehicles
- Traction Power System (Substations, Contact Rails and Overhead Catenary)
- Train Control System
- Signaling System
- Traffic Signaling
- Communications System
- SCADA (supervisory control and data acquisition)
- Operations Control Center
- Fare Collection System Equipment
- Grade Crossings
- Other items, as deemed necessary

The PMOC shall evaluate the Grantee's 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. Check for areas in which early coordination and testing may be critical to avoiding delays to the balance of the testing. As an example, railroads often require early coordination and testing, including:

- Clearance testing for shared transit/railroad track along the transit corridor;

- Pedestrian crossing warning system testing at stations;
- Grade crossing warning system control testing at intersections with both transit and railroad tracks.

6.1.2 Plan for Systems/Facilities Integration and Coordination for Testing

The PMOC shall evaluate the Sponsor’s 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. Check for areas in which early coordination and testing may be critical to avoiding delays to the balance of the testing. As an example, railroads often require early coordination and testing, including:

- Clearance testing for shared transit/railroad track along the transit corridor;
- Pedestrian crossing warning system testing at stations;
- Grade crossing warning system control testing at intersections with both transit and railroad tracks.

6.1.3 Systems Integration Test Plan (SITP)

The PMOC shall evaluate the Project Sponsor’s SITP 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 PMOC shall evaluate activities where coordination and testing may be critical to avoiding delays.

The PMOC shall evaluate the test plan, to confirm the following have been included:

- Title of each test with reference to the respective article or section number in the contract documents
- Organization performing each test
- Coordination with other stakeholders
- Test location
- Submittal date of each test procedure, test report, and certified test document;
- Schedule – Starting and completion date for each test
- Document control procedures

6.1.4 Schedule for Testing

The PMOC shall evaluate the project’s schedule for integrated testing.

6.1.5 Test Procedures

Each test procedure shall contain detailed step-by-step procedures for performing the test and shall include the following information:

- Title of test
- Test objectives

- Test location and date of test
- Equipment and instrumentation with accuracy and calibration data
- Test criteria including test setup with circuit diagrams and test sequence
- Test criteria including data evaluation procedures
- Test data requirements including forms and format for recording data
- Primary and supporting test agency

6.1.6 Test Reports

The PMOC shall evaluate the project's test reports and ensure they include the following information:

- Title of test
- Test objectives
- Summary and conclusions
- Location and date of test
- Results including tables, curves, photographs, and any additional test data required to support the test results
- Descriptions of all failures and modifications including reasons for such failures and modifications and names of individuals approving such modifications
- Abbreviations and references
- Signatures of test witnesses

6.1.7 Completion and Recording

The PMOC shall confirm the successful completion and recording of the tests:

- Design Tests
- Production Tests
- Field Tests
- Individual Systems
- Integrated Tests – Static and Dynamic

6.2 Project System Safety and Security Validation

The PMOC shall review the Project Sponsor's safety and security planning process for general conformance that the recommendations developed through the hazard management program and other planning processes have been carried through design, and implemented during construction. The PMOC will also confirm that the host communities affected by the project have been well informed on safety and security issues associated with the project. Safety and Security validation should begin prior to any train movements being allowed on the new system, and hazards that have not been fully mitigated should be reviewed and appropriate work-arounds developed. The following subtasks will be completed, as described below.

6.2.1 Safety and Security Organization

As part of its review the PMOC will assess the general effectiveness of the safety and security organization within the Project Sponsor's organization at large. For example:

- Does the safety and security organization have the appropriate Management Capacity and Capability to assure a safe project and is the organization effectively configured?
- Has the safety and security organization participated in design reviews, configuration control, the change control board and/or other review capacities?
- Has the safety and security organization participated in the proceedings of the Fire/Life Safety Committee established for the new system?
- Has the safety and security organization been party to the completion of the PHA and TVA workshops and resulting mitigations?
- Has the safety and security organization participated in development of work-arounds for outstanding construction punch-list items affecting safe operation and interface with the general public prior to testing trains on the system?
- Has an OHA been prepared, or as an alternative, has the PHA been refreshed to address readiness to first test trains safely; and to safely open for revenue operations?

6.2.2 Review of Safety and Security Planning

The PMOC shall review the following plans and documents to assure that safety and security concerns have been addressed prior to testing trains and all intermediate steps leading up to revenue operations:

- a. Safety and Security Program Plan
- b. Safety and Security Management Plan
- c. Preliminary Hazard Analysis
- d. Threat and Vulnerability Analysis
- e. Operation Hazard Analysis
- f. Grade Crossing Analysis / Reports
- g. Safety and Security Certification Plan
- h. Certifiable Items Lists
- i. Workarounds / Construction Punch-lists*

* Construction punch-lists should be reviewed to ensure all safety critical items, public warning devices, and safety-related signage are installed and tested prior to testing trains.

6.2.3 Review of Risks and Mitigation

The PMOC will confirm that the findings and mitigations from the TVA and PHA are reviewed and addressed by the Project Sponsor. The PMOC will confirm that an OHA, containing, at a minimum, an assessment of the PHA and typically involving additional hazard analysis was conducted with operation and maintenance experts. The PMOC shall review the disposition of all unacceptable and undesirable risks (sometimes color coded "Red" and "Yellow" in hazard tables) and the associated mitigation measures recommended in the PHA or the OHA, as applicable. The intent is to confirm which high risks have been mitigated, whether the mitigation has been included in the completed

project or appropriate workarounds have been developed, or if the high risk has been considered acceptable and documented with the justification for this conclusion.

6.3 Pre-Revenue Operation

PRO planning involves the Project Sponsor's work plan for preparing the system for revenue service. This work plan referred to as the PRO Plan/RAP, defines the staffing requirements, personnel, and the training, testing and documentation necessary to prepare the project for revenue operations.

The PMOC shall evaluate satisfactory completion of the following:

- PRO Planning
- Completed Rule Book and Standard Operating Procedures
- Operator and Maintenance Staff Training
- Emergency Preparedness
- Security System
- Public Education and Safety Awareness

6.3.1 Pre-Revenue Operations Planning

The PMOC shall confirm that the Project Sponsor has prepared a PRO Plan/RAP to guide its activities. The PRO Plan/RAP is a narrative document that introduces the PRO requirements of operation and maintenance personnel prior to the opening of the project.

The following will be done before operating the new project or alignment in revenue service:

- Assurance that the system is safe for PRO including mitigating the unacceptable risk identified in the OHA or acceptable workarounds
- Rail Activation Committee or other applicable committee approvals
- Schedules for PRO and operations are completed
- Operations, maintenance, supervisor and first responder personnel training are complete
- Standard and emergency operating procedures (SOPs and EOPs) should be updated
- The operating book of rules should be updated
- Emergency drills with local emergency response agencies should be completed
- PRO activities are complete
- Assurance that all rail operations certifiable items are complete / certificate of occupancy

6.3.2 Completed Rule Book and Standard Operating Procedures

The PMOC shall review and confirm that the Rule Book and the SOPs have been updated, accepted and distributed to all operations personnel prior to the start of revenue service. The Project Sponsor shall demonstrate that all Operations and Maintenance (O&M) staff has been trained in the new procedures.

6.3.3 Operator, Maintenance and Supervisor Staff Training

The PMOC shall determine that the Project Sponsor has trained its staff to operate and maintain the new transit system. The PMOC should assess the training program to determine if new and updated procedures and rules are provided within the training curriculum and to confirm that all training schedules or activities address training for all necessary staff, including supervisors, as applicable. If this has been confirmed by a recent MCC study, the PMOC shall reference the findings of that evaluation.

6.3.4 Emergency Preparedness

The PMOC shall review the Emergency Preparedness Plan and PRO schedule to confirm that emergency preparedness drills and familiarization training activities have been completed and coordinated with the affected community fire departments, police departments and first responding agencies, prior to revenue operations. The documentation of completeness should include a description of the drill, date, procedures, attendees and results of the drill. The proceedings should be incorporated into the Project Sponsor document control system.

6.3.5 Security System

Implementation of a new transit system will often require additional security staff. The PMOC shall determine whether the Project Sponsor has increased and trained its security forces proportionate to the added system capacity. If a recent MCC study has confirmed this, the PMOC shall reference the findings of that evaluation.

6.3.6 Public Education and Safety Awareness

Introduction of a new transit system into the community adds an element of risk, especially accidents related to pedestrian/transit vehicle and automobile/transit vehicle collisions. The PMOC shall document that the Project Sponsor has prepared the community for the implementation of transit, prior to train movements on the new system within a safety outreach plan and a grand opening plan. The outreach activities would typically include outreach to schools, neighborhood associations, and other well-attended community events.

6.3.7 Spare Parts Requirements and Inventory

The PMOC shall review and assess the Project Sponsor's process to track and maintain spares, spare parts, spare parts inventory, warranties, and O&M manuals.

6.4 Evidence of Management Capacity and Capability

As a confirmation of the readiness to enter service, the PMOC shall assess the MCC but with emphasized focus on operational capacity. This assessment will simply refresh the previous MCC evaluations if these have been completed within one calendar year. This will include a review of the following:

- a. PMP
- b. O&M Plan
- c. Rail/Bus Fleet Management Plans
- d. Safety and Security Plans, Signed Third Party Agreements with Railroads, Utilities, other Third Parties
- e. Quality Management Plan (QMP)

6.4.1 Project Management Plan

The PMOC shall determine that the PMP and Sub-Plans are current and demonstrate the readiness to enter service. For example, the PMP should incorporate the updated SSMP and related plans including the RAP, SSCP, and OHA, and all should be tracked back to the findings and mitigation measures recommended in the refreshed PHA and TVA. Further, the O&M Plan, Rail Fleet Management Plan, and Bus Fleet Management Plan should demonstrate the ability to own and operate the new transit system.