

Transbay Transit Center Program

Quality Management System Manual

Revision 1

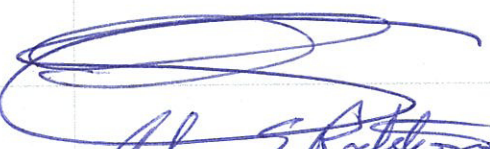



September 2013



Transbay Transit Center

URS

Review and Approval

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TRANSBAY TRANSIT CENTER PROGRAM

Quality Management System Manual

Revision 1

September 2013

Prepared for the

Transbay Joint Powers Authority

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Contents **Page**

Transbay Transit Center Program Quality Policy v

Quality Management Plan

Introduction 1

1 Management Responsibility 3

2 Documented Quality Management System 11

3 Design Control 15

4 Document Control 19

5 Purchasing 21

6 Product Identification and Traceability 23

7 Process Control 25

8 Inspection and Testing 27

9 Inspection, Measuring and Test Equipment 33

10 Inspection and Test Status 35

11 Nonconformance 37

12 Corrective Action 41

13 Quality Records 43

14 Quality Audits 47

15 Training 51

Appendixes

Appendix A–Documented Quality Management System Outline

Appendix B–Definitions

Appendix C–Abbreviations

Appendix D–Quality Assurance Program Procedures

QA-01 QA Program

QA-02 Quality Planning

QA-03 Review of Design Documents and Packages

QA-04 Contractor and Supplier Quality Program Evaluation

QA-05 Purchasing Quality Assurance

QA-06 Contractor and Supplier Surveillance

QA-07 Inspection and Testing

QA-08 Nonconformance Reports

QA-09 Corrective Action

QA-10 Quality Audits

QA-11 Qualification of Auditors

QA-12 Training

Appendix E–Inspection Guidelines

Appendix F–FTA Quality Management System Guidelines 2012

Transbay Transit Center Program Quality Policy

It is the policy of the Transbay Joint Powers Authority that all projects within the Transbay Transit Center Program be planned, designed, and constructed with the highest regard for quality. The Program and project teams are committed to achieving and verifying that the highest quality standards are maintained throughout the duration of the Program. The Program's quality objective is to deliver projects that meet all contract requirements.

Program and project managers will ensure that each project adheres to the established schedule and that staffing levels are adequate to meet Program demands. Program and project managers will ensure that the skill levels of personnel assigned to a project are commensurate with the project's technical demands.

Quality is everyone's responsibility. All individuals on each project within the Transbay Transit Center Program are responsible for their contribution to the quality of the Program.

The Program's Quality Management System (QMS) provides specific requirements for Program implementation based upon this Program Quality Policy and the Federal Transit Administration (FTA) *Quality Management System Guidelines* (FTA-PA-27-5194-12.1, December 2012), including the assignment of primary responsibility for implementation. Each organization within the Program Team, in providing management, design, construction, consulting or other services, is responsible for providing and implementing quality plans that fully meet the requirements specified in this QMS Manual. These plans must define specific quality goals and objectives, specify quality-related activities through documented procedures and instructions, and assign responsibilities for conducting the activities and verifying that the objectives are met.

The requirements of the Program QMS are described under *General Requirements* in each functional section of the Quality Management Plan. The QMS defines activities for verifying implementation of administrative and control measures during design, procurement, construction, installation, testing, inspection, systems testing and start-up, and facilities and records turnover. The administrative and control measures will be prepared and implemented to contribute to, and document the attainment of, a safe, reliable, economical, and convenient public transit facility.


Maria Ayerdi-Kaplan
Executive Director
Transbay Joint Powers Authority

Date

10/14/13

Introduction

This Quality Management System (QMS) Manual is intended to guide all members of the Program Team in delivering a project that meets the highest quality standards. Design and construction organizations with certified ISO 9001:2000 quality programs may perform work under their own programs, providing that their programs meet the requirements called for in this QMS Manual.

Transbay Transit Center Program Background

The Transbay Transit Center Program (Program) is a \$4 billion program to replace the former Transbay Terminal at First and Mission streets in San Francisco with a modern regional transit hub that will connect eight Bay Area counties and the State of California through eleven transit systems: Alameda–Contra Costa Transit, BART (Bay Area Rapid Transit), Caltrain, Golden Gate Transit, Greyhound, Muni (San Francisco municipal bus lines), SamTrans (San Mateo County Transit), WestCAT (Western Contra Costa Transit) Lynx, Amtrak, Paratransit, and high-speed rail from San Francisco to Los Angeles/Anaheim.

The Program will be constructed in two phases. Phase 1 includes design and construction of the above-grade portion of the Transit Center, the structure and core of the two below-grade levels of the train station, new bus ramps, and a bus storage facility. The Downtown Rail Extension (DTX) tunnel, the build-out of the below-grade train station facilities at the Transit Center, and an intercity bus terminal will follow as Phase 2 of the Program.

The Transbay Transit Center is a multimodal transit hub that will serve train and bus commuters, local area office workers, and residents of the emerging Transbay neighborhood. The building is composed of four levels above ground and two levels below and will contain active pedestrian, shopping, dining, and recreational areas. The project includes construction of dedicated bus ramps—a series of aerial structures and at-grade roadway—that will connect the Transit Center bus deck to the Bay Bridge for use by bus transit agencies operating bus service across San Francisco Bay.

The Bus Ramps will also lead to the new Bus Storage facility, which will be used primarily by AC Transit for weekday layovers between peak hour commutes. The facility will include AC Transit offices, storage, and restrooms.

A Temporary Terminal, located just south of the Transit Center site, was completed in 2010 and currently serves bus operators during construction of the Transit Center until its opening for bus operations in 2017.

Quality Management System

The Federal Transit Administration (FTA) Quality Management System Guidelines (FTA-PA-27-5194-12.1, December 2012) provided in Appendix F require a documented Quality Management System (QMS). For the Program, this consists of the Program Quality Policy, the Program Quality Management Plan, and the associated Program and project quality manuals, procedures and instructions. These include the management, design and construction quality plans and procedures developed by consultants, designers and construction contractors, the Program-wide quality assurance procedures developed by the Program Management/Program Controls Consultant, and quality-related sections of other Program and project documents.

The Program Quality Management Plan is based on the 15 quality elements required by the FTA's 2012 guidelines. For each quality element, the plan defines the quality requirements and the responsibilities for QMS implementation, and the requirements for project-specific quality plans and procedures.

The 15 quality elements of the Program Quality Management Plan are listed below:

1. Management Responsibility
2. Documented QMS
3. Design Control
4. Document Control
5. Purchasing
6. Product Identification and Traceability
7. Process Control
8. Inspection and Testing
9. Inspection, Measuring and Test Equipment
10. Inspection and Test Status
11. Nonconformance
12. Corrective Action
13. Quality Records
14. Quality Audits
15. Training

Details of the QMS are described in Section 2.0, Documented Quality Management System.

1 Management Responsibility

1.1 Purpose and Scope

This section defines the Program Team's commitment to and responsibility for ensuring the quality of the constructed product.

1.2 References

FTA Quality Management System Guidelines (FTA-PA-27-5194-12.1, December 2012).

1.3 Responsibilities

The TJPA has retained a Program Management/Program Controls (PMPC) Consultant to support the TJPA's management of planning, design, construction, and commissioning of the projects within the Program, including the following quality requirements:

- a. establishing and continually improving the Program's quality policy and quality objectives
- b. communicating to the Program Team the importance of meeting quality requirements
- c. providing the necessary resources to implement the QMS
- d. conducting management quality reviews

The project managers for each consultant or contractor implementing projects or subprojects within the Program are responsible for developing and implementing quality plans that meet the requirements of the QMS. These quality plans should document the FTA's expectations for the projects to which they apply.

1.3.1 Program Management Staff

Program Management staff is shown in the TJPA's organization chart in Figure 1.1, Program Team. The Program Management Plan contains additional organization charts that show the TJPA's organizational structure and PMPC staff members and their reporting relationships. The TJPA, supported by PMPC staff, is responsible for:

- organizing, mobilizing, and directing Program personnel and coordinating the efforts of other organizations involved in the Program
- developing and implementing detailed Program procedures and performing general administration
- overseeing preliminary engineering, final design, permitting, and construction of the projects and other aspects of the Program
- providing Program controls, including planning, scheduling, cost control, scope, and change control
- procuring and overseeing professional services agreements and construction contracts
- executing the Program QMS

Specific responsibilities of key Program Management staff members are described in Sections 1.3.2 through 1.3.14.

1.3.2 TJPA Executive Director

The TJPA Executive Director is an officer of the TJPA and reports directly to the TJPA Board of Directors. The Executive Director has full day-to-day responsibility for Program execution as authorized by the Board. As the head of the TJPA Executive Staff, the Executive Director coordinates work with the TJPA Officers, the Chief Financial Officer, the Board Secretary, and legal counsel. The major tasks of the Executive Director are to advance the Transbay Transit Center Program; manage the timely, consistent, and effective decision-making process; supervise and direct TJPA consultants; and maintain proper coordination with agencies and the public.

With regard to the QMS, the TJPA Executive Director is specifically responsible for:

- adopting the QMS and issuing the Quality Policy
- managing and directing the work of the Program Quality Assurance (QA) Manager, including ensuring that proper corrective actions are taken when necessary
- ensuring that appropriate language is inserted into design, construction and other contracts for the Program that require conformance to the Program QMS by all designers, consultants, suppliers, and contractors

1.3.3 TJPA Program Management

TJPA Program Management comprises four staff positions—the Senior Program Manager, the Principal Engineer, the Engineering Manager, and the Senior Construction Manager, all reporting directly to the TJPA Executive Director. TJPA Program Management staff oversees design, architectural and engineering requirements, project construction, and the Program’s execution strategy. TJPA Program Management staff supervises PMPC management, design and engineering consultants, the Construction Management Oversight consultant, the Construction Manager/General Contractor, and PMPC coordination with outside agencies to ensure planning and designs are consistent with federal, state, and local requirements. The PMPC Consultant provides working staff to support TJPA Program Management on an as-needed basis.

With regard to the QMS, TJPA Program Management is responsible for:

- establishing an FTA-compliant quality policy and the quality management system, including a quality management plan, for the Program
- overseeing all aspects of the work of the various technical consultants and constructors, in accordance with the highest standards of quality control and assurance
- asserting strong and consistent leadership over the Program to ensure that the various consultants engaged in the Program work in concert with one another and in accordance with Program quality requirements
- ensuring that appropriate quality control and quality assurance procedures are in effect at all times
- evaluating ongoing design work and recommending timely changes or additions to consultant or subconsultant staffs and work plans as necessary to ensure a high-quality finished product
- serving as advisor to the TJPA Executive Director on quality matters
- anticipating quality problems and crafting mitigation measures

1.3.4 PMPC Program Manager and Deputy Program Manager

The PMPC Program Manager and Deputy Program Manager administer activities related to design, construction, schedule, budget, quality assurance, and inspection of the projects within the Program,

including the Transit Center and the Downtown Rail Extension (DTX) and their subprojects. The PMPC Program and Deputy Program Managers directly manage the PMPC project managers and design managers for the Transit Center and DTX projects and are ultimately responsible for the activities of all PMPC staff. With regard to the QMS, the PMPC Program Manager and Deputy Program Manager are responsible for:

- adopting the QMS and directly overseeing the activities of the Program QA Manager, except with regard to activities of the PMPC team
- directly overseeing the PMPC project managers and design managers to ensure their compliance with the QMS

1.3.5 PMPC Program Controls Manager

The PMPC Program Controls Manager and Program Controls staff prepare and maintain the Program's Baseline Budget and Baseline Program Schedule, prepare updates and cost and schedule progress reports for the TJPA, and implement the Program's document control systems.

The Program Controls Manager works with TJPA financial staff on financial controls and forecasting Program cash needs. With regard to the QMS, the Program Controls Manager is responsible for:

- implementing the QMS requirements for document control
- assisting PMPC project managers with achieving project budget, schedule, and quality objectives by implementing rigorous and timely Program controls and tracking systems

1.3.6 PMPC Program Coordinator

The PMPC Program Coordinator is responsible for coordination with the City and County of San Francisco and outside agencies, and coordinates work in support of traffic management planning, permitting, environmental mitigation and monitoring, historic and archeological resource compliance, adjacent project development, and right-of-way acquisition. The PMPC Program Coordinator supports the TJPA Legislative Affairs and Community Outreach Manager's communications with the public and the media. With regard to the QMS, the PMPC Program Coordinator is responsible for:

- overseeing and supporting processes regarding local, regional, state, and federal permits
- verifying the implementation of all required environmental mitigation measures as outlined in the Program's Final Environmental Impact Statement/Environmental Impact Report (FEIS/EIR), addenda to the FEIS/EIR, and Section 4(f) Evaluation

1.3.7 PMPC Transit Center Project Manager and Design Managers

The PMPC Transit Center Project Manager and design managers manage the project performance and delivery of programming, planning, and design of the Transit Center building and related subprojects and support their construction, commissioning, and turnover.

The Transit Center Project Manager, with support from the design managers, serves as the primary technical point of contact for all project management issues; initiates and maintains contact with key project team members, outside agency representatives, and others as necessary; monitors and proactively addresses and resolves key issues; monitors, controls, and maintains the project to its approved scope, schedule, and budget requirements; supports the management of planning and design consultants; and supports construction, commissioning, and turnover of the Transit Center building and infrastructure to the TJPA.

With regard to the QMS, the PMPC Transit Center Project Manager is responsible for working with the Program QA Manager to:

- ensure compliance with all QMS requirements for the Transit Center project
- resolve quality issues regarding acceptance by or coordination with outside agencies

With regard to the QMS, the PMPC Transit Center design managers are responsible for:

- managing design reviews and commenting on design deliverables
- verifying conformance to design criteria to achieve consistency in design among various project components and contract packages
- guiding the development of Program design management procedures for the handling of design and construction documents

1.3.8 PMPC Downtown Rail Extension Project Manager

The DTX Project Manager manages the project performance and delivery of programming, planning, and design of the DTX project. Specific responsibilities include serving as the technical point of contact for all project management issues; initiating and maintaining contact with key project team members, PMPC team members, outside agency representatives, and others as necessary; supporting the management of planning and design consultants; supporting construction, and turnover of the DTX to the TJPA; monitoring, addressing, and resolving key issues; monitoring, controlling, and maintaining the project to its approved scope, schedule, and budget requirements; and coordinating with other key PMPC staff as necessary.

With regard to the QMS, the PMPC DTX Project Manager is responsible for:

- developing design constraints, criteria, and standards
- managing design reviews and commenting on design deliverables
- ensuring that appropriate language is inserted into design, construction and other contracts under the DTX project that require conformance to the Program QMS by all designers, consultants, suppliers and contractors
- ensuring that all designers, consultants, suppliers and contractors conform to the QMS, including maintaining quality records and correcting deficiencies
- working with the Program QA Manager as appropriate to ensure compliance with all QMS requirements for the DTX project

1.3.9 Program Quality Assurance Manager

The Program QA Manager is responsible for planning, implementing, evaluating, and maintaining an effective QMS. The Program QA Manager's responsibilities include:

- reporting to the TJPA Executive Director for quality oversight and auditing of the Program consultants and construction contractors, including the PMPC Consultant
- reporting to the PMPC Program Manager for quality activities of PMPC subconsultants
- developing and implementing the Program QMS
- reviewing and approving quality plans submitted by Program participants
- conducting regular reviews of the Program QMS, and continually improving the Program QMS based upon these reviews

- performing other specific activities as described in Section 1.5, Implementation, and Section 2.3.1, Program QA Manager Responsibilities

1.3.10 A/E Consultants

The Program's architectural/engineering (A/E) consultants are responsible for the design of all facilities being constructed as part of the Program, including utility relocation.

With regard to the QMS, the A/E consultants are responsible for:

- designing their projects within budget, schedule, and quality objectives
- developing and maintaining design constraints, criteria, and standards
- ensuring that appropriate language is inserted into design, construction, and other contracts with subconsultants that requires conformance to the QMS, including language that addresses maintaining quality records and correcting deficiencies
- working with the Program QA Manager as appropriate to ensure compliance with all QMS requirements

1.3.11 Construction Manager/General Contractor—Webcor/Obayashi Joint Venture

The Transit Center Construction Manager/General Contractor (CM/GC) is responsible for construction of the new Transit Center building, Bus Ramps, and related utility relocation.

With regard to the QMS, the CM/GC is responsible for:

- successfully constructing and commissioning the Transit Center project within budget, schedule, and quality objectives
- working with the Program QA Manager as appropriate to ensure compliance with all QMS requirements

1.3.12 Construction Management Oversight Consultant and Bus Storage Construction Manager

The Construction Management Oversight consultant (the CMO), Turner Construction Company, is responsible for construction oversight management of the new Transit Center building and Bus Ramps, and related utility relocation.

The Bus Storage Construction Manager (CM) will manage the construction of the Bus Storage facility.

With regard to the QMS, the CMO and Bus Storage CM are responsible for:

- providing oversight of construction and commissioning the projects within budget, schedule, and quality objectives.
- working with the Program QA Manager as appropriate to ensure compliance with all QMS requirements

1.3.13 Consultant and Construction Contractor Project Managers

The project managers for each consultant or contractor implementing project phases with the Program are responsible for:

- supporting the development and continual improvement of quality plans that meet the requirements of FTA and the Program QMS as appropriate for their scopes of work
- managing the implementation of these quality plans

- establishing written procedures for engineering and construction activities
- supporting and participating in audits conducted by the Program QA Manager and external audits, as described in Section 14.5.5, Audit Execution
- implementing corrective action as needed to correct deficiencies
- identifying training needs of project personnel, including subcontractor employees
- maintaining appropriate quality records as defined in the QMS and working to correct deficiencies identified by PMPC project managers or the Program QA Manager

1.3.14 Consultant and Construction Contractor QA Managers

The QA managers for each consultant or contractor implementing project phases with the Program are responsible for:

- developing, implementing, conducting management review of, and continually improving quality plans and supporting procedures that meet the requirements of FTA and the Program QMS as appropriate for their scopes of work
- conducting audits of quality processes to verify implementation of their quality plans
- supporting and participating in audits conducted by the Program QA Manager and external audits, as described in Section 14.5.5, Audit Execution
- identifying, documenting, tracking, and verifying the closure of internal nonconformances and corrective actions
- working to correct deficiencies identified by PMPC project managers or the Program QA Manager, or in external audits
- identifying training needs of project personnel, and developing and conducting training on quality procedures
- maintaining appropriate quality records as defined in the QMS, including logs and records of audits, nonconformances, corrective actions, and training

1.4 General Requirements

The Program Quality Policy has been developed by the TJPA Program Management. Key points of this policy are as follows:

- All projects within the Program will be managed, planned, designed and constructed with the highest regard for quality. The Program Team is committed to this policy, and to meeting or exceeding all project requirements.
- Quality is everyone's responsibility. All individuals on the Program are responsible for contributing to the quality of the Program.
- To implement this policy, the TJPA will develop, implement and continually improve a QMS that defines quality policies and requirements for the Program. All consultants (including subconsultants), contractors, subcontractors and suppliers within the Program will conform to the applicable Program QMS requirements.

1.5 Implementation

The Program QMS will satisfy the needs of the Program and projects within the Program in accordance with the policies and procedures identified in this document.

The Program QA Manager has the authority and organizational freedom to perform the following tasks:

- a. identify and evaluate quality problems
- b. review and approve proposed solutions to identified quality issues
- c. control further processing, delivery, or installation of nonconforming or deficient items or service through the nonconformance report system until proper and acceptable disposition is obtained
- d. verify implementation of the corrective action request system to document resolution of quality issues
- e. perform quality oversight and quality assurance audits of Program management
- f. perform quality oversight and quality assurance audits of project engineering, procurement, construction, inspection, and other areas as required by the TJPA, FTA and federal regulations to verify conformance with Program quality standards and applicable state and local codes
- g. review the proposed design and construction contracts to identify the applicable QMS requirements, with assistance from Program design consultants

1.6 Implementing Documents

As shown in Appendix A, Documented Quality System Outline.

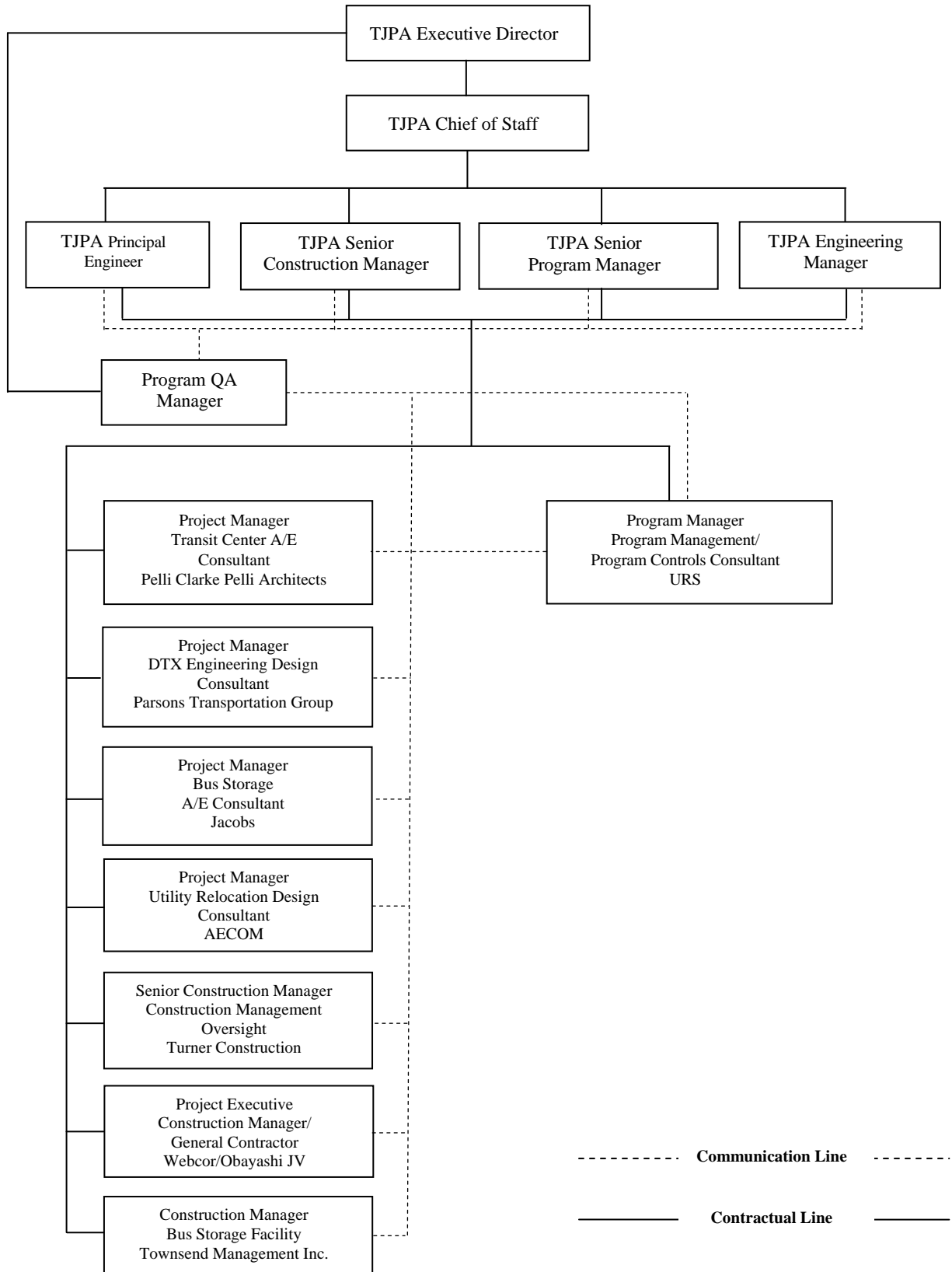


Figure 1.1: Program Team

2 Documented Quality Management System

2.1 Purpose and Scope

The FTA Quality Assurance and Quality Control Guidelines provided in Appendix F require a documented QMS. This section describes the QMS used on the Transbay Transit Center Program.

2.2 References

FTA Quality Management System Guidelines (FTA-PA-27-5194-12.1, December 2012).

2.3 Responsibilities

TJPA Program Management and the PMPC Program Manager are responsible for providing the necessary resources to implement and maintain the QMS.

The Program QA Manager is responsible for establishing and maintaining an effective and economical QMS. The specific responsibilities of the Program QA Manager are listed in Section 2.3.1.

All Program and project consultant, construction contractor, and supplier personnel are responsible for implementing the QMS and their own quality plans as appropriate for their scope of work. All managers are responsible for developing and implementing procedures and work instructions within their areas of responsibility.

2.3.1 Program QA Manager Responsibilities

The specific responsibilities of the Program QA Manager include:

- developing, issuing, and maintaining—through the controlled distribution of the Program QMS Manual—the Program Quality Management Plan and associated QA procedures and instructions
- verifying, through the quality oversight of implementation of the Program QMS by all Program participants, that all equipment, structures, components, systems, and facilities are designed, procured, constructed, installed, and maintained in accordance with applicable criteria, codes and standards throughout the design, construction, start-up and commissioning of the projects within the Program
- verifying that each project contract document includes design or construction quality requirements for each project and that these requirements are in compliance with the Program QMS
- reviewing, evaluating and approving consultant, supplier, or construction contractor quality plans, quality procedures and instructions, and related quality submittals prior to implementation
- performing and overseeing quality audits and surveillance of the PMPC team, designers, construction contractors, and suppliers
- informing the Program Team on the status and effectiveness of the Program QMS and recommending improvements including semiannual reviews of the Program QMS with TJPA Program Management
- participating in design reviews to verify that quality issues are fully considered in the design

- facilitating, through training sessions, meetings, reports, reviews, surveillance and audits, the effective implementation of the Program QMS with consultants, suppliers and contractors.
- identifying and analyzing nonconformances
- performing and coordinating root-cause analysis activities, as appropriate
- verifying implementation of required corrective actions to resolve problems
- coordinating with construction project personnel, including representatives of the construction contractor, construction manager, resident engineer, or inspector on construction quality status and problem resolution
- taking appropriate action within approved Program procedures to ensure conditions adverse to quality are corrected

2.4 General Requirements

The Program will implement and maintain a QMS that documents policies, plans, procedures, and instructions.

All Program participants will adhere to the requirements of the QMS. All work performed by Program management staff, design consultants, construction contractors, suppliers, vendors, subcontractors and construction management, and other consultants is subject to quality review and approval.

Each organization providing management, design, construction, consulting or other services to the Program is required to provide a quality plan appropriate to its scope of work.

The Program QA Manager must approve all quality plans prior to their implementation.

Program or project personnel performing quality verification activities will be independent of and report at least one level above those personnel having responsibility for the work being performed.

2.5 Implementation

2.5.1 Quality Management System Structure

The Program QMS defines quality policies and four levels of quality documents as shown in Figure 2.1. The underlined documents shown in the figure are included in the Program QMS Manual.

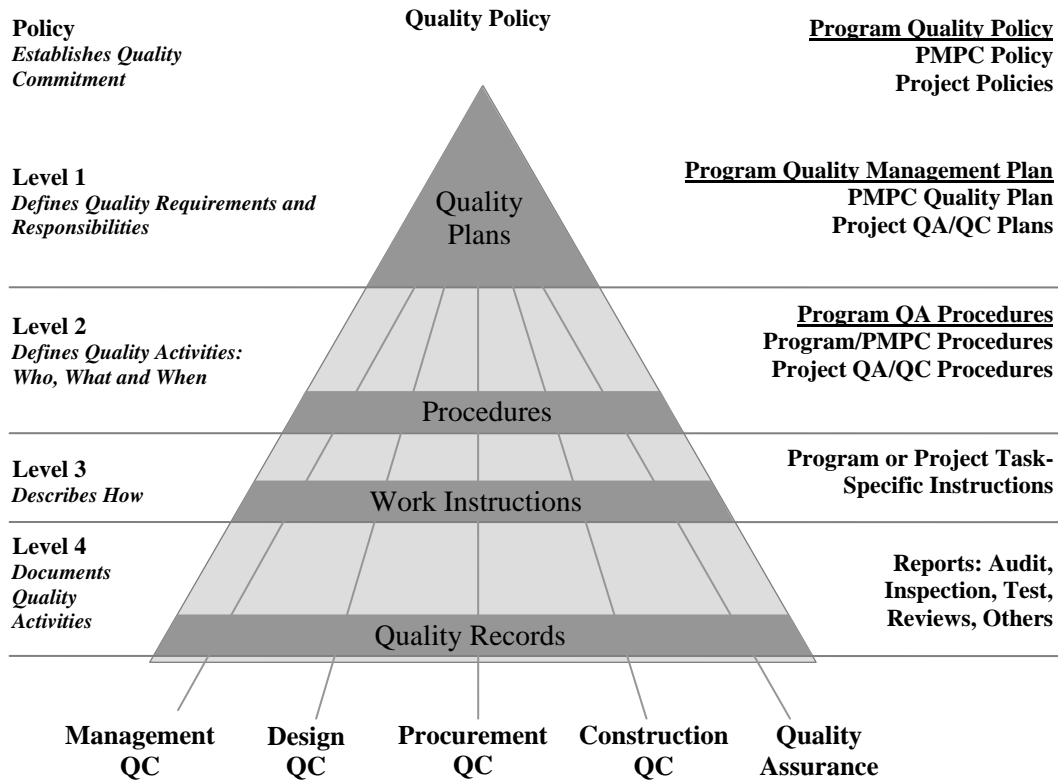


Figure 2.1: Quality Management System Overview

Quality policies are statements of commitment to quality and customer satisfaction. The Program Quality Management Plan and each project quality plan must include a quality policy that confirms and supports the Program Quality Policy, which appears at the front of this manual.

Each Program and project quality plan will contain both Level 1 and Level 2 documents. Level 3 Work Instructions will be provided wherever possible, and Level 4 Quality Records will be developed as appropriate.

Appendix A of this manual lists the Program and project documents, plans, and procedures for implementing the required quality elements described in this plan.

2.5.2 Quality Plans

Each organization providing management, design, construction, consulting or other services to the Program will develop, adopt and implement a quality plan appropriate to the service being provided that define the administrative and control measures to achieve the quality requirements of the QMS. These plans must define quality goals and objectives, specify quality-related activities through documented procedures and instructions, and assign responsibilities for conducting the activities and verifying that the quality objectives and FTA expectations are met. The specific requirements in the quality plans will be implemented as appropriate to cover each contract’s scope of services. These requirements will be included in the specifications and bid documents for engineering, procurement, construction, construction management and other services.

2.5.3 Program QMS Manual Issue and Control

The Program QMS Manual will be issued, revised, and updated as a controlled document. Distribution will include, at a minimum, the FTA, the TJPA, and all Program team members responsible for ensuring quality. Distribution lists and revision numbers and dates will be used to control the Program QMS Manual in accordance with Program document control procedures. The TJPA and the Program QA Manager will approve the initial QMS Manual and subsequent revisions before they are issued. Revisions to the Program QMS Manual will be coordinated with the PMPC Consultant and design consultants, suppliers, construction contractors and construction management consultants to ensure consistency in their application by all Program participants.

2.5.4 Program Quality Verification

The Program QA Manager with the approval of TJPA Program Management will perform quality verification document review, quality assurance monitoring, inspection, testing, and auditing as necessary to verify that consultants, construction contractors, subcontractors and suppliers are properly implementing the quality plan in compliance with contract requirements.

2.5.5 Implementing Documents

Transbay Transit Center Program Quality Policy.

As shown in Appendix A, Documented Quality System Outline.

3 Design Control

3.1 Purpose and Scope

Design control is implemented to verify that all design documents meet Program and project requirements. Design documents include all design deliverables, including design criteria, calculations, drawings, technical reports, specifications, and bid documents. This section defines the requirements for design control procedures to be included in project quality plans used on the Program.

3.2 Reference

FTA Quality Management System Guidelines (FTA-PA-27-5194-12.1, December 2012).

3.3 Responsibilities

Each PMPC project manager is responsible for performing design reviews and commenting on design deliverables.

All design consultant project managers are responsible for establishing, implementing, maintaining and continually improving the procedures and instructions that will control, verify and validate the design for their projects.

Design consultant project managers are also responsible for:

- a. preparing and submitting a quality plan for their scope of work
- b. planning the design development, integration, and verification activities and identifying specific personnel responsible for design, development, and verification activities
- c. assigning design development, integration, and verification activities to qualified staff equipped with adequate resources
- d. ensuring sufficient staff are assigned to complete the design development, integration, and verification activities
- e. scheduling design development, integration, and verification activities to include adequate time for all QC reviews required by the Quality Management Plan, and including these QC reviews in the project schedule
- f. managing design interfaces with other Program projects and third parties

Integration reviews shall be specified in the Design Quality Plan to be performed prior to each submittal. These should include reviews of integration of interdisciplinary designs, external stakeholders' requirements (including FTA requirements), and existing conditions.

Each consultant QA manager shall audit internal and external design and development activities to verify that design control procedures are being implemented. Each consultant QA manager shall provide relevant QA and QC documentation when requested by the Program QA Manager to facilitate Program audits.

TJPA Program Management is responsible for the review and approval of submitted design deliverables.

The Program QA Manager shall verify implementation of the QMS requirements for design control within each project.

3.4 General Requirements

The Program requires quality oversight of all phases of design to achieve the specified Program and project objectives. As part of their project-specific quality plans, each design consultant or subconsultant, or construction contractor or subcontractor preparing design documents shall prepare documented procedures for architecture and engineering activities, including planning, design preparation, review, approval, verification, distribution, revision, and control of the configuration of the design documents. These quality plans must meet the requirements of Section 3.5, Implementation, as well as the following criteria:

- a. Design work will be performed by qualified personnel and will comply with the documented procedures.
- b. Design control and review processes will be conducted to verify design integrity, reliability, safety, constructability, operability and economic maintainability.
- c. An individual of equal or higher qualification than that of the designer will perform an independent verification of design documents. The Program QA Manager will assess the qualifications and responsibilities of design reviewers.

3.5 Implementation

Project-specific quality plans shall include design control procedures addressing, at a minimum, the elements described in Sections 3.5.1 through 3.5.12.

3.5.1 Design Basis—Memoranda Describing Criteria and Requirements

Describe the methods and requirements for documenting and reviewing the basis of design, including the following:

- Identify, document and verify design input requirements, including owner, contractual and regulatory requirements relating to the project.
- Identify organizational and technical interfaces with input into the design process, and establish processes for transmitting and reviewing interface requirements.
- Establish acceptance criteria for the adequacy of design solutions in satisfying design input requirements.
- Identify, review, and approve inputs to the design basis prior to use.
- Ensure that any additions or changes to the design basis are properly checked and integrated as needed to ensure the quality of the design basis.
- Ensure that the design basis is issued internally and approved before beginning preliminary design activities; ensure that it is reviewed and approved by affected external entities before beginning final design activities.

3.5.2 Calculations

Describe the methods and requirements for documenting and reviewing calculations, including the following:

- methods and requirements for planning, uniquely identifying, preparing, checking, reviewing, controlling, approving, and documenting calculations
- methods and requirements for developing alternative calculations as required by authorities having jurisdiction where applicable

3.5.3 Drawing Preparation and Approval

Describe the methods and requirements for planning, preparing, checking, integrating, reviewing, controlling, approving, and documenting engineering drawings.

3.5.4 Technical Reports

Describe the methods and requirements for preparing, checking, reviewing, controlling and approving technical reports that document design input or are used as a basis for making decisions on the project.

3.5.5 Specifications

Describe the methods and requirements for preparing, checking, reviewing, integrating, controlling and approving specifications prepared during design to identify requirements for procurement and construction. Specifications should be well written and complete and include all applicable quality requirements.

3.5.6 Cost Estimates

Describe the methods for preparing, checking and reviewing quantity takeoffs and estimates of probable construction costs in conjunction with design.

3.5.7 Design Documents Prepared by Others

Describe the methods and requirements for documenting and reviewing design documents prepared by others, including:

- ensuring that any activity carried out by a subconsultant, subcontractor or supplier, including prime consultant design criteria, is conducted in accordance with a quality plan and supporting procedures that meet QMS requirements
- acknowledging, reviewing, accepting, and documenting engineering design inputs prepared by other organizations before incorporation into the design basis or design output

3.5.8 Design Changes

Describe the methods and requirements for documenting and reviewing design changes, including:

- identifying, documenting, appropriately reviewing and approving changes and modifications to the design basis, drawings, specifications, cost or schedule
- ensuring that design changes are controlled and authorized only by designated personnel

3.5.9 Project Record “As-Built” Documents

Describe the methods and requirements for documenting and reviewing project record documents, including:

- verifying that as-built drawings, specifications, calculations, and reports reflect completed project configuration

- verifying that final submittal-of-record documents are in accordance with contract requirements

3.5.10 Design Reviews

Describe the methods and requirements for documenting and conducting design reviews.

- Verify that design documents are adequate and back-checked in accordance with approved project design criteria and generally accepted design and engineering practices, including the following:
 - coordination between disciplines
 - physical coordination with adjoining projects
 - verification that all comments and directives from the TJPA have been addressed
 - cost checks
 - value engineering
- Ensure that design reviews incorporate requirements from other interfacing projects.
- Ensure that additional reviews are held and documented as appropriate, including the following reviews:
 - bidability reviews
 - constructability reviews
 - risk assessments

3.5.11 Design Verification

Define appropriate methods for verifying that design outputs satisfy the design input requirements, including:

- planning for and conducting design reviews
- determining when a review must be performed by an independent or outside entity
- undertaking qualification tests
- carrying out alternative calculations, as appropriate
- comparing the new design with a similar proven design, if available

3.5.12 Computer Programs

Describe the methods and requirements for documenting the use of and verifying computer programs, including:

- describing the methods for documenting the use of industry standard computer programs for design and analysis
- describing the methods for verifying custom or non-industry standard programs used for design and analysis
- describing methods for documenting input to computer programs used for design and analysis

3.6 Implementing Documents

As shown in Appendix A, Documented Quality System Outline.

4 Document Control

4.1 Purpose and Scope

This section defines the requirements for the control of all documents and data produced or used on the Program.

4.2 Reference

FTA Quality Management System Guidelines (FTA-PA-27-5194-12.1, December 2012).

4.3 Responsibilities

The PMPC Program Controls Manager is responsible for developing and implementing Program document and data control procedures.

Consultant, construction contractor, and supplier project managers are responsible for developing and implementing project-specific document and data control procedures that meet Program requirements for their scope of work.

The PMPC Program Controls Manager is responsible for reviewing and recommending approval of the consultant, contractor, and supplier document control procedures in accordance with PMPC document control requirements.

The PMPC Program Controls Manager is responsible for:

- maintaining and controlling a master set of the latest project documents
- controlling distribution of all controlled documents issued by PMPC, both electronic and hard copy
- maintaining lists of the personnel holding the controlled documents
- withdrawing controlled documents when document holders leave the project

The Program QA Manager is responsible for reviewing and assessing that document control procedures are effective in meeting the requirements of this policy.

The quality personnel of each project are responsible for reviewing and assessing that the project document control procedures are effective in meeting the requirements of this Program QMS.

All project personnel producing, using or revising any document or data that falls within the scope of controlled documentation are responsible for performing these activities in accordance with the document control procedures.

4.4 General Requirements

All documents used by the Program throughout all project phases will be managed to ensure that approved documents are available when and where needed, obsolete documents are withdrawn to prevent inadvertent use and documents are identified, tracked and stored to permit efficient retrieval.

4.5 Implementation

The PMPC Consultant will establish the Program procedures for document control.

Organizations working on projects within the Program, including design consultants, construction contractors, suppliers, and construction management consultants, will prepare project document control procedures describing the actual execution and method for document control that meet the Program requirements within their scope of work.

Document control procedures shall achieve the following objectives:

- a. All documents are reviewed and approved by designated personnel prior to issue for use.
- b. Document changes are approved by designated personnel; where possible, the reason for changes to documents that have previously been issued shall be indicated in the document or attachments.
- c. The review and approval of changes to previously issued documents follow the same procedures by the same functions or organizations that applied to the original reviews and approvals.
- d. Documents are available at locations where the use of the document is vital.
- e. The distribution of project documents is recorded and, in designated cases, controlled.
- f. A master list of all documents, indicating current authorized versions, is maintained.
- g. A historical record of project documents is maintained to record implemented changes, the proper release by authorized personnel, and distribution to the location where the prescribed activity is performed.
- h. Procedures exist to ensure that current information is available as required throughout the project and that obsolete information is withdrawn from use. Obsolete documents kept for historical record are identified as obsolete.
- i. Quality records are maintained and retained in accordance with Program procedures.
- j. Electronic documents are distributed and managed in the same manner as hard copy documents.
- k. Distribution of all controlled documents, both electronic and hard copy, is controlled.
- l. Lists of the personnel holding the controlled documents are maintained.
- m. Controlled documents are withdrawn when document holders leave the project.
- n. Protected information, i.e., information classified as Confidential Information, Sensitive Security Information, or Protected Critical Infrastructure Information, and access to it are handled according to Program procedures.

4.6 Implementing Documents

As shown in Appendix A, Documented Quality System Outline.

5 Purchasing

5.1 Purpose and Scope

This section defines the requirements for the preparation, review, approval and control of Program procurement activities. These requirements will provide for, as appropriate, the inclusion of quality, program control, and procedural requirements in procurement documents; source evaluation; objective evidence of quality furnished by the consultant, construction contractor, or supplier; inspection or audit at the source; and the evaluation of items upon delivery to verify conformance of products to procurement and contract document requirements.

5.2 Reference

FTA Quality Management System Guidelines (FTA-PA-27-5194-12.1, December 2012).

5.3 Responsibilities

The PMPC Consultant will support the preparation of documented procedures for the preparation, review, approval and control of Program procurement activities.

PMPC project managers, design consultants, and construction contractors are responsible for supporting the preparation of procurement documents that adhere to the Program QMS.

The PMPC Program Coordinator, with support by PMPC project managers, is responsible for supporting procurement activities.

All PMPC managers are responsible for reviewing and recommending the approval of program control or procedural submittals made by consultants, construction contractors, or suppliers in their area of authority in accordance with the Program QMS.

As part of the monitoring and audit function, the Program QA Manager is responsible for verifying compliance with this policy, which includes reviewing selected consulting, construction contractor and supplier procurement packages to evaluate the adequacy of the quality program, program control, and procedural requirements.

5.4 General Requirements

5.4.1 Purchased Material and Equipment

Prior to issue, purchasing and contract packages are prepared, reviewed and processed in accordance with approved procedures. Purchasing and contract packages checklists will be used to verify that the packages address the following issues:

- design, technical and quality requirements, by reference to design standards, specifications, drawings, and reference documents
- required source inspections, surveillance requirements, independent laboratory inspection, or witness or hold points, as necessary
- specific shipping, handling, storage, and safety requirements, as necessary
- specific quality plan, Program control, or procedural requirements, by inclusion or reference

- any required certifications of conformance or compliance
- the purchasing function is carried out in accordance with the standards and methods defined in the program procedures
- guaranteed right-of-entry to contractor or supplier facilities to perform quality audits to verify compliance by the contractor and their suppliers with the quality program requirements and to ascertain the following:
 - the existence and subsequent evaluation of a documented quality system
 - the ability of that organization to meet the Program's procurement and quality requirements
 - the ability of that organization to adequately ensure that the Program's products are controlled, handled, shipped, and stored to ensure acceptable quality of items and services

The PMPC Consultant may periodically audit accountability for, and verification of, the proper execution of these procedures.

5.4.2 Selection of Professional Services

Professional service contracts (including construction management) shall be prepared, reviewed, and processed in accordance with approved procedures prior to issue. Checklists will be used to verify that the packages include all applicable quality requirements. Prior to contract award, the ability of the professional services firm to meet contract requirements, including quality requirements, shall be assessed.

5.4.3 Selection of Construction Contractors

Construction contracts shall be bid, reviewed, prepared, approved, and processed in accordance with approved procedures before notice-to-proceed is issued. Checklists will be used to verify that the packages include all applicable quality requirements. Prior to contract award, the ability of the Construction Contractors to meet contract requirements, including quality and timeliness requirements, shall be assessed.

5.5 Implementation

The requirement to develop and implement design or construction quality plans that meet QMS requirements will be included in all requests for bids or proposals.

Any specific Program control or procedural requirements will be included by incorporation or reference in all requests for bids or proposals.

Contract change orders or design service scope changes shall be reviewed and approved using the same process as the original contract.

5.6 Implementing Documents

As shown in Appendix A, Documented Quality System Outline.

6 Product Identification and Traceability

6.1 Purpose and Scope

This section defines the requirements for product identification and traceability controls for material and equipment used in the Program. These controls ensure that only correct and acceptable items are used or installed and prevent the use of incorrect or defective items.

6.2 Reference

FTA Quality Management System Guidelines (FTA-PA-27-5194-12.1, December 2012).

6.3 Responsibilities

Personnel involved with receiving, storing, handling, issuing, or installing materials or equipment will implement the Program QMS.

Design consultants will identify material and equipment identification and traceability requirements and include them in the appropriate technical specifications.

The PMPC Consultant will identify material and equipment identification and traceability requirements and identify them in the appropriate contract documents.

Contractors are responsible for developing and implementing procedures that meet the specification requirements for this section.

6.4 General Requirements

Products used in the Program shall be identifiable and traceable so that their adherence to project or specification requirements can be verified and that any identified quality issues can be tracked, analyzed, and resolved.

6.5 Implementation

Contracts, specifications or other documents will specifically include requirements for the proper identification, traceability, and control of materials and items, including spare parts, throughout all stages of production, handling, storage, shipment, delivery, installation and testing.

Contractors and suppliers shall prepare and implement procedures that adhere to the following requirements:

- a. All equipment and materials are marked for identification upon receipt and during storage, pending their issue and installation or use.
- b. All equipment and materials specified as requiring control in accordance with this section are assigned unique identification throughout construction and testing.
- c. Manufactured items are traceable through unique serialization to the minimum requirement of the contract specification.
- d. The controlled quality records include the traceability history.

- e. Items that are not immediately used are marked and stored in a separate location for later use, with appropriate safeguards and documentation.
- f. Proper materials are drawn and installed in accordance with the approved design, including oversight by the manufacturer's quality assurance staff.
- g. Items that have been inspected and confirmed to be discrepant in accordance with QMS requirements are marked, segregated, and controlled.
- h. Parts or materials that are received without satisfactory identification, have lost their identification in process, or are otherwise untraceable are segregated. Such parts or materials shall not be used unless re-identified or recertified by the manufacturer's quality assurance staff.
- i. Audits and oversight are conducted, as necessary, to maintain reasonable assurance that contractor, subcontractor, manufacturer or supplier procedures are maintained and effectively carried out on a continuing basis. Audits and oversight activities ensure that purchased items are identified by positive markings or certifications, inspected when received and, if appropriate, kept in segregated storage containing identification data for controlled issue.

6.6 Implementing Documents

As shown in Appendix A, Documented Quality System Outline.

7 Process Control

7.1 Purpose and Scope

This section defines the requirements for identifying and controlling special processes. Special process and control instructions may be specified for critical, high-value, or high-risk operations, or when the specified performance cannot be verified upon completion or installation.

7.2 Reference

FTA Quality Management System Guidelines (FTA-PA-27-5194-12.1, December 2012).

7.3 Responsibilities

Design consultants are responsible for identifying work that requires special process instructions and for establishing workmanship standards. This includes identifying activities related to meeting the expectations of FTA or other involved agencies. These special requirements will be included in the specifications.

Construction contractors are responsible for performing work in accordance with the instructions and workmanship standards indicated in the special process instructions and specifications.

The Program QA Manager will monitor and verify conformance with documented procedures required for special processes. Examples include welding, non-destructive examination, heat treatment, and special coatings.

The Program QA Manager will verify that special process instructions have been included in the specifications and contract documents and that they are implemented.

7.4 General Requirements

Specifications shall describe the required performance and quality of the work product. Where the specified performance cannot be verified upon completion or installation, special process and control instructions may be specified.

7.5 Implementation

Contract documents and specifications will include specifications and acceptance criteria for any required special work processes to ensure that these processes are carried out under controlled conditions. Special processes can include the following requirements and procedures:

- a. Documented work instructions will define the manner of production and installation, where the absence of such instructions could adversely affect quality.
- b. These work instructions may be required to adhere to applicable standards, such as welding specifications, non-destructive examination, heat treatment requirements or special coating specifications.
- c. Special processes will use suitable production and installation equipment in a suitable working environment, and will comply with reference standards and codes and the quality plans.
- d. Special processes and products will be monitored and controlled during fabrication, manufacturing or construction.

- e. The design consultant or the Program QA Manager, as appropriate, will approve the process and equipment.
- f. All special processes performed by the TJPA, consultants, construction contractors, subcontractors, or inspection and test laboratories will be identified, planned and conducted under the required and applicable controlled conditions as specified in the contract documents.
- g. Before any of the aforementioned special processes begins, the qualified processes, the equipment, and personnel involved will be documented by the contractors, and the documentation submitted to the Program QA Manager.
- h. Records will be maintained for qualified processes, equipment, and personnel, as appropriate.
- i. Monitoring of these processes and product characteristics will be performed through the use of surveillance, hold-point inspections, report reviews, or audits.

The Program QA Manager will perform planned and systematic reviews or audits of processes and procedural compliance where results of processes cannot be fully verified by subsequent inspection or testing of the product.

7.6 Implementing Documents

As shown in Appendix A, Documented Quality System Outline.

8 Inspection and Testing

8.1 Purpose and Scope

This section defines the requirements for inspection and test activities during receiving inspection and testing, in-progress inspection and testing, final inspection and testing and start-up testing. These requirements will be included in construction quality plans used on the Program.

8.2 Reference

FTA *Quality Management System Guidelines* (FTA-PA-27-5194-12.1, December 2012).
U.S. Army Corps of Engineers Guideline Specification (CEGS) 01451, Contractor Quality Control.

8.3 Responsibilities

Design consultants are responsible for identifying inspection and testing requirements and including them in the specifications.

The project design managers are responsible for reviewing and recommending approval of start-up and commissioning test results.

Each contractor (or supplier) is responsible for identifying inspection and testing requirements in its own quality plan, performing and documenting its quality control inspections and tests, and documenting the inspecting work being performed by its subcontractors and suppliers.

Construction management consultants are responsible for performing independent inspections and preparing inspection checklists.

The Program QA Manager is responsible for reviewing and approving the contractor quality plans, and monitoring and verifying plan implementation and all inspection and test activities.

8.4 General Requirements

Contract documents and specifications shall include specific test and inspection requirements, including testing procedures, frequency and location, requirements for witnessing of tests, and where factory inspection and/or testing is recommended prior to shipping.

Contractor and supplier quality control plans shall meet the requirements of CEGS 01451, Contractor Quality Control, as appropriate to each organization's scope of work. These plans shall specify and describe inspection and test activities and include methods for controlling the quality of work performed by subcontractors and suppliers. These plans shall meet the requirements of Section 8.5, Implementation.

The inspection, testing and surveillance personnel who verify conformance of work activities for the purposes of acceptance shall not be the same personnel who performed the work being inspected or tested. Inspection, testing, and surveillance personnel shall be qualified and certified as necessary to perform the assigned inspection or testing task.

Contractors shall perform and inspect all work in accordance with their approved quality control plans, and in cases where it is required by contract, their approved test plans.

Oversight monitoring of inspection and testing activities by the project QA Manager will be based on the approved contractor or supplier quality plan.

8.5 Implementation

Contractor quality plans shall be based on the “three phases of control” approach as follows:

Phase 1: Preparatory phase, which consists of the actions required before beginning any definable feature of work

Phase 2: The work in each definable feature of work

Phase 3: Follow-up (performed daily to ensure that work is in compliance with requirements)

Contractors’ quality plans describe the inspections and tests to be performed, and the procedures for monitoring work being performed by subcontractors and suppliers. This plan, and a separate test plan if required by contract, shall be submitted to the Program QA Manager for review and approval prior to the beginning of relevant work.

At a minimum, these plans shall include the requirements specified in Sections 8.5.1 through 8.5.7.

8.5.1 Inspection and Test Planning

Contractor quality plans shall address inspection and test planning including the following:

- identification of the individuals, group, or test laboratory responsible for performing the inspection or test
- location of the inspection or test (e.g., on-site or off-site)
- item to be inspected and characteristics and activities to be inspected or tested
- a description of the method of inspection or test including identification of required procedures, drawings and specifications
- acceptance (i.e., pass/fail) criteria
- frequency of the required inspections or tests
 - Where a sample is used to verify acceptability of a group of items, the sampling procedure shall be based on recognized sampling practice.
 - Inspection or test hold points (where work shall not proceed without the specific consent of the appropriate quality representative) shall be identified in the plan.
 - Before continuing work beyond the designated hold point, consent to waive specified hold points shall be justified and recorded on documentation related to the hold point and include the identification of the quality representative consenting to the waiver.

8.5.2 Contractor Inspection Requirements

Contractor quality plans shall address, at a minimum, the following inspection requirements:

- Provide documented evidence, such as inspection reports, lab reports, test results or certifications of conformance as specified, that the work, including work of subcontractors and suppliers, was monitored or inspected.
- Perform incoming or receipt inspections of all purchased items so only approved materials, equipment and supplies, with appropriate quality documentation, are delivered to the project site.
- Perform source Inspections at supplier or subcontractor plant(s) as required.
- Perform “first article” inspections, including engineering tests and physical examinations, on the first production unit of all major components and systems, prior to delivery, to ensure compliance with contract requirements.
- As required in the contract documents and the appropriate rules and regulations, perform in-process inspections and testing of items in process or under construction to verify conformance to quality requirements throughout the duration of the process.
- In collaboration with construction management, agree on final acceptance inspection—procedures for inspection and turnover of completed items of work.
- Document inspection and test results. The Program QA Manager will evaluate inspection results and determine their acceptability, using technical personnel when required.

Items that have been modified, repaired, or replaced subsequent to final inspection shall require re-inspection or retest, as appropriate, to verify their acceptability.

8.5.3 Contractor Acceptance Testing

Contractor quality plans shall address acceptance testing, i.e., the regular testing of materials entering a construction project to verify that the materials or products comply with contract specifications or standards, including at a minimum the following:

a. Independent Testing Laboratory

- An independent testing laboratory will be approved by the Program QA Manager to perform required sampling and testing. The independent testing laboratory may be provided by the contractor or by the TJPA, depending upon the specific contract.
- The proposed testing laboratory will be accredited by an acceptable accreditation program such as the American Association of State Highways and Transportation Officials program; the American Association of Laboratory Accreditation program; the American Society for Testing and Materials (ASTM); the National Institute of Standards and Technology National Voluntary Laboratory Accreditation Program; or the International Conference of Building Officials Evaluation Service.
- The proposed laboratory will be subject to PMPC QA audits and surveillances to verify that industry test standards are upheld.
- Contractors will provide sufficient notice to the Program QA Manager to enable the manager to witness any prequalification tests.

b. Tests, Test Methods, and Test Frequency

Tests, test methods and test frequency will follow contract specifications. Sampling shall begin as soon as materials are placed on a project. Material that has been in storage after acceptance should be re-inspected before use, as appropriate.

c. Test Results Reporting Guidelines

Test results shall be submitted to the construction management consultant's resident engineer or inspector within five working days of sampling, or as specified in the contract. Tests that do not meet the specification requirements will be reported promptly.

8.5.4 Testing of Manufactured Materials

Contractor quality control plans will address the inspecting, accepting and testing of manufactured and prefabricated materials either by source inspection and testing, jobsite inspection and testing, or certificate of compliance, and shall include the following, at a minimum:

- Source inspection and testing will be performed by the approved testing laboratories.
- Sufficient notice will be given to the resident engineer or inspector and the Program QA Manager to enable them to witness these tests.
- Test results will be submitted to the resident engineer or inspector within five days after completion of the tests or earlier, if required.

8.5.5 Resident Engineer Inspection and Testing

The construction management consultant's quality plans shall address how the resident engineer or inspector will monitor the implementation of the contractors' quality programs. Quality plans shall include the following, at a minimum:

- Inspection guidelines and checklists that are based on generally accepted industry practice to assist the inspector. Appendix E contains a list of anticipated required inspection guidelines.
- Requirements for independent assurance sampling and testing (IAST) to verify that the contractor's acceptance testing is being performed correctly and reliably, and to ensure that the test equipment is properly calibrated.
 - The TJPA or the construction manager will employ an independent testing laboratory to perform the IAST to verify compliance with contract requirements.
 - A TJPA- or construction manager-employed testing laboratory will be qualified or accredited by an acceptable accreditation program as listed in Section 8.5.3, Contractor Acceptance Testing.
- Documentation of Inspection and Testing.
 - The resident engineer or inspector will clearly and accurately document the work accomplished and the conditions encountered on each contractual day (including weekends) in an inspector's daily report.
 - The resident engineer or inspector will notify the contractor of the improper use of materials, poor workmanship, or safety concerns and record this notification in the daily report. Each succeeding report must indicate the actions taken by the contractor to remedy the conditions until all unsatisfactory conditions have been corrected. All delays are noted in the daily report and verified with the contractor's representative for correctness. Taken together, these daily reports form a concise history of the project.

- The contract may require the contractor to take construction photographs, videos, X-rays, or other documentation at timed intervals to assist in documenting conditions. Whenever possible, photographs will also be used to document conditions subject to nonconformance reports and potential claims.

8.5.6 Quality Assurance Oversight Monitoring

The Program QA Manager will conduct oversight monitoring to verify that appropriate examinations, tests, measurements and inspections are being properly performed and documented by the contractor, independent testing laboratory, and resident engineer or inspector.

The results of the oversight monitoring will be documented in accordance with Program QA Procedures contained in Appendix D.

The Program QA Manager may be assisted by the various technical engineering disciplines assigned as field and discipline engineers to verify that contractor or supplier work processes and installation activities conform to Program requirements.

The Program QA Manager will monitor contractors' measuring and test equipment calibration and control processes for compliance with contract requirements, calibration industry standards and contractors' quality program procedures.

Calibration industry standards will take precedence in the evaluation. Calibration requirements are discussed in Section 9, Inspection, Measuring and Test Equipment.

Where products or materials fail to meet any design criteria or contractually imposed specification during inspection or test, the procedures for nonconformances will apply. Details of nonconformance control are described in Section 11, Nonconformance.

8.5.7 Quality Assurance Audits

The Program QA Manager may monitor and audit the performance of all inspection and test activities.

8.6 Implementing Documents

As shown in Appendix A, Documented Quality System Outline.

9 Inspection, Measuring and Test Equipment

9.1 Purpose and Scope

This section defines requirements for calibrating the equipment used for inspecting, monitoring and testing the quality of the work.

9.2 Reference

FTA Quality Management System Guidelines (FTA-PA-27-5194-12.1, December 2012).

9.3 Responsibilities

Design consultants are responsible for including in the specifications a requirement for all testing equipment to be calibrated prior to its use on the project.

Contractor and supplier quality control supervisors are responsible for ensuring that written procedures on the calibration and control of measuring and test equipment are provided and implemented, and that measurement and test logs are maintained.

The Program QA Manager will monitor contractors' and suppliers' calibration and control processes of inspection, measuring and testing equipment for compliance with the contract specifications and with the contractors' and suppliers' approved quality plans.

9.4 General Requirements

All Program participants using test equipment to verify the quality of the materials or work within the Program shall have documented procedures to ensure that the test equipment is in calibration. These procedures shall meet the requirements discussed in Section 9.5, Implementation.

Contractors and suppliers shall keep updated lists of all equipment requiring calibration, and their calibration recall dates, for equipment used on the Program.

Contractors and suppliers shall maintain accurate records of calibration, and these records will be available for review at the calibration facility.

9.5 Implementation

These calibration procedures will ensure that gauges, instruments and other measuring and test equipment used by the TJPA, contractors, subcontractors, suppliers or independent test inspection laboratory personnel in the performance of tests, measurements and inspection are of the range and type, and produce the level of accuracy, required to satisfy the measurement or test tolerance parameters specified.

The calibration procedures will define the method of calibration, means of identification, recalibration frequency, and provide for the recall of suspect or damaged measuring and test equipment to ensure continued accuracy and precision.

The adequacy of the calibration system or method will be evaluated on the basis of the "out-of-tolerance" data generated. Evaluation may require adjusting the frequency or analyzing the item or the associated calibration procedure.

Contractor and supplier quality plans shall meet the following requirements for the control of inspection and test equipment:

- a. Measuring and test equipment shall be positively identified with the name of the equipment, the name of the calibration lab, the date of the last calibration, and the date of calibration expiration.
- b. A calibration schedule of testing equipment shall be maintained for equipment that requires periodic and regularly scheduled calibration, indicating at a minimum the last calibration date and the next calibration due date.
- c. Prior to use and periodically thereafter if required, measuring and test equipment shall be calibrated against standards that have a known, valid relationship to national standards to provide for the accurate reporting of quality testing and inspection results. In situations where no national standard exists, the basis for calibration will be identified and documented. If rented equipment is used, dated calibration certificates will be provided each time equipment is rented.
- d. The tolerances used in calibration should comply with the manufacturer's recommendation or other specification or documentation.
- e. An independent calibration laboratory shall perform all calibrations.
- f. Environmental conditions for calibration shall be consistent with the manufacturers' recommendations and the location where inspection and testing is performed.
- g. Calibration shall be performed in accordance with approved calibration procedures. These procedures shall specify the following:
 - details of equipment type
 - identification number
 - location (as required)
 - calibration method and frequency
 - acceptance criteria
 - action to be taken if results are unsatisfactory
- h. When feasible, a sticker shall be secured to the calibrated equipment indicating calibration status, including last calibration date and next calibration due date.
- i. Results from tests requiring calibrated equipment that were performed with uncalibrated equipment shall be suspect. The test equipment used shall be tested and recalibrated. If the equipment is found to be within calibration limits, the test results shall be accepted. If the equipment was not within calibration limits, the tests results must be verified by other means, or the material in question replaced.

9.6 Implementing Documents

As shown in Appendix A, Documented Quality System Outline.

10 Inspection and Test Status

10.1 Purpose and Scope

This section defines the requirements for defining, documenting, and controlling the status of inspection and test activities, where necessary.

10.2 Reference

FTA Quality Management System Guidelines (FTA-PA-27-5194-12.1, December 2012).

10.3 Responsibilities

The Program QA Manager will approve and monitor the applicable test plans of the contractors, subcontractors and suppliers, either at the project site or at the suppliers' or manufacturers' facilities. This activity may include on-site surveillance or the review of applicable test reports before further processing.

Contractor and supplier quality control supervisors shall identify those persons authorized to apply and remove inspection and test status indicators and to release products for installation and use.

10.4 General Requirements

Procurement documents shall prescribe the requirements for the identification and reporting of the inspection and test status of products at supplier facilities or construction sites.

Inspection and test status shall be identified and controlled in accordance with specifications throughout each stage of the project. Control will include the identification of nonconforming work pending investigation and disposition. Photographic records of nonconformances can be useful.

10.5 Implementation

The status of inspection and test activities performed on products or services shall be identified on the items themselves, on documents or tags physically attached to the item, or by documents traceable to the item by a quality inspector. This may be accomplished by the use of markings, inspection records, shop travelers, stamps, color coding, tags that are physically attached to the item, or other approved means.

Where required, a test list shall be established and maintained containing the following information:

- a. test name, identifying item, or material being tested
- b. specification paragraph containing test requirements
- c. personnel and laboratory responsible for the test
- d. inspection authority responsible for the acceptance of test results
- e. inspection instructions, checklist, or reference for the applicable specification section
- f. test equipment used in the test

10.6 Implementing Documents

As shown in Appendix A, Documented Quality System Outline.

11 Nonconformance

11.1 Purpose and Scope

This section defines the requirements for controlling materials, parts, or components that do not conform to specified requirements. The intent is to ensure that nonconforming items are identified, documented, segregated, and dispositioned to prevent inadvertent use or installation. When appropriate, a proactive corrective action (see Section 12) may be required to prevent recurrence of the nonconformance.

11.2 Reference

FTA Quality Management System Guidelines (FTA-PA-27-5194-12.1, December 2012).

11.3 Responsibilities

All Program and project personnel detecting nonconformances shall identify the nonconformance to the lowest-ranking appropriate quality personnel as quickly as practical.

Contractors, resident engineers, inspectors, and the Program QA Manager will document nonconformances on an approved nonconformance report (NCR) form.

The contractor will document nonconformances in an NCR log for tracking purposes, and for use in identifying trends and root cause analysis. Upon request, this log will be made available to the PMPC Consultant, the Program QA Manager, and the CMO.

The supplier's quality assurance group will track and close nonconformances initiated in a supplier-facility, subject to audit by the Program QA Manager.

The Program QA Manager will monitor contractor and supplier quality control procedures for controlling and processing NCRs, and ensuring that they contain the correct information.

11.4 General Requirements

Nonconforming work should be identified, documented and evaluated to determine appropriate disposition. Supplier and contractor quality plans shall require that a nonconformance be documented in an NCR written by the designated quality representative(s). NCRs shall document the following information: nonconforming condition; approved disposition or instructions (e.g., "reject," "rework," "repair," or "accept-as-is" (see Section 11.5.3)); corrective actions taken; results of re-inspection after corrective work (if any) has been completed; and resolution of the nonconformance.

Nonconforming work, material, articles, or equipment shall be identified immediately upon detection, segregated if possible, and held, pending investigation and disposition. This includes work, material, articles or equipment supplied by construction contractors, their suppliers, and subcontractors. If segregation is not possible, nonconforming items should be clearly identified as such.

NCRs and related documentation shall be maintained as project quality records. NCR records and trends shall be analyzed by the Program QA Manager for potential improvements or corrective actions.

11.5 Implementation

11.5.1 Identification of Nonconforming Items

The identification of a nonconforming item may occur during a field inspection or surveillance inspection, or by review of documentation.

Nonconforming material shall be physically segregated to preclude further use without proper authorization. When segregation is not feasible because of its size, configuration or installation location, the material must be conspicuously identified by the methods described in the approved contractor, subcontractor, or supplier quality control plan.

11.5.2 Nonconformance Report Processing

Nonconformances will be documented using an approved NCR form in accordance with the contractor's approved quality plan. Field-initiated NCRs will be listed by the CMO on the NCR log and field management system for status tracking until closure.

Nonconformances occurring inside a supplier facility shall be handled in accordance with the requirements and processes in the approved supplier's quality control plan or manual.

Nonconformances discovered by inspections of supplier facilities or the contractor's on-site construction or installation will be immediately brought to the attention of the contractors or suppliers.

Whether an NCR is created at a supplier facility or in the field, the identification and control system will be maintained and available for the Program QA Manager's review at all times.

11.5.3 NCR Disposition

The NCR dispositions and instructions are defined as follows:

Reject—The item is unsuitable for its intended purpose and economically or physically incapable of being reworked or repaired.

Rework—The deficiency can be brought into conformance with all specification requirements through re-machining, reassembling, reprocessing, reinstalling, or completing the required operations.

Repair—Work is required which will result in making an item acceptable for its intended use, as determined by an engineering evaluation, even though it is not restored to a condition that meets all original specification requirements.

Accept-As-Is—An item that does not meet all requirements is allowed when an engineering evaluation determines that the item will satisfy its intended use. It is the same as "use-as-is."

If the recommended disposition of the nonconformance is listed as "repair" or "accept-as-is," the recommended disposition must be approved and signed by the applicable TJPA representative and the Program QA Manager. Work on items with a "repair" or "accept-as-is" disposition may not proceed without these signatures.

The status of all nonconformances will remain open until satisfactory corrective action has been implemented and approved by the applicable TJPA representative and the Program QA Manager.

11.6 Implementing Documents

As shown in Appendix A, Documented Quality System Outline.

12 Corrective Action

12.1 Purpose and Scope

This section defines the approach used on the Program to identify opportunities for continuous improvement, and identify appropriate corrective actions that address the root causes of nonconformances or process problems, monitor and document their implementation, and review their effectiveness.

12.2 Reference

FTA Quality Management System Guidelines (FTA-PA-27-5194-12.1, December 2012).

12.3 Responsibilities

Project quality representatives shall document and implement corrective actions resulting from NCRs, inspections, audits, or other management oversight.

The Program QA Manager shall lead a review of corrective actions and verify that their implementation is effective at correcting the process deficiency identified in the NCR. Verification may also be performed by contractors, suppliers, and design consultants, but QA personnel should be involved in the final verification and close out of the corrective action.

12.4 General Requirements

The Program will improve its processes and performance, and those of projects within the Program, through defined procedures for monitoring project management and technical performance. Deficiencies shall be analyzed to determine their magnitude and root cause; analysis will include evaluating opportunities for corrective action or process improvements.

12.5 Implementation

Corrective actions shall be tracked in the NCR database for proper disposition, closure, and use for additional preventive actions.

All consultant, contractor, and supplier quality plans shall include requirements for corrective action processes, including at a minimum the following:

- a. All NCRs are reviewed, and investigations are initiated to determine the root cause of the deficiency and the corrective actions needed to preclude recurrence of discrepancies. Contractors or suppliers must provide a complete and documented explanation of the nonconformance: explanations such as "mishandling" or "operator error" are not acceptable.
- b. Contractor or supplier corrective actions may include initiating new procedures, tests, measurements or instructions to alleviate the conditions causing the nonconformance.
- c. Program administrative corrective actions may include documenting new revision(s) to procedures or drawings to clarify, delete or add additional requirements.
- d. During normal surveillance activities, if the Program QA Manager discovers that the contract participant is not implementing the approved corrective action as agreed, or has not initiated an

NCR as required, a corrective action request (CAR) may be generated to document and bring additional focus to the condition.

- e. The CAR is written and processed in accordance with the requirements of the Program Quality Management Plan Section 8.5.6, Quality Assurance Oversight Monitoring. The CAR is immediately submitted to the responsible contract participant; a copy is sent to the Program QA Manager and the resident engineer, construction manager or PMPC project manager, as appropriate, for timely follow-up.
- f. Product or process discrepancies noted during quality audits will be reported as a quality assurance finding (see Section 14.0, Quality Audits). Corrective actions taken to prevent recurrence resulting from quality audits are also addressed in this section.
- g. Where nonconformances involve work common to multiple projects, the corrective action is memorialized in a lessons-learned format and disseminated throughout the Program.
- h. Potential risks and areas of improvement are identified continually throughout the life of the project.
- i. Analysis is done to detect the causes of and eliminate potential nonconformances before they occur or recur.
- j. Quality procedures are modified as needed based upon preventive or corrective actions and continuous improvement activities.

The Program QA Manager will monitor the implementation of the corrective action process.

12.6 Implementing Documents

As shown in Appendix A, Documented Quality System Outline.

13 Quality Records

13.1 Purpose and Scope

This section defines the requirements for the maintenance of quality records to ensure that they are properly identified, collected, stored, indexed, filed, and maintained until final disposition of the records, or later as required by the contract, to validate compliance with contractual requirements. Quality records include all the records required by the Program QMS, its supporting procedures, manuals, and specifications.

13.2 Reference

FTA Quality Management System Guidelines (FTA-PA-27-5194-12.1, December 2012).

13.3 Responsibilities

The Program QA Manager is responsible for ensuring that the Program procedures that implement this policy are established, maintained and implemented.

Quality personnel for each project within the Program are responsible for ensuring that the procedures that implement this policy on their projects are established, maintained, and implemented.

The Program QA Manager is responsible for verifying that these procedures are implemented and effective.

All personnel who generate quality records are responsible for ensuring that the records are complete, legible and accurate.

13.4 General Requirements

The Program will generate and keep quality records to demonstrate that the specified requirements were achieved and that the Program QMS was effectively implemented. Electronic data and documents will be regularly backed up, and the backups stored off site in a manner that ensures their safety from deterioration or damage.

13.5 Implementation

The PMPC Consultant and each project manager of organizations (e.g., A/E consultants, construction contractors) working on the Program will establish and maintain the procedures for the identification, collection, indexing, filing, storage, maintenance, and disposition of quality records.

Quality records shall be legible and clearly identify the material, equipment, or element of work involved.

Quality records shall be controlled, with clear traceability to current and superseded versions as applicable.

The indexing, filing, and storage of quality records shall allow documents to be easily identified and retrieved. Quality records shall be maintained in facilities that provide a suitable environment to minimizing deterioration and damage, and preventing loss.

Access to quality records will be provided to auditing agents for the purpose of conducting surveillance or audits to verify implementation of the QMS.

Where possible, test results, delivery slips, and certifications for the same materials should be kept together.

13.5.1 Types of Quality Records

Quality records include those specified in procurement and construction contract documents and documents from contractors and suppliers that are uploaded and stored in the Program’s document control system. Examples of quality verification documents for records control and retention include the following:

- | | |
|----------------------------|--|
| approved shop drawings | field test records |
| as-built drawings | inspector's daily reports |
| audit reports | laboratory test records |
| certificates of compliance | nonconformance reports |
| change orders | procurement documents |
| concrete pour cards | project certifications |
| contract change orders | project management reviews |
| contracts | project specifications and drawings |
| corrective action reports | quality training records |
| design check prints | quantity take-off check prints |
| design review reports | supplier’s quality verification submittals |
| design submittals | |

13.5.2 Retention of Quality Records

Quality records will be divided into two categories, lifetime and non-permanent, according to the length of time they will be retained.

Lifetime (permanent) records are those that provide:

- significant value in demonstrating safe design and construction and the capability of safe operation
- baseline data for inspection and testing
- significant value in maintaining, reworking, repairing, replacing, modifying, or otherwise supporting an item
- significant value in determining the cause of an accident, or the malfunction of an item

Non-permanent records are retained for a limited duration and will be labeled with “destruct” dates on the document container and on the appropriate transmittal forms. These records will be maintained for the contractually required period.

13.6 Implementing Documents

As shown in Appendix A, Documented Quality System Outline.

14 Quality Audits

14.1 Purpose and Scope

This section defines the requirements for internal and external quality audits to verify implementation of the Program QMS and its effectiveness.

14.2 Reference

FTA Quality Management System Guidelines (FTA-PA-27-5194-12.1, December 2012).

14.3 Responsibilities

The Program QA Manager is responsible for overseeing planning and executing audits of all Program quality activities, including the implementation of project-specific quality plans by project quality personnel.

Project quality personnel are responsible for planning and executing quality audits within their scope of work.

All Program personnel are responsible for assisting the Program and project quality personnel in the performance and documentation of audits, and the implementation of any corrective actions resulting from these audits.

14.4 General Requirements

The Program shall establish a comprehensive program of planned and documented internal and external quality audits—to be performed or overseen by the Program QA Manager—to verify that quality activities being performed by and for the Program meet the commitments of the QMS. These audits shall be used to provide feedback on the implementation and effectiveness of the QMS and confirm that discrepant conditions are addressed by comprehensive and verifiable corrective action.

14.5 Implementation

14.5.1 Quality Management System Review

The Program QA Manager shall perform and document a semiannual QMS review with senior staff from both the PMPC Consultant and the TJPA to assess the effectiveness of the QMS Manual and its implementation.

14.5.2 Assignment of Auditors

The Program QA Manager shall assign auditors with experience and training commensurate with the audit assignment. Records of the qualifications of all auditors shall be maintained by the Program QA Manager. Technical specialists may be used under the direction of a lead auditor to independently review or assess the technical adequacy and acceptance of specialized products or processes being audited.

14.5.3 Audit Scheduling

Audits are scheduled according to work completion status and the importance of the activity. They should be done early enough to ensure that adequate control has been planned and implemented during initial contract activities.

For each contract, audits schedules will vary according to the needs of the contract and will depend on the nature and importance of the activity being performed and the results achieved, as determined by the Program QA Manager. The audits should include reviews of Program document control, to ensure quality records are properly managed.

Every contractor and supplier shall be audited at least once during its contract. The Program QA Manager is responsible for planning and scheduling these audits. Project audits may be requested on activities outside of the normal scope of the quality program by the TJPA Executive Director, TJPA Program Management, PMPC Program Manager or PMPC project managers.

14.5.4 Audit Planning

In preparation for a contractor or supplier audit, auditors shall review the relevant commercial and technical documents used in the execution of the contract and the results of previous audits, if applicable. From this review, a checklist shall be developed to ensure that a comprehensive analysis is accomplished. The technical documents may include:

- quality assurance and quality control plans
- project procedures and instructions
- drawings, specifications and calculations
- industry standards (e.g., ASTM, ACI, FHWA, Caltrans)

14.5.5 Audit Execution

In some cases, external audits of the Program may be scheduled (e.g., an audit by the FTA project management oversight contractor). Prior to the execution of an external audit, the Program QA Manager will notify relevant Program and project management and the consultant, construction contractor or supplier of the time, duration and scope of the audit. On the initial day of the audit, the Program QA Manager will schedule an entry meeting to familiarize the project team with the audit process. The contractor is ultimately responsible for notifying subcontractors and suppliers about the audit requirements.

For an internal PMPC audit, Program management and the audit functional group participants are notified of the time, duration and scope of the audit, and provided with any relevant audit checklists. Functional group management is responsible for conformance to the audit requirements and will include architectural and engineering consultants, procurement, construction management consultants, and Program controls. The policies and procedures for the execution of this type of audit are identical to those for external audits.

Each audit shall begin with a pre-audit conference chaired by the audit team leader. At this meeting, the audit agenda will be discussed and commitments will be obtained from the head of the audited group regarding personnel to be contacted in the areas scheduled for audit.

Using the prepared checklist, the auditor will gather evidence to verify compliance with contractual requirements. Deficiencies that are noted shall be documented on a “quality assurance finding” form that describes the quality requirement, the finding, the recommended corrective action, if any, and the scheduled completion date.

Contactor or supplier departures from or failure to implement the requirements of the governing documents listed in 14.5.4 will be recorded as “quality assurance findings” on the audit report.

On the last day of an audit, an exit meeting shall be held to discuss the audit evaluation and findings before finalization of the audit report. This gives the functional group, contractor, or supplier the opportunity to examine, with the oversight group and the auditors, all the issues disclosed during the audit. Prior to the close of the exit meeting, the audited organization and audit participants will jointly agree on the corrective action plan, the assignment of the responsible group or person, and the scheduled due date for completion.

14.5.6 Audit Reports

An audit report written by the participating QA auditor or technical specialist will identify the scope of the audit, audit results and corrective action, and will include a quantitative and qualitative assessment of the effectiveness of the quality program.

The audit report will be prepared and issued within two weeks of the audit exit meeting. The audit report will be provided to Program and project management and to the functional organizations, contractors or suppliers having responsibility in the audited area. The audited organization will generally have one month to respond to the audit report.

Follow-up verification that corrective action has taken place will occur if the audited organization does not provide objective evidence with its response to the audit finding.

Audit results are reported to Program management in both job-specific audit reports and QA/QC activity status reports.

14.6 Implementing Documents

As shown in Appendix A, Documented Quality System Outline.

15 Training

15.1 Purpose and Scope

This section defines the requirements for the training of personnel working on the Program and its constituent projects to ensure they are familiar with all requirements of the Program QMS and its implementation. It also defines the requirements for the training of personnel working on the constituent projects to ensure they are familiar with all requirements of the various project quality manuals and their implementation.

15.2 Reference

FTA Quality Management System Guidelines (FTA-PA-27-5194-12.1, December 2012).

15.3 Responsibilities

Program design consultants, functional managers and other consultants will be responsible for identifying the personnel to implement the QMS and ensuring their training.

The Program QA Manager will be responsible for identifying training needs, and for designing, modifying, providing and documenting training on QMS implementation.

15.4 General Requirements

Personnel working on the Program and its constituent projects shall be trained in QMS requirements and implementation. Training sessions shall be documented. This training will provide assigned individuals with specific instruction and training covering the Program and project quality procedures and application of the procedures to their assigned tasks and responsibilities. When modifications are made to the procedures, training shall be provided on the updates.

15.5 Implementation

The PMPC Program Manager shall identify those PMPC and Program personnel responsible for ensuring quality who need to be trained in QMS implementation.

The Program QA Manager will design and conduct training sessions for identified Program personnel, and document attendance and course content. The Program QA Manager will also evaluate the effectiveness of the training, and modify it as needed.

The constituent project managers shall identify those project personnel responsible for ensuring quality who need to be trained in project quality procedures.

The project QA managers will design and conduct training sessions for identified project personnel, and document attendance and course content. The project QA managers will also evaluate the effectiveness of the training, and modify it as needed.

15.6 Implementing Documents

As shown in Appendix A, Documented Quality System Outline.

Appendix A

Documented Quality Management System Outline

The following table summarizes the requirements of the Transbay Transit Center Program’s Quality Management System (QMS). The table links these QMS requirements with the specific Program and project roles that are responsible for them, and the documents that describe the implementation of these requirements.

This outline of the documented QMS shows the Program and project roles responsible for the QMS requirements, and the documents that implement these requirements.

QMS Section	QMS Requirements	Responsibility	Implementing Documents
Program Quality Policy	Establish an FTA-compliant quality policy for the Transbay Transit Center Program Team	TJPA Program Management	Program Quality Policy PMPC QA/QC policies
Quality Management Plan (QMP) Subsection:	Establish a documented QMS	TJPA Program Management	Program Quality Policy Program Quality Management Plan project QA plans
<i>Introduction</i>			
	Establish a Program Quality Management Plan based on 15 quality elements required by the FTA	TJPA Program Management	Program Quality Management Plan
	Each organization in program provides a quality plan	All	PMPC Quality Plan project quality plans
<i>1.0 Management Responsibility</i>			
1.3.a	Establish and support a QMS	TJPA Executive Director and TJPA Program Management PMPC Program Manager Program Quality Assurance (QA) Manager	Program Quality Policy
1.3.b	Communicate Program Quality Policy to all employees and subcontractors	TJPA Program Management PMPC Program Manager	signed receipts for Program QMS QA training attendance records
1.3.c	Conduct management quality reviews	Program QA Manager Program Management staff	Program QA audit reports review meeting minutes
1.3d	Provide the necessary resources to implement the QMS	TJPA Program Management PMPC Program Manager	organization charts job descriptions
1.3.1	Provide Program management, direction and coordination	TJPA Executive Director and TJPA Program Management PMPC Program Manager	Program Management Plan Program Procedures

QMS Section	QMS Requirements	Responsibility	Implementing Documents
1.3.2	Adopt QMS and issue Quality Policy statements	TJPA Executive Director	QMS Manual
1.3.2	Manage and direct Program QA Manager	TJPA Executive Director	QMS Manual
1.3.3	Manage the design and construction of TJPA capital projects including Transbay Transit Center and Downtown Rail Extension	TJPA Program Management	Program QMS Manual
1.3.4	Provide oversight and administration of all activities related to design, construction, schedule, budget, quality assurance, inspection, and start-up of projects within the Program	TJPA Program Management PMPC Program Manager	Program QMS Manual PMPC Quality Plan Program Procedures
1.3.5	Provide day-to-day management of Program Coordinator, Program Controls Manager, Contracts Manager, reporting and administrative staff	PMPC Program Manager	Program QMS Manual PMPC Quality Plan Program Procedures
1.3.5	Control overall Program cost and schedule	PMPC Program Controls Manager	Program QMS Manual PMPC Quality Plan Program Procedures
1.3.6	Coordinate overall Program with the City and outside agencies	PMPC Program Coordinator	Program QMS Manual PMPC Quality Plan Program Procedures
1.3.7	Manage overall project performance and delivery of Transit Center building and related subprojects	PMPC Transit Center Project Manager and design managers	Program QMS Manual project QA plans project QA and QC procedures
1.3.8	Manage overall project performance and delivery of Downtown Rail Extension	PMPC DTX Project Manager	Program QMS Manual DTX Design QA Plan DTX Design QC Procedures
1.3.9	Plan, implement, evaluate and maintain Program QMS	Program QA Manager	Program QMS Manual and updates
1.3.11 & 1.3.12	Manage construction and commissioning of the Program in compliance with the Program QMS	QA managers for CM/GC, CMO & CM	audit reports
1.5	Verify that suppliers' and subcontractors' organizational responsibility and authority affecting quality are defined and that adequate resources are allocated to the work	TJPA Program Management Program QA Manager	evaluation reports pre-award survey reports suppliers' approved quality plans
2.0 Quality System			
2.3	Identify and provide adequate resources to support implementation of the QMS	TJPA Program Management PMPC Program Manager	organization charts job descriptions
2.3	Establish and maintain an effective and economical QMS	Program QA Manager	QMS Manual with supporting quality plans and documents as noted in this table

QMS Section	QMS Requirements	Responsibility	Implementing Documents
2.3	Establish and maintain quality plans with supporting procedures in their areas	project QA managers, or project managers if no project QA	project quality plans project quality procedures
2.3	Develop and implement quality procedures and work instructions	project QA managers, or project managers if no project QA	Program Procedures
2.4	Ensure quality verification personnel are independent of those responsible for performance of the work	TJPA Program Management project managers	job descriptions
2.5.1	Establish QMS structure	Program QA Manager project QA managers, or project managers if no project QA	Program QMS Manual project QMS manuals
2.5.2	Provide quality plans	TJPA Program Management project managers	Program QMS Manual PMPC Quality Plan project quality plans
2.5.3	Issue controlled copies of the QMS Manual to Program Team members responsible for ensuring quality	Program QA Manager	Program QMS Manual controlled copies
2.5.3	Issue revisions to controlled copies of QMS and withdraw obsolete information	Program QA Manager	Program QMS Manual revisions
2.5.3	Approve revisions to the QMS Manual	Program QA Manager	revision sheet with signatures of TJPA Executive Director PMPC Program QA Manager
2.5.4	Verify quality plan implementation by consultants, construction contractors, subcontractors and suppliers	Program QA Manager	Program QMS Manual Program QA audit reports Program QA audit log
3.0 Design Control			
3.3	Audit design processes to verify implementation of the design quality control plan	project QA managers	project audit reports
3.3	Perform/coordinate design reviews and comment on design deliverables	PMPC project managers & design managers PMPC Transit Center Design Managers	design submittal comment documents
3.4	Establish written procedures for A/E activities	PMPC project managers A/E project managers	Program Procedure 03-01, Management of Designers project quality procedures
3.4	Review and approve procedures and quality plan for any external design activities	PMPC project managers Program QA Manager A/E project managers	project quality plans project quality procedures
3.5	Conduct design and development activities in accordance with written procedures documenting design activities	A/E project managers	project quality plans project quality procedures
3.5.1	Prepare design basis—criteria and requirements	A/E project managers	design basis memoranda

QMS Section	QMS Requirements	Responsibility	Implementing Documents
3.5.2	Prepare calculations	design consultants	calculations, stamped and signed by designer upon final submittal
3.5.3	Prepare design drawings	design consultants	drawings, stamped and signed by designer upon final submittal
3.5.4	Prepare technical reports	design consultants	reports, stamped and signed by designer upon final submittal
3.5.5	Prepare specifications	design consultants	specifications, stamped and signed by designer upon final submittal
3.5.6	Prepare A/E estimates	design consultants	estimate documents and quantity takeoffs
3.5.7	Review design documents prepared by others	design consultants	documents signed by reviewer project QA audit reports
3.5.8	Prepare design changes	design consultants	design documents, stamped and signed by designer upon final submittal
3.5.9	Prepare “as-built” documents	design consultants	record drawings, stamped and signed by designer upon final submittal
3.5.10	Conduct design reviews	design consultants	design checksets, signed by designer, checker, and backchecker
3.5.11	Conduct design verification	design consultants	as-built drawing approval system test reports
3.5.12	Verify computer programs used in design activities	design consultants	computer program verification documents reports of computer runs on known problems
4.0 Document Control			
4.3	Ensure project consultants, contractors, and subcontractors have document control procedures	PMPC Consultant	project management plans project quality plans and procedures
4.3	Establish document control procedure to authorize, issue, record and control identified items	PMPC Consultant project managers	Program Procedures project procedures
4.5a	Review documents prior to issue, and review and approve revisions	PMPC Consultant project managers	Program Procedure 01-03, Internal Document Review project procedures
4.5d	Ensure documents are available where required, and that distribution is controlled and recorded	PMPC Consultant project managers	Program Procedure 03-02, Drawing and Specification Management Program Procedure 01-02, Document Control project procedures
4.5f	Maintain master list of documents	PMPC Consultant	Program Procedure 01-02, Document Control
4.5i	Maintain quality records	PMPC Consultant Program QA Manager project managers project QA managers	Program Procedure 01-02, Document Control Program quality records project quality records

QMS Section	QMS Requirements	Responsibility	Implementing Documents
5.0 Purchasing			
5.4.1	Ensure procedures for preparation of purchasing and contract packages include checklists for program requirements	TJPA contracts staff PMPC Consultant	TJPA Board Policy 001, Procurement Program Procedure 01-05, Procurement
5.4.2	Ensure procedures for professional services contracts follow program requirements	TJPA contracts staff PMPC Consultant	TJPA Board Policy 001, Procurement Program Procedure 01-05, Procurement
5.4.3	Ensure procedures for construction contracts follow Program requirements	TJPA contracts staff PMPC Consultant	TJPA Board Policy 001, Procurement Program Procedure 01-05, Procurement
5.5	Ensure purchasing quality requirements are included in procurement documents	TJPA contracts staff PMPC Consultant	TJPA Board Policy 001, Procurement Program Procedure 01-05, Procurement
5.5	Ensure contract change orders and scope changes are approved using same process as originals	PMPC Consultant	Program Procedure 03-02, Design Change Control Program Procedure, 04-04, Contract Change Orders
6.0 Product Identification and Traceability			
6.3	Ensure contract documents include specific product identification and traceability requirements; ensure specifications include specific product identification and traceability requirements	PMPC Consultant design consultants	design engineering specifications Construction Contract Documents
6.5	Ensure contract documents and specifications include requirement to identify and trace all equipment and materials throughout construction and testing	PMPC Consultant design consultants	design engineering specifications Construction Contract Documents
6.5.c	Ensure contract documents and specifications include requirement for manufactured items to be traceable through unique serialization	PMPC Consultant design consultants	design engineering specifications Construction Contract Documents
6.5	Ensure all equipment and materials are identified and traceable throughout construction and testing, and that manufactured items are traceable through unique serialization	construction contractor CMO QA Manager CM/GC QC Manager CM QA Manager	positive material identification (PMI) or other product identification documents inspection reports audit reports
6.5.f	Ensure specifications and contract documents include requirement for proper materials to be drawn and installed in accordance with approved design including oversight by manufacturers' QA staff	PMPC Consultant design consultants	design engineering specifications Construction Contract Documents

QMS Section	QMS Requirements	Responsibility	Implementing Documents
6.5.g	Ensure contract documents and specifications include requirement for items found discrepant through inspection to be marked, segregated and controlled	PMPC Consultant design consultants	design engineering specifications Construction Contract Documents
6.5.h	Ensure contract documents and specifications include requirement to segregate parts or material without satisfactory identification until re-identified or re-certified by manufacturer	PMPC Consultant design consultants	design engineering specifications Construction Contract Documents
6.5.g, h	Ensure all items found discrepant and all parts without satisfactory identification through inspection are marked, segregated and controlled	construction contractor CMO QA Manager CM/GC QC Manager CM QA Manager	inspection reports audit reports
7.0 Process Control			
7.3	Ensure specifications and contract documents include requirement for special process controls when special processes are required to ensure final product quality	PMPC project managers design consultants	design engineering specifications Construction Contract Documents
7.5	Ensure special process controls are in place when special processes are required to ensure final product quality	construction contractor CM/GC QC Manager	special process documentation inspection reports
7.5	Perform QA audits of special processes	Program QA Manager CMO QA Manager CM QA Manager	contractor QA procedures audit reports
8.0 Inspection and Testing			
8.3	Ensure specifications include specific inspection and test requirements	PMPC project managers design consultants	design engineering specifications
8.3	Perform inspection and testing per approved quality plans and test plans, including control of subcontractors' work	construction contractors	contractors' approved quality plans contractors' approved test plans
8.5	Perform QA audits of inspection and test procedures and activities	Program QA Manager CMO QA Manager	contractor QA procedures audit reports
9.0 Inspection, Measuring and Testing Equipment			
9.3	Establish written procedures for calibration and control of test and measurement equipment	project QA managers project quality supervisors	contractor quality plans contractor quality procedures
9.4	Maintain calibration records and schedules, and make them available for review	project quality supervisors	contractor quality procedures calibration records
9.4	Perform QA audits of equipment calibration	Program QA Manager CMO QA Manager CM QA Manager	contractor QA procedures audit reports
10.0 Inspection and Test Status			

QMS Section	QMS Requirements	Responsibility	Implementing Documents
10.4	Ensure specifications include specific reporting requirements for inspection and test status	PMPC project managers design consultants	Program Procedure 03-02, Drawing and Specification Management
10.5	As appropriate, indicate inspection and test status, and track the status on test list	project quality supervisors construction contractors	contractors' approved quality plans contractors' approved test plans
11.0 Nonconformance			
11.4	Maintain NCRs as quality records	Program QA Manager project QA managers	QMS Quality Assurance Procedure QA-08, Nonconformance Reports project quality plans contractor quality plans
11.4	Record and review nonconformances; look for trends and determine the need for future preventative action	Program QA Manager project QA managers	NCRs and logs
11.5.1	Identify, segregate (or tag) and hold non-conforming work, materials and equipment for investigation and disposition	project quality supervisors	QMS Quality Assurance Procedure QA-08, Nonconformance Reports contractor quality plans
11.5.2	Include NCR form and log for tracking nonconformances in quality plans	project QA managers CMO QA Manager CM QA Manager	QMS Quality Assurance Procedure QA-08, Nonconformance Reports project quality plans
11.5.2	Review non-conforming work, material or equipment to determine need for corrective/preventative action and for disposition	Program QA Manager project QA managers CMO QA Manager CM QA Manager	QMS Quality Assurance Procedure QA-08, Nonconformance Reports project quality plans
12.0 Corrective Action			
12.3	Verify implementation of the corrective action process	Program QA Manager project QA managers	QMS Quality Assurance Procedure QA-10, Audits project quality plans Program QA audit reports project QA audit reports
12.4 12.5	Analyze nonconformances to determine if there is a need for design or process improvement	Program QA Manager project QA managers CMO QA Manager CM QA Manager	QMS Quality Assurance Procedure QA-09, Corrective Action project quality plans
12.5	Initiate new procedures, tests, measurements or other actions to correct conditions causing the nonconformance	PMPC Consultant project managers CM/GC QC Manager Program QA Manager project QA managers CMO QA Manager CM QA Manager	QMS Quality Assurance Procedure QA-09, Corrective Action project procedures test instructions quality control instructions
12.5	Assign corrective actions with a schedule for timely implementation and follow up review	Program QA Manager project QA managers	QMS Quality Assurance Procedure QA-09, Corrective Action memos, schedules
12.4 12.5	Document and log corrective actions and review to establish need for additional preventive action	Program QA Manager project QA managers	corrective action reports corrective action log

QMS Section	QMS Requirements	Responsibility	Implementing Documents
13.0 Quality Records			
13.5	Establish procedures for identification, collection, indexing, filing, storage, maintenance, and disposition of quality records	PMPC Program Manager Program QA Manager project QA managers	QMS Quality Assurance Procedure QA-01, QA Program Procedure 01-02, Document Control project QA procedures
13.5	Verify that records are legible and identifiable to the material, equipment or element of work involved	Program QA Manager project QA managers	inspection reports project QA audit reports
13.5.2	Maintain quality records at project office	Program QA Manager project QA managers project managers CMO QA Manager CM/GC QC Manager CM QA Manager	quality record logs Program Procedures project QA procedures
14.0 Quality Audits			
14.5.1	Conduct semiannual management audits of the QMS	Program QA Manager project QA managers	QMS Quality Assurance Procedure QA-10, Quality Audits project QA procedures audit schedule Program QA audit reports and logs project QA audit reports and logs
14.5.1	Review QMS audit results to ascertain effectiveness of the QMS	TJPA Executive Director and TJPA Program Management PMPC Program Manager Program QA Manager project QA managers	QMS 1, Management Responsibility QMS Quality Assurance Procedure QA-10, Quality Audits minutes of review meeting
14.5.4, 14.5.5	Conduct audits of management, consultants, contractors, and suppliers	Program QA Manager project QA managers	QMS 1, Management Responsibility QMS Quality Assurance Procedure QA-10, Quality Audits project QA procedures Program QA audit reports and logs project QA audit reports and logs
14.5.6	Document results of audits and bring to the attention of personnel responsible for the area audited	Program QA Manager project QA managers	QMS 1, Management Responsibility QMS Quality Assurance Procedure QA-10, Quality Audits project QA procedures Program QA audit reports project QA audit reports
14.5.6	Take corrective action on deficiencies found by the audit	TJPA Executive Director and TJPA Program Management PMPC Program Manager project managers	QMS Quality Assurance Procedure QA-09, Corrective Action corrective action reports corrective action logs meeting minutes audit logs
15.0 Training			

QMS Section	QMS Requirements	Responsibility	Implementing Documents
15.5	Identify training needs to acquaint team personnel, including subcontractor employees, with quality requirements	Program QA Manager project QA managers project managers	QMS Quality Assurance Procedure QA-12, Training project QA procedures employee rosters subcontractor list
15.5	Conduct training as required	Program QA Manager project QA managers	QMS Quality Assurance Procedure QA-12, Training project QA procedures training materials, lesson plans, training records
15.5	Document training; record attendance and course content	Program QA Manager project QA managers	QMS Quality Assurance Procedure QA-12, Training project QA procedures training attendance lists training logs

Appendix B

Definitions

Accept-As-Is: A disposition which may be imposed for a non-conformance when it can be established by proper competent authority that the discrepancy will result in no adverse condition and that the item under consideration will continue to meet all engineering functional requirements including performance, maintainability, fit, safety and quality. This disposition must be accepted by the Program QA Manager and the TJPA.

Acceptance Criteria: Defined limits placed on characteristics, materials, products or services as defined in codes, standards or other requirement documents.

Acceptance Testing: Performing functional tests on articles submitted for acceptance. Acceptance tests will not have a detrimental effect on the operational life of the article, but will verify that each production article is essentially equal to those that successfully pass the qualification tests.

Action to Prevent Recurrence: Actions taken that would reduce the probability of a similar problem occurring in the future. Such action focuses on analyzing underlying cause(s) of an identified discrepancy or non-conformance and its generic implications.

Audit/ Quality Audit: A documented activity performed in accordance with written procedures or check lists to verify, by independent examination and evaluation of objective evidence, that applicable elements of the quality assurance program have been developed, documented and effectively implemented in accordance with specified requirements. An audit should not be confused with surveillance or inspection.

Auditor: An individual who performs any portion of a QA audit, including lead auditor, technical specialist, or auditors-in-training.

Audit Report: A signed, written document presenting the purpose, scope and results of an audit.

Buttress, Shoring Excavation: Project consisting of (a) construction of the perimeter shoring wall for the Transit Center building, (b) installation of a buttress next to the 301 Mission tower for ground support during excavation, and (c) the mass excavation and shoring wall bracing of the Transit Center site.

Calibration: Comparison and adjustment to a standard of known accuracy.

Cause: A chain of events or conditions responsible for an identified quality issue.

Certificate of Compliance: A written statement, signed by a qualified party, attesting that the item or services comply with specific requirements, and accompanied by additional information to substantiate the statement.

Certificate of Conformance: A written statement, signed by a qualified party certifying that items or services comply with specific requirements.

Conformance: Compliance with specified requirements.

Control: To exercise authority over and regulate.

Control Element: A documented activity to verify conformance with specific requirements of applicable specifications.

Construction Management Oversight Consultant, or CMO: The consultant team providing oversight management of the construction of the new Transit Center building and Bus Ramps, and related utility relocation.

Construction Manager/General Contractor, or CM/GC: The contractor managing construction of the new Transit Center building and Bus Ramps, and related utility relocation.

Corrective Action: Changes to processes, work instructions, workmanship practices, training, inspection, tests, procedures, specifications, drawings, tools, equipment, resources, or material that result in preventing, minimizing, or eliminating non-conformances.

Corrective Action Request (CAR): A form used to document and process the quality issue. See the attached sample.

Defect: The non-fulfillment of intended usage requirements.

Definable Feature of Work: Project-specific construction elements where quality control inspection and testing are required to verify that completed work meets contract and specification requirements. One or more specification elements may be included in the definable feature of work, e.g., 03100 Concrete form work, 03200 Concrete reinforcement, 03300 Cast-in-place concrete. See US Army Corps of Engineers Guideline Specification (CEGS) 01451, Contractor Quality Control.

Documentation: Properly recorded information.

Documented Quality Management System: The FTA 2012 QA/QC Guidelines require a documented Quality Management System to ensure project quality objectives are satisfied. For the Transbay Transit Center Program, this is accomplished with the QMS Manual, along with the quality-related sections of associated program and project manuals, procedures and instructions.

Downtown Rail Extension Project: The surface and below-grade extension of the Caltrain rail commuter service into the new Transbay Transit Center. The project is being design to accommodate the trains that will run on California's future high-speed train system.

Equipment: Any simple completed unit that can be used for its intended purpose without further processing or assembly.

Failure: Any condition that prevents the product or service from performing its specified function.

Finding: Objective evidence that a control element of an approved quality plan was not implemented, or not implemented properly.

Grade: An indicator of category or rank related to the features or characteristics that cover different sets of needs for products or services intended for the same functional use.

Inspection: Activities such as measuring, examining, and testing, gauging one or more characteristics of a product or service and comparing these with specified requirements to determine conformity.

Instructions: A document that provides detailed "how-to" directions to accomplish a task.

Lead Auditor: An individual specifically qualified to organize and direct a QA audit, to report audit findings, and evaluate corrective action.

Non-Conforming Item: Equipment, components, parts, and material that deviate in form, fit, or function from specified requirements. Lack of required documentation may also be cause for a non-conformance.

Non-Conformance Report (NCR): A document recording an identified non-conformance, its disposition, and its resolution. See Attachment QA-08-01 in Appendix D for a sample NCR form.

Objective Evidence: Facts that are observed and documented.

Observation: Evidence that a surveyable or auditable element exists that is not contrary to documented requirements, but may warrant further qualification or improvement.

Part: Individual pieces used in the assembly of single equipment units.

Program QA Manager: Program staff member responsible for planning, implementing, evaluating, and maintaining an effective quality management system for the Transbay Transit Center Program.

Program Management/Program Controls Consultant: The consultant team responsible for providing program management and controls staff to support the Transbay Joint Powers Authority's execution of the Transbay Transit Center Program.

Program Procedures: Program Management/Project Controls procedures written for overall program management.

Program Team: Collective term for the TJPA and its consultants working on the Transbay Transit Center Program.

Qualification Tests: Tests performed on original lots of production items to verify industry standard and design performance requirements. These tests may be more extensive than acceptance tests and may destroy the item being tested. Qualification tests may also be referred to as "design tests."

Quality: Conformance to specified requirements.

Quality Assurance (QA): All those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy the given requirements for quality. QA emphasizes "upstream" actions that directly improve the chances that QC actions will result in a product or service that meets requirements. QA includes making sure that the project requirements are developed to meet the needs of all relevant internal and external agencies, planning the processes needed to verify quality of the project, verifying that the equipment and staffing is capable of performing tasks related to project quality, verifying that contractors are capable of meeting and carrying-out quality requirements, and documenting the quality efforts.

Quality Control (QC): The operational techniques and activities that are used to fulfill requirements for quality. These techniques are used to verify that a product or service meets requirements. QC is carried out by the operating forces whose job is to do the work and meet the product or service goals. Generally, QC refers to the act of taking measurements, testing, and inspecting a process or product to verify that it meets specification. It also includes actions by those performing the work to control the quality of the work. Products may be design drawings or specifications, manufactured equipment, or constructed items. QC also refers to the process of documenting such actions.

Quality Issue: An action or condition that could adversely affect quality. Examples of quality issues include, but are not limited to, physical defects, test failures, incorrect or inadequate documentation, non-compliance with requirements, and deviations from instructions, procedures or specifications.

Quality Management: That aspect of the overall management function that determines and implements the quality policy.

Quality Management System (QMS): The documented organizational structure, responsibilities, procedures, processes and resources for implementing the Quality Policy.

Quality Management System Manual: The main document used to establish and implement a quality management system. The Quality Management System Manual contains the Quality Policy and the Quality Management Plan defining requirements for procedures implementing that policy.

Quality Oversight: The surveillance, investigation and evaluation of ongoing activities to verify that the elements of the overall QMS are functioning as intended. This can range from an informal process of “keeping in touch” with the parties assigned QA to formally documented QA activities conducted by QA staff. This includes oversight by Program Quality Assurance of sub-contractor or consultant implementation of their quality plans.

Quality Plan, Quality Management Plan: A written description of intended actions to control and verify quality. The quality plan defines the applicable quality policy for the program and applicable quality procedures. For each project within the program, each consultant or contractor implementing project phases will develop quality plans consistent with the requirements of the Program Quality Management System.

Quality Policy: The overall quality intentions and direction of the organization as regards to quality, as formally expressed by top management.

Quality Procedure(s): Written instructions for implementing various components of the Quality Management System. Procedures will identify what is to be done, who will do it, how, where, and when it will be done.

Quality Program: The coordinated execution of applicable QA and QC plans and activities for the project.

Quality System Review: A formal evaluation by top management of the status and adequacy of the quality system in relation to quality policy and new objectives resulting from changing circumstances.

Reject: The action taken to eliminate a non-conforming item from its specified use.

Repair: A procedure that reduces but does not completely eliminate a non-conformance. Repair is distinguished from rework in that the characteristic after repair still does not conform to the applicable original acceptance criteria.

Rework: A procedure applied to a non-conformance that will completely eliminate it and result in a characteristic that conforms completely to the applicable acceptance criteria.

Surveillance: The act of monitoring, witnessing, or observing to verify whether an item or activity conforms to specified requirements. A surveillance activity is usually limited to a small segment of work or a product.

Subcontractor or Trade Subcontractor: Any independent individual or organization that furnishes services and associated materials and products.

Specification: The document that prescribes the requirements for products, workmanship, or services.

Supplier: Any individual or organization who furnishes materials, products and related services.

Traceability: The ability to trace the history, application or location of an item or activity, or similar items or activities, by means of recorded identification.

Verify: To determine conformance to specified requirements.

Work Instructions: Detailed directions on how to implement a work activity or procedure. These are normally prepared by the personnel performing the task with assistance from their management.

Appendix C

Abbreviations

Abbreviation	Full Text
A/E	architect/engineer or architectural/engineering
AC Transit	Alameda–Contra Costa Transit District
ACI	American Concrete Institute
ASQ	American Society of Quality
ASTM	American Society of Testing and Materials
Caltrans	California Department of Transportation
CAR	corrective action request
CEGS	U.S. Army Corps of Engineers Guideline Specification
CQA	Certified Quality Auditor
CM	construction manager
CM/GC	Construction Manager/General Contractor
CMO	Construction Management Oversight Consultant
DRR	document review record
DTX	Downtown Rail Extension
FEIS/EIR	Final Environmental Impact Statement/Environmental Impact Report
FTA	Federal Transit Administration
IAST	independent assurance sampling and testing
Muni	San Francisco Municipal Railway
NCR	nonconformance report
PMPC	program management/program controls
QA	quality assurance
QAF	quality assurance finding
QC	quality control
QMS	Quality Management System
SamTrans	San Mateo County Transit District (bus services)
TJPA	Transbay Joint Powers Authority

Appendix D

Quality Assurance Program Procedures

Appendix D contains the quality assurance program procedures that the Program QA Manager will follow when auditing the individual quality plans of design, construction, and construction management consultants and contractors.

These Program participants may use these procedures as guidelines to developing their quality plans and ensuring that their individual procedures meet the requirements of the Program QMS.

Contents

**Procedure Title
No.**

QA-01	QA Program	D-3
QA-02	Quality Planning	D-9
QA-03	Review of Design Documents and Packages	D-11
QA-04	Contractor & Supplier Quality Program Evaluation	D-13
QA-05	Purchasing Quality Assurance	D-15
QA-06	Contractor & Supplier Surveillance	D-17
QA-07	Inspection and Testing.....	D-19
QA-08	Nonconformance Reports	D-23
QA-09	Corrective Action	D-27
QA-10	Quality Audits	D-29
QA-11	Qualification of Auditors.....	D-33
QA-12	Training	D-37

The procedures on the following pages may be revised from time to time. The most current procedures will be maintained in controlled copies of the Quality Management System Manual.

QA-01—QA Program

1 Purpose

The Quality Assurance (QA) Procedures define the management approach, organization, interfaces, and controls used to ensure that the engineering, design, procurement, construction, and start-up are performed in accordance with the requirements defined in the Transbay Transit Center Program Quality Management Plan.

2 Scope

This QA Program applies to all project activities and personnel of the Program and provides for planning, checking, reviewing, revising, monitoring, and auditing to ensure that the design-, procurement-, and construction-related activities conform to applicable quality criteria and standards.

3 Responsibilities

Quality is the responsibility of the organization and individuals performing the work.

Quality is maintained through the appropriate planning and control of work operations and is verified by specific quality control activities such as reviewing, checking, inspecting, or testing.

The QA Manager, who is independent of the work activities being performed, performs surveillance monitoring and auditing of the Program's ongoing work activities. The Program Quality Management System (QMS) allows the QA Manager to identify, recommend, or provide solutions to quality problems.

The Program QA Manager, who reports to the TJPA Executive Director and the PMPC Program Manager, is responsible for developing and maintaining the Quality Program and for supporting and evaluating the effectiveness of the Program QMS. The QA Manager is also responsible for:

- implementing an audit and surveillance system to monitor Program and project activities and determine compliance with Program and project QMS requirements
- reviewing design documents, including procurement documents, for inclusion of inspection and quality requirements in accordance with the specification(s)
- reporting regularly to the Program Management Team on QA/QC activities and problems
- reviewing and approving design consultants', contractors', construction managers', and suppliers' quality control plan submittals
- conducting independent reviews of design and design and construction packages
- monitoring material testing laboratory sampling and testing activities
- reviewing suppliers', contractors', and subcontractors' quality verification record submittals
- monitoring and auditing project participants' field operations for compliance to their approved quality control programs
- identifying needed corrective action; initiating, recommending, coordinating and providing solutions for quality problems
- providing quality assurance indoctrination and training to project personnel

4 References

Quality Management System Manual

Quality Management Plan (QMP):

Section 1 Management Responsibility

Section 2 Documented Quality System

Appendix D: Project Quality Assurance Procedures

QA-02 Quality Assurance Planning

QA-03 Quality Assurance Review of Design Documents and Design/Construction Packages

QA-04 Procurement Quality Verification

QA-05 Contractor/Supplier Surveillance

QA-06 Contractor/Supplier Quality Program Evaluation

QA-07 Inspection and Testing

QA-08 Nonconformance Reports

QA-09 Corrective Actions

QA-10 Quality Audits

QA-11 Qualification of Auditors

QA-12 Training

5 Procedure

5.1 Surveillance and Monitoring

The Program QA Manager is responsible for independent monitoring of the performance of work activities for compliance with the quality program requirements.

The QA Manager coordinates surveillance and monitoring activities with the Program and project teams to minimize the impact of surveillance and monitoring on the normal conduct of project work.

Surveillance and monitoring may be both scheduled and unscheduled. Scheduled monitoring activities are shown on the QA planning schedule as addressed in QA Procedure QA-02, Quality Planning.

Evidence of compliance with specific quality requirements is examined during surveillance and monitoring activities.

Surveillance and monitoring activities are documented in a QA work plan/log and are reported in the QA activities report. Where resolution of areas found to be in non-compliance with quality requirements and cannot be reached in the normal course of prescribed work, a corrective action request (CAR) or a nonconformance report (NCR) shall be issued.

See QA Procedures QA-06, Contractor/Supplier Surveillance; QA-08, Nonconformance Reports; and QA-09, Corrective Action.

5.2 Quality Audits

5.2.1 External Audits

Oversight monitoring and audits may be conducted by the FTA's project management oversight contractor in the overall Program work by the PMPC team including QA. These audits ensure that an unbiased review of Program management and controls and the QMS is accomplished.

5.2.2 Internal Audits

Audits of the Program team participants, including design consultants, contractors and subcontractors, suppliers, technical services contractors, and construction management consultants, shall be conducted in accordance with QA Procedure QA-10, Quality Audits. Project QA audits may be conducted by team participants using their own approved QA procedures or Procedure QA-10, Quality Audits. The Program QA Manager is responsible for assigning program audit personnel. The experience and training of each auditor shall be commensurate with the audit assignment.

Audits are conducted to verify conformance to approved policies, procedures, or instructions. Audits may also include verification of the technical adequacy of end products. Technical specialists will be used under the direction of the lead auditor, to independently review or assess the technical adequacy of the end product.

Audits shall be conducted on a schedule commensurate with the activities being performed. The audit frequencies may vary depending on the nature and importance of the activity being performed and the results achieved at the sole discretion of Program QA Manager.

Audits shall be performed using auditor-prepared checklists developed from applicable project procedures and instructions, technical requirements of engineering drawings and design output documents, and quality program plans, manuals, and procedures. A departure from or failure to implement the requirements from the above governing documents shall be recorded as a quality assurance finding (QAF).

Each audit performed shall be documented by an audit report, and shall include, as a minimum, the following information:

- narrative summary of the scope of the audit for each area audited
- identification of the auditors and persons contacted during the audit
- summary of audit results, including an assessment of the quality program effectiveness
- clearly defined descriptions of QAFs
- corrective action completion dates

Audit results shall be reported to the audited organization's management, the PMPC Program Manager, and TJPA Program Management.

The audited organization shall take timely and appropriate action to correct conditions documented by the QAF and to prevent their recurrence.

The implementation of corrective action for deficient items or areas shall be verified by the Program QA Manager through follow-up actions such as the review of documentation and activities or re-audits, as necessary.

5.3 Nonconforming Items, Materials, and Processes

Non-conforming items, materials, or processes occurring during on-site construction are identified and controlled in accordance with the participant's quality plan and procedures, as outlined in the contract specifications and the quality plan.

Nonconformances may be identified as a result of a deviation in form, fit, or function, or the lack of proper or complete documentation used to verify quality conformance.

Items, materials, and processes that do not conform to the quality requirements shall be identified, removed, and stored to prevent their inadvertent use or installation.

Nonconformances shall be controlled and documented in accordance with the contractors' and suppliers' approved quality control plans and contract requirements. The contractors shall use the Program's NCR form and instructions, or obtain approval for a substitute NCR form prior to using it.

NCRs initiated by Quality Assurance or by the resident engineer or inspector shall be immediately brought to the attention of the project participant. The NCRs are to be written and processed in accordance with Quality Management Plan Section 11, Nonconformance, and QA Procedure QA-08, Nonconformance Reports.

Quality Assurance shall monitor the nonconformance reporting system of the contractors and suppliers for compliance to their established quality plans and the contract requirements.

5.4 Quality Improvement

The Program Team is responsible for initiating actions to communicate and improve the quality of deliverables and services.

Continuous attention shall be given to the quality of work performance and program effectiveness.

5.5 Corrective Actions

Deficiencies that require management action to correct systemic or process problems are identified, reported, and tracked by a corrective action request (CAR), as described in QA-09, Corrective Action. Corrective action in such cases shall include all the necessary steps that management can take to preclude or minimize recurrence of the problem. The CAR documents the identification of the adverse condition, the corrective action taken, and the follow-up verification.

All Program and project personnel are responsible for reporting situations warranting a CAR to the Program QA Manager. The following conditions may warrant a CAR:

- failure to obtain appropriate approval before making changes to policies or procedures
- repeated failure to follow approved procedures
- failure to act to resolve a deficiency discovered in a program or project audit
- failure to process design changes in accordance with established procedures
- systemic or process problems having an adverse effect on quality

5.6 Quality Assurance Records

The Program QA Manager will establish a systematic method for identifying, collecting, indexing, filing, storing, retrieving, and maintaining quality records.

Copies of the following QA documents shall be maintained with the project quality records:

- Program Quality Management System Manual (initial issue plus revisions—archive copy)
- Program Quality Assurance Plan (initial issue plus revisions—archive copy)
- Program Quality Assurance Procedures (initial issue plus revisions—archive copy)
- quality assurance planning schedules
- quality assurance activity reports
- contractor or supplier quality program evaluations
- quality assurance surveillance reports
- quality assurance audits
- nonconformance reports
- corrective action requests
- quality assurance findings
- corrective action reports
- quality assurance reviews—design and design construction packages
- inspection guidelines (initial issue plus revisions—archive copy)

6 Definitions

Refer to Appendix B of this manual for a list of definitions.

7 Attachments

None.

QA-02—Quality Planning

1 Purpose

The purpose of this QA procedure is to establish the policy for QA planning and scheduling activities.

2 Scope

This QA procedure provides for planning and scheduling quality assurance surveillance and audit activities.

3 Responsibilities

The Program QA Manager is responsible for implementing an audit and surveillance system to monitor Program activities and determine compliance with the Program Quality Management System (QMS) requirements.

4 References

Quality Management Plan (QMP):

Section 1 Management Responsibility
Section 2 Documented Quality System
Section 3 Design Control
Section 7 Process Control
Section 8 Inspection and Testing

Appendix D, Program Quality Assurance Procedures:

QA-01 Quality Assurance Program
QA-06 Contractor/Supplier Surveillance
QA-07 Inspection and Testing
QA-10 Quality Audits
QA-12 Training

5 Procedure

5.1 Planning and Scheduling

Planning of surveillance and audit activities shall be based on the preliminary engineering, final design, and construction schedules for the projects within the Program.

Attachment QA-02-1, Quality Assurance Program Planning Schedule, identifies the planned surveillance, and audit activities for each project team design consultant, contractor, and supplier. The QA planning schedule also provides a status of completed audits, surveillances, and findings. The schedule is reviewed monthly by the Program QA Manager for updates and is issued with the quality assurance activity report.

Attachment QA-02-2, Quality Program Elements, shall be used for scoping surveillance and audit activities.

5.2 Quality Checklist

A quality checklist, see form QA-02-3, Quality Checklist, shall be developed by the Program QA Manager and used during monitoring and auditing activities to verify the implementation of the project participants' quality programs. This will involve the review of procedures, records, documentation, work practices, and discussions with project personnel.

5.3 Documentation

Forms QA-02-4, Work Plan, and QA-02-5, Work Plan Log, are used to document planned surveillance and audit activities.

Work plans are typically prepared at least once a month. The frequency may be decreased to bimonthly at the discretion of the Program QA Manager, based on the level of project QA activity. For surveillance activities, the work plans shall show specifications, manuals, procedures, etc., as necessary, to define the activity.

6 Definitions

Refer to Appendix B in this manual for a list of definitions.

7 Attachments

QA Forms:

QA-02-1 Quality Assurance Program Planning Schedule

QA-02-2 Quality Program Elements

QA-02-3 Quality Checklist

QA-02-4 Work Plan

QA-02-5 Work Plan Log

QUALITY PROGRAM ELEMENTS

1.0 Management and Administration

1.1 Project Procedures

- 1.1.1 Project procedures followed.
- 1.1.2 Procedures; issued appropriate for nature of project.

1.2 Scope

- 1.2.1 Scope of services issued.
- 1.2.2 Scope documents consistent with contract.
- 1.2.3 Scope change control system implemented.

1.3 Project Organization

- 1.3.1 Responsibilities clearly defined.
- 1.3.2 Project organization chart issued.
- 1.3.3 QA/QC Management identified on organization chart.

1.4 Indoctrination on Project Procedures and Prime Contract

- 1.4.1 Personnel have working knowledge of project procedures.

1.5 Work Plans, Schedules, and Budgets Established

- 1.5.1 Code of accounts, facility codes, etc., established.
- 1.5.2 Cost and schedule control systems implemented.

1.6 Certification/Registration

- 1.6.1 Certification of personnel accomplished as required (professional engineers, architects, etc.).

1.7 Document Control

Document Control (procedures, drawings, specifications, calculations, purchase orders, contracts, including changes, which prescribe activities affecting quality).

- 1.7.1 Documents reviewed and approved, as applicable.
- 1.7.2 Revisions clearly identified.
- 1.7.3 Record of distribution and assurance of receipt (including revisions or notification of obsolescence) prepared.
- 1.7.4 Control register and logs accurate and up to date. Project Document Control Center routines complete and systematic.
- 1.7.6 Proper documents and revisions in use at work location.

1.7.7 Removal or marking of obsolete documents accomplished.

1.7.8 Files systematic, retrievable, and complete with record copies retained.

1.8 Communication Control

Communications Control (letters, memoranda, electronic-mails, faxes, telecoms, minutes).

1.8.1 Incoming and outgoing logs show date, subject, originator, recipient, and code/identification.

1.8.2 Action item follow-up performed for incoming and outgoing communications and record of closeout.

1.9 Records

1.9.1 Quality records requirements defined.

1.9.2 Records have information to identify the activity to which record applies, legible, complete, dated, signed or otherwise authenticated.

1.9.3 Records are retrievable and protected from deterioration.

1.9.4 Periodic turnover of records for archival storage and protection accomplished.

1.9.5 Records turnover and maintenance fulfilled at close of project.

1.10 Filing System

1.10.1 System/index established and systematic; office/field coordinated.

1.10.2 Up-to-date.

1.10.3 Files retrievable.

1.10.4 Official files complete.

1.10.5 Filing responsibilities defined.

1.11 Reference Library

1.11.1 Documents required by contract and procedure are contained in library.

1.11.2 Documents required by design criteria/specifications are contained in the library.

1.11.3 Documents up-to-date or specified editions contained in library.

1.11.4 Standards/codes referenced in the technical specification are contained in the library.

1.12 Quality Assurance

- 1.12.1 Means of evaluating quality performance established.
- 1.12.2 Corrective action to prevent recurrence of problems initiated.
- 1.12.3 QA audits and corrective action performed on identified deficiencies.

1.13 Management Reports

- 1.13.1 Required reports are timely and accurate.

2.0 Engineering

2.1 Design Criteria

- 2.1.1 Discipline criteria approved by owner/agency/designer.
- 2.1.2 Coordinated among discipline groups.
- 2.1.3 Client approval or acknowledgement received.
- 2.1.4 Issued to project engineering team.
- 2.1.5 Criteria in use by project engineering team (proper revision).
- 2.1.6 Document control.

2.2 Design Interfaces

- 2.2.1 Design Interfaces (between project and client, segment designers, specialty groups, other design build contractors, engineering subcontractors).
- 2.2.2 Defined and documented (including scope of design responsibility, review, approval, transmittal requirements, and lines of communication).

2.3 Design Output Documents—Drawings

- 2.3.1 Clear definition of acceptance criteria provided.
- 2.3.2 Compliance with drafting standards; changes complete before initialing.
- 2.3.3 Checked by independent checker; back checked; changes complete before initialing.
- 2.3.4 Coordinated prior to issuing for use.
- 2.3.5 Approved prior to issuing for use.
- 2.3.6 Registered engineer or architect seal, if required.
- 2.3.7 Preliminary or incomplete design identified as such.
- 2.3.8 Off-project review completed, as required, and approved.
- 2.3.9 Purpose of revisions or issue noted on drawings.
- 2.3.10 Revisions reviewed and approved.

- 2.3.11 System integration and configuration management checks performed.
- 2.3.12 Constructability and bidability reviews accomplished.
- 2.3.13 Document control.

2.4 Design Output Documents—Specifications

- 2.4.1 Acceptance criteria clearly defined.
- 2.4.2 Completeness, including format, identification, page numbering, and date.
- 2.4.3 Inclusion of special requirements, such as cleanliness, handling, packaging, shipping, storage, identification, inspection, maintenance, records, payment, and submittals.
- 2.4.4 Reviewed by independent engineer/architect.
- 2.4.5 Approved prior to issuance of use.
- 2.4.6 Registered engineer or architect seal, if required.
- 2.4.7 Preliminary or incomplete design identified as such.
- 2.4.8 Off-project review completed, as required, and approved.
- 2.4.9 Purpose of revision or issue noted on cover page with clear indication of where change took place.
- 2.4.10 Revisions reviewed and approved.
- 2.4.11 Constructability or supplier quality review accomplished.
- 2.4.12 QA review performed, as applicable.
- 2.4.13 Document control.

2.5 Project Deliverables

Deliverable Product Documents (such as reports, consultations, studies, recommendations, and computations software).

- 2.5.1 Completeness, including subject, date, name of preparer, identification (including attachments) identification of input, sources, data, or assumptions.
- 2.5.2 Reviewed and approved by design review committees, as applicable.

2.6 Design Analyses or Calculations

- 2.6.1 Completeness, including subject, purpose date, preparer identification, identification of input sources, data, or assumptions, and resolution of reviewer comments.
- 2.6.2 Reviewed and approved; checked and back checked.
- 2.6.3 For computer analyses, computer program checked or approved.
- 2.6.4 Legible and suitable for reproduction and filing.
- 2.6.5 Follow-up performed on design output documents when analyses/calculations are revised.

2.7 Design Change Requests

- 2.7.1 Permanent changes—notification of approval (or disapproval) provided to requestor, revised design document, and distribution verified.
- 2.7.2 Temporary changes—review and approval accomplished, notification of approval (or disapproval) provided to requestor, documentary evidence of change to requestor, and design records.

2.8 Supplier/Contractor Submittals

- 2.8.1 Listing of requirements, schedules, record or receipts, and status of acceptance accomplished.
- 2.8.2 Timely review performed.
- 2.8.3 Status of acceptance transmitted to supplier or contractor and documented.
- 2.8.4 Review performed for acceptability to contract requirements, without relieving supplier/contractor of responsibility.
- 2.8.5 Submittals approved by supplier/contractor prior to review.
- 2.8.6 Document control, filing, and records maintained.
- 2.8.7 Submittal or acceptance completed.

2.9 Design Subcontractor/Consultant Control

- 2.9.1 Work reviewed.
- 2.9.2 Acceptability documented.

2.10 Off-Project Review

- 2.10.1 Listing of items agreed with review authorities for off-project review.
- 2.10.2 Records of review accomplished, including resolution of comments and sign-off.

3.0 Procurement

3.1 Material Assignment Schedule

3.1.1 Issued and approved.

3.2 Material Requisition, including subcontracts

3.2.1 Completeness, including attachments of proper revisions.

3.2.2 Quality control requirements complete and clear, such as supplier program submittals.

3.2.3 Approvals accomplished.

3.2.4 Supplier quality/responsible engineer review of material requisitions for purchase accomplished.

3.2.5 Technical requirements are clearly defined in drawings, specifications; special instructions and procedures; including preservation, packaging, and handling instructions.

3.2.6 Document control.

3.3 Bid Evaluation and Source Selection

3.3.1 Purchasing or Subcontracts review for commercial considerations.

3.3.2 Engineering or Construction review for technical requirements.

3.3.3 Procurement supplier quality—supplier program evaluation performed, when applicable.

3.3.4 Quality Assurance—contractor/subcontractor quality program evaluation performed, where applicable.

3.3.5 Approved alternates, exceptions, agreements incorporated in procurement document.

3.4 Purchase Orders/Subcontracts

3.4.1 Orders placed only with approved sources.

3.4.2 Provisions for supplier quality representative and client access provided.

3.4.3 Provisions made for submittal of design change requests or requesting approval for deviations.

3.4.4 Authorization and clear communication of changes.

3.4.5 Document control.

3.5 Supplier Quality/Contracts/Engineer, as applicable

- 3.5.1 Planning meeting with suppliers held.
- 3.5.2 Witness and hold points established.
- 3.5.3 Quality plan—QA review accomplished.
- 3.5.4 Visit and audit reports complete.
- 3.5.5 Review of supplier documentation.
- 3.5.6 Non-conformance control maintained.
- 3.5.7 Release for shipment provided (conforming or non-conformances approved in writing by project engineer).

4.0 Construction

4.1 Quality Control of Contractors/Subcontractors

- 4.1.1 Contract documents complete, clear, approved, and communicated; with change control.
- 4.1.2 Planning meeting with contractor held.
- 4.1.3 Witness and hold points established.
- 4.1.4 Contractor's organization chart issued.
- 4.1.5 Resident engineer inspection plan coordinated with contractor inspection plan to ensure proper coverage.
- 4.1.6 Inspection Plan—QA review accomplished.
- 4.1.7 Contractor list of deliverables complete.
- 4.1.8 Inspection reports complete and properly maintained.
- 4.1.9 QA audits performed as required.
- 4.1.10 Review of quality documentation.
- 4.1.11 Acceptance and release.
- 4.1.12 Construction conformance to contract drawings/specifications.
- 4.1.13 Non-conformance control maintained.
- 4.1.14 Change control and extra work system implemented.
- 4.1.15 Claim control system.
- 4.1.16 Contractor submittal/acceptance completed.

4.2 Receiving/Material Control

- 4.2.1 Receiving review for surplus, shortage, or damage; plus report accomplished.
- 4.2.2 Receiving inspection for conformance performed, as required.
- 4.2.3 Release on shop-inspected items made, as applicable.
- 4.2.4 Review and acceptability of documentation.
- 4.2.5 Receiving report complete.
- 4.2.6 Identification/segregation of accepted material.
- 4.2.7 Storage, handling, identification, preservation, and preventative maintenance.
- 4.2.8 Correct acceptable materials used/installed.
- 4.2.9 Traceability to quality records established, where necessary.
- 4.2.10 Spot checks made for compliance with procurement document.

4.3 Measuring and Test Equipment

- 4.3.1 Equipment used is of proper type and accuracy for the job.
- 4.3.2 Care and handling of measuring equipment.
- 4.3.3 Equipment calibration performed at prescribed intervals, including prior to initial use.
- 4.3.4 Calibration made against certified equipment having valid relationship to industry standards.
- 4.3.5 Records of calibration include variable data.
- 4.3.6 Status indicators identified on or with equipment.
- 4.3.7 Inspected items evaluated if equipment found out of calibration.

4.4 Inspection and Test

- 4.4.1 Inspection/test plan accomplished; QA review required.
- 4.4.2 Inspection/test plan includes prerequisites, what, who, when, how, acceptance criteria, and records requirements.
- 4.4.3 Inspection/test plan document control.
- 4.4.4 Inspection personnel are qualified and independent of production.
- 4.4.5 Non-destructive examination (NDE) and special coatings inspectors are certified.
- 4.4.6 Prerequisites, such as personnel and procedure qualifications (e.g., welding procedures and welders, concrete mix approval), and up-to-date lists maintained.
- 4.4.7 Use of properly calibrated inspection/test equipment, including use of special equipment.

- 4.4.8 Records of results, including identity of item, type of inspection or test, inspector's name, date, acceptability and action taken on deficiencies.
- 4.4.9 Inspection or test status identifiable to prevent inadvertent bypassing of inspection/test.
- 4.4.10 Spot checks made for conformance to drawing and specification requirements.

4.5 Non-conformance Control

- 4.5.1 Identification/segregation of nonconforming conditions to prevent inadvertent use.
- 4.5.2 Non-conforming conditions properly documented.
- 4.5.3 Dispositions made in timely manner.
- 4.5.4 Dispositions approved by properly authorized persons. Repair (to a condition other than originally specified) and use-as-is must be approved by the design authority.
- 4.5.5 Disposition completed, rework, and repair inspected.
- 4.5.6 Records of "repair" and "use-as-is" dispositions maintained.
- 4.5.7 Conditional release of non-conforming conditions controlled for retrievability. Non-conforming conditions turned over to client, even on conditional basis, documented in writing to client.

4.6 Design Change Control

- 4.6.1 Field sketches and design detailing reviewed and approved.
- 4.6.2 Design change requests processed for changes to project engineering design documents.
- 4.6.3 Design basis integrity of project engineering documents and design criteria maintained.
- 4.6.4 Design changes authorized by Engineering Manager or design agency.
- 4.6.5 Design documents updated reflecting approved changes.

4.7 Safety

- 4.7.1 Safety action plan prepared and implemented.
- 4.7.2 Record keeping and reporting procedures prepared and maintained.
- 4.7.3 First aid and medical services provided for.
- 4.7.4 Fire protection and prevention provided for.
- 4.7.5 Hazardous materials management information system and protective measures provided for.

4.8 Final Inspection and Turnover

- 4.8.1 Inspection, test, and documentation records reviewed and complete.
- 4.8.2 List made of incomplete or unacceptable work at final inspection.
- 4.8.3 Incomplete or non-conforming work turned over to client clearly identified and documented.
- 4.8.4 Clear definition made of item, facility, or system being turned over.
- 4.8.5 "Walk through" inspection with client performed and results documented.



QUALITY CHECKLIST

CHECKLIST NO. _____

PAGE _____ OF _____

ITEM	ELEMENT CHARACTERISTIC	REFERENCE	METHOD OF VERIFICATION	RESULT



WORK PLAN LOG

PAGE _____ OF _____

LOG ENTRY NO.	ORGANIZATION	SUMMARY OF SURVEILLANCE / AUDIT ACTIVITIES AND ELEMENT CHARACTERISTIC	SCHEDULED SURVEILLANCE / AUDIT DATES	ACTUAL SURVEILLANCE / AUDIT DATES	CAR / QAF / NCR ISSUED

QA-03— Review of Design Documents and Packages

1 Purpose

The purpose of this procedure is to establish a method for the review of selected design documents and design and construction packages to ensure they are properly defined in accordance with specific Program requirements.

2 Scope

Design documents or design and construction packages may be prepared by the Program's project design consultants or design/build contractors, or both. This procedure provides a mechanism for documenting the review results of the design documents for the Program.

3 Responsibilities

Individual members of Quality Assurance are responsible for issuing results of their design document reviews, and for the follow-up and verification of incorporated comments.

4 References

Quality Management Plan (QMP): Section 3—Design Control
Appendix D Program Quality Assurance Procedures: QA-01—Quality Assurance Program

5 Procedure

Quality Assurance shall use form QA-03-1, Document Review Record (DRR), which provides documentation of the reviewer's results and a verification of the actions taken to resolve comments. Quality Assurance may also use other document review records developed by the PMPC team or design consultants to record review results.

Quality Assurance shall record the status of ongoing and completed design document reviews on form QA-03-2, Document Review Record Log. The Program QA Manager is responsible for maintaining these logs.

The criteria for reviewing selected design documents and design and construction packages shall include ensuring that they comply with Program requirements and implementing procedures, conform to the format, clearly present the information, and accurately reflect the design criteria and design basis requirements in the design documents.

Forms QA-03-3, Design Input Elements, and QA-03-4, Design Review Elements, shall be used as a guide for the above review process.

The completed design review shall be directed to the responsible design consultant, or design/build contractor. The Program's Document Control shall make copies of the review for control and tracking before sending it to the responsible design organization.

Where review comments require more room that is available on the forms, additional forms shall be used as necessary.

The design manager or resident engineer, as applicable, is responsible for resolving the technical comments in each active review form.

The responsible design manager or resident engineer shall coordinate the follow-up and verification of the resolution of the technical comments in conjunction with the applicable design consultant or engineering group. Technical comments by Quality Assurance should be resolved, and pertinent changes to design documents or design and construction packages should be made before being completed and issued.

Copies of the completed forms shall be provided to Document Control in accordance with the established Program document control procedures.

6 Definitions

Refer to Appendix B in this manual for a list of definitions.

7 Attachments

QA Forms:

QA-03-1 Document Review Record (DRR)

QA-03-2 DRR Log

QA-03-3 Design Input Elements

QA-03-4 Design Review Elements



DOCUMENT REVIEW RECORD (DRR) LOG

PAGE ____ OF ____

DRR NO.	DATE	TO	TOPIC OF REVIEW	INFORMATION ONLY	COMMENTS ONLY	RESOLUTION REQUIRED	FOLLOW-UP ACTION
							YES/NO
							YES/NO
							YES/NO
							YES/NO
							YES/NO
							YES/NO
							YES/NO

DESIGN INPUT ELEMENTS

The design review should include, but is not limited to the following, where applicable.

- basic functions of each structure, system and component
- codes, standards, and regulatory requirements including applicable issue and/or addenda
- codes such as seismic, wind, thermal and dynamics
- environmental conditions anticipated during storage, construction and operation such as temperature, humidity, corrosiveness, and duration of exposure
- interface requirements including definition of the functional and physical interfaces involving structures, systems and components
- material requirements including such items as compatibility, electrical insulation properties, protective coating and corrosion resistance forces
- structural requirements covering such items as bridge abutment and equipment foundations
- layout and arrangement requirements
- equipment qualification requirements, including environmental and dynamic requirements
- handling, storage and shipping requirements
- inspection and testing requirements

DESIGN REVIEW ELEMENTS

The following basic questions shall be addressed, as applicable, during the performance of any design review.

- Were the commitments in the design criteria documents correctly incorporated into the design documents?
- Is the design basis clear?
- Does the design meet the requirements of applicable codes, standards, and regulatory requirements?
- Have the design interface requirements been satisfied?
- Have adequate periodic testing and inspection requirements been appropriately incorporated into the design specifications?
- Are the procedures used in the design process adequate?

QA-04—Contractor & Supplier Quality Program Evaluation

1 Purpose

This procedure provides instructions for Quality Assurance personnel performing quality program evaluations of consultants, contractors or suppliers for the Program.

2 Scope

This procedure covers the review and reporting process for evaluating the results of the contractor's or supplier's quality program.

3 Responsibilities

The Program QA Manager is responsible for reviewing and evaluating Quality Program submittals to ensure compliance with contract document requirements.

4 References

Program Quality Management Plan (QMP): Section 1—Management Responsibility
Appendix D Program Quality Assurance Procedures: QA-01—Quality Assurance Program

5 Procedure

When a Program participant's (e.g., PMPC Consultant, design consultant, design/build contractor, construction contractor, supplier, or construction management consultant) quality plan or manual is submitted with a bid request or a scheduled project deliverable, the document is forwarded to the Program QA Manager for review and evaluation.

The Program QA Manager will evaluate quality program submittals for compliance with the contract requirements. This review shall be performed in cooperation with the Program team member responsible for final acceptance of the quality plan or manual.

The results shall be documented on form QA-04-1, Contractor/Supplier/Designers/CMs Quality Program Summary Checklist, or form QA-04-2, Contractor/Supplier Quality Program Evaluation.

Specific checklists will be generated as required to address contract regulatory requirements. Comments resulting from the review shall be transmitted back to the requestor (e.g., group manager or resident engineer), and shall be categorized as follows:

- Acceptable
- Acceptable with Comments
- Not Approved (submittal does not fully comply with contract requirements: revise and resubmit)

The PMPC Program Manager or TJPA Program Management shall initiate action as necessary to obtain resolution from the contractor or supplier.

Re-submittals are required to duplicate the above process until approved.

Records of contractor or supplier quality program evaluations shall be maintained by Document Control.

6 Definitions

Refer to Appendix B in this manual for a list of definitions.

7 Attachments

QA Forms:

QA-04-1 Contractor/Supplier/Designers, CMs Quality Program Summary Checklist

QA-04-2 Contractor/Supplier Quality Program Evaluation



**CONTRACTOR/SUPPLIER/DESIGNERS, CMs
 QUALITY PROGRAM SUMMARY CHECKLIST**

COMPANY NAME (AND DIVISION) _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

THE FOLLOWING SUMMARIZES THE ENTRIES ON SUPPLEMENTAL SHEETS

No.	Requirement	Not Applicable	Acceptable	Additional Information Required
1	Organization			
2	Quality Program			
3	Design Control			
4	Document Control			
5	Control of Purchased Material, Equipment, Services			
6	Identification and Control of Materials, Parts, Components			
7	Control of Special Processes			
8	Inspection and Test Control			
9	Calibration of Measurement and Test Equipment			
10	Inspection, Test and Operating Status			
11	Non-conforming Materials, Parts or Components			
12	Corrective Action			
13	Quality Program Records			
14	Quality Audits			
15	Training			

CONTRACTOR'S QUALITY PROGRAM IS:

ACCEPTABLE ACCEPTABLE WITH COMMENTS NOT APPROVED

REMARKS _____

REVIEWED BY _____ DATE _____

CONTRACTOR AND SUPPLIER QUALITY PROGRAM EVALUATION

QUALITY PROGRAM ELEMENT	SPECIFICATION REFERENCE	REQUIRED Y / N	QUALITY PROGRAM REFERENCE
I. ORGANIZATION			
Does the contractor's/supplier's quality program: <ul style="list-style-type: none"> • Establish an organizational structure showing functional responsibility levels of authority and lines of internal and external communication as related to the quality organization? 			
<ul style="list-style-type: none"> • Establish authority and responsibility of persons and organizations performing activities affecting quality to grant authority to: 			
<ul style="list-style-type: none"> • Identify problems? • Initiate, recommend, or provide solutions? • Verify implementation of solutions? • Control non-conforming material until proper disposition has occurred? 			
<ul style="list-style-type: none"> • Establish the responsible quality representative? 			
<ul style="list-style-type: none"> • Provide independence of the above person from pressures and allow him or her access to responsible management? 			
<ul style="list-style-type: none"> • Provide for regular reporting by the above person on the effectiveness of the quality program? 			
<ul style="list-style-type: none"> • Provide for verification of work by personnel who do not have direct responsibility for performing the work? 			
II. QUALITY PROGRAM			
Does the contractor's/supplier's program provide for: <ul style="list-style-type: none"> • Supplier/Operations interfaces that facilitate the surveillance of the work? 			
<ul style="list-style-type: none"> • Systematic notification to Engineer of planned work operations? 			
<ul style="list-style-type: none"> • Free access to supplier's quality related documentation? 			

QUALITY PROGRAM ELEMENT	SPECIFICATION REFERENCE	REQUIRED Y / N	QUALITY PROGRAM REFERENCE
<ul style="list-style-type: none"> • Training of supplier’s QC personnel? 			
III. DESIGN CONTROL			
Does the contractor’s/supplier’s quality program: <ul style="list-style-type: none"> • Recognize the importance of design bases, i.e., regulatory requirements, codes and standards, and correctly translate them into specifications, drawings, procedures, and instructions, including quality standards? 			
<ul style="list-style-type: none"> • Provide for documentation of deviations or waivers from established quality standards? 			
<ul style="list-style-type: none"> • Provide for maintaining records that show implementation of design control measures? 			
IV. PROCUREMENT DOCUMENT CONTROL			
Does the contractor’s/supplier’s program provide provisions: <ul style="list-style-type: none"> • To incorporate or reference, as part of their documents for procurement (including changes to these purchase documents) necessary regulatory requirements, design bases to ensure adequate quality? 			
<ul style="list-style-type: none"> • For procurement documents to include as appropriate: <ul style="list-style-type: none"> • Supplier QA program if necessary for product being manufactured? • Basic technical requirements? • Source inspection? • Documentation requirements? • Extending requirements above to lower tier procurements? 			
V. INSTRUCTIONS, PROCEDURES AND DRAWINGS			
Does the contractor’s/supplier’s quality program: <ul style="list-style-type: none"> • Incorporate or require for activities affecting quality documented instructions, procedures, or drawings appropriate for their work operations? 			
<ul style="list-style-type: none"> • Include a method for ensuring that important activities have been satisfactorily accomplished? 			

QUALITY PROGRAM ELEMENT	SPECIFICATION REFERENCE	REQUIRED Y / N	QUALITY PROGRAM REFERENCE
<ul style="list-style-type: none"> Require that critical work activities be described by job specifications, work instructions, drawings, job tickets, planning sheets, manuals, procedures, etc.? 			
<ul style="list-style-type: none"> Require the establishment of acceptance criteria that constitutes satisfactory work or quality compliance? 			
VI. DOCUMENT AND DATA CONTROL			
Does the contractor's/supplier's quality program: <ul style="list-style-type: none"> Establish a method for controlling the issuance of documents, instructions, procedures, and drawings (and their changes) that relate to quality? 			
<ul style="list-style-type: none"> Provide for the distribution of documents to the location where the prescribed activity is performed? 			
<ul style="list-style-type: none"> Provide for control of documents and changes to preclude the use of inappropriate documents? 			
<ul style="list-style-type: none"> Establish those documents that are to be used in performing the activity? 			
VII. CONTROL OF PURCHASED MATERIAL, EQUIPMENT AND SERVICES			
Does the contractor's/supplier's quality program: <ul style="list-style-type: none"> Provide a system to ensure that purchased items and services conform to the procurement documents? 			
<ul style="list-style-type: none"> Provide for, as appropriate: <ul style="list-style-type: none"> Objective evidence of quality furnished by the supplier? Source inspection? Examination of items upon delivery? 			
<ul style="list-style-type: none"> Ensure that the required documentation be obtained or provided as required by the Engineer? 			

QUALITY PROGRAM ELEMENT	SPECIFICATION REFERENCE	REQUIRED Y / N	QUALITY PROGRAM REFERENCE
VIII. IDENTIFICATION AND CONTROL OF MATERIALS, PARTS AND COMPONENTS			
Does the contractor's/supplier's quality program: <ul style="list-style-type: none"> • Provide for the identification and control of materials, parts and components? 			
<ul style="list-style-type: none"> • Ensure that only correct and acceptable items are used and installed? 			
<ul style="list-style-type: none"> • Establish an appropriate identification system that ensures identification of items? 			
<ul style="list-style-type: none"> • Identification system to clearly identify the item without affecting its functioning? 			
<ul style="list-style-type: none"> • Provide either for transfer of markings to each part when subdivided or for the use of other suitable means? 			
<ul style="list-style-type: none"> • Provide for traceability as required by various codes and standards or specifications? 			
IX. CONTROL OF SPECIAL PROCESSES			
Does the contractor's/supplier's quality program: <ul style="list-style-type: none"> • Ensure that special processes such as welding, heat treating, soldering, cleaning, and nondestructive examination are accomplished using qualified personnel and procedures under controlled conditions and in accordance with applicable codes, standards, and specifications? 			
<ul style="list-style-type: none"> • Provide for personnel and procedure qualification in accordance with applicable codes and standards? 			
<ul style="list-style-type: none"> • Require that documentation be maintained for currently qualified personnel, processes, or equipment, as required by pertinent codes and standards? 			

QUALITY PROGRAM ELEMENT	SPECIFICATION REFERENCE	REQUIRED Y / N	QUALITY PROGRAM REFERENCE
X. INSPECTION			
Does the contractor's/supplier's quality program: <ul style="list-style-type: none"> • Incorporate a program to verify conformance to documented instructions, procedures and drawings? 			
<ul style="list-style-type: none"> • Require inspection for each work operation where it is necessary to ensure quality? 			
Do the inspection plan documents contain: <ul style="list-style-type: none"> • Scope of work to be inspected? • Sequence of inspection (in-process or final inspection) and frequency? • Personnel responsible for inspection? • Unique inspection plan identification? • Activities, work operations, or end results to be inspected? • Acceptance and rejection criteria? 			
<ul style="list-style-type: none"> • Space to record inspection data, non-conformance and reference to any additional forms used to record data • Method of inspection? • Acceptance signature and date? 			
Do receipt inspection plan documents contain: <ul style="list-style-type: none"> • Review of supplier quality verification documentation? • Visual inspection for correct type, and shipping damage? • Inspection marking and tagging? • Verification of traceability between the purchased item and its documentation? • Performance of required user's tests by the supplier? • Collection of records? • Review of receipt inspection results and disposition of any non-conformances? 			

QUALITY PROGRAM ELEMENT	SPECIFICATION REFERENCE	REQUIRED Y / N	QUALITY PROGRAM REFERENCE
<p>Do inspection plans for contractor's/supplier's surveillance of work performed by its subcontractors include:</p> <ul style="list-style-type: none"> • Completion of preplanning coordination between the supplier and subcontractor including prefabrication meetings as appropriate? • Verification of completion of prerequisites by the subcontractor prior to performance of the work? • In-process surveillance of the work with established witness and hold points? • Verification of satisfactory performance of quality verification? • Review and acceptance of quality verification records prepared by the subcontractor? • Review of disposition of any non-conformances noted? 			
<ul style="list-style-type: none"> • Provisions for the engineer to indicate review, inspection, witness, and hold points? 			
<p>XI. TEST CONTROL</p>			
<p>Does the contractor's/supplier's quality program:</p> <ul style="list-style-type: none"> • Provide a comprehensive test program satisfactorily in service and testing that is performed using appropriate equipment and in accordance with written procedures? 			
<ul style="list-style-type: none"> • Require that testing procedures include or reference acceptance limits of the design documents? 			
<ul style="list-style-type: none"> • Require that testing procedures ensure that adequate calibrated instrumentation is used and that testing is monitored, as necessary, by trained personnel? 			
<ul style="list-style-type: none"> • Provide for documenting the test results and for evaluation by responsible authority to ensure test requirements have been satisfied? 			

QUALITY PROGRAM ELEMENT	SPECIFICATION REFERENCE	REQUIRED Y / N	QUALITY PROGRAM REFERENCE
XII. INSPECTION, TEST AND OPERATING STATUS			
Does the contractor's/supplier's quality program: <ul style="list-style-type: none"> • Provide means for assuring that required inspections and tests are performed and that the acceptability of the items is known? 			
<ul style="list-style-type: none"> • Provide for identification of non-conforming items? 			
<ul style="list-style-type: none"> • Provide for maintaining the inspection and test status of items by using such indicators as tags, shop travelers, inspection records, or stamps? 			
<ul style="list-style-type: none"> • Prevent the use of items that have not passed the required tests and inspections? 			
<ul style="list-style-type: none"> • Include procedures for control of status indicators, including the authority for application and removal of tags, markings, labels, and stamps? 			
<ul style="list-style-type: none"> • Provide for indicating operating status for systems and components by tagging to prevent inadvertent operations? 			
XIII. CONTROL OF MEASURING AND TEST EQUIPMENT			
Does the contractor's/supplier's quality program: <ul style="list-style-type: none"> • Have an established plan to ensure that the tools, gauges, instruments, and other inspection, measuring and testing equipment and devices (used in activities affecting quality) and the proper range, type, and accuracy to verify conformance of his product to established requirements? 			
<ul style="list-style-type: none"> • Ensure the controlling, calibrating, adjusting, and maintaining of the above equipment at prescribed intervals or prior to use? 			
<ul style="list-style-type: none"> • Require traceability to nationally recognized standards where they exist, or documented evidence for the basis of calibration if they do not exist. 			
<ul style="list-style-type: none"> • Have an established recalibration plan starting method and frequency of recalibration for each item? 			

QUALITY PROGRAM ELEMENT	SPECIFICATION REFERENCE	REQUIRED Y / N	QUALITY PROGRAM REFERENCE
<ul style="list-style-type: none"> Have a method of evaluating the validity of previous inspection or test results and the acceptability of the material so checked if the equipment has been found to be out of calibration? 			
<ul style="list-style-type: none"> Maintain records and suitable marking of the equipment to indicate calibration status? 			
XIV. HANDLING, STORAGE AND SHIPPING			
<p>Does the contractor's/supplier's quality program:</p> <ul style="list-style-type: none"> Establish measures for handling, storage and shipping, including cleaning, packaging, and preservation of material and equipment in accordance with established instructions, procedures or drawings? 			
<ul style="list-style-type: none"> Provide for inspection and testing of special handling tools or equipment in accordance with written procedures to ensure that the tools and equipment are adequately maintained? 			
<ul style="list-style-type: none"> Provide instructions for marking and labeling that are adequate to identify special environments or the need for special controls? 			
XV. NON-CONFORMING ITEMS			
<p>Does the contractor's / supplier's quality program:</p> <ul style="list-style-type: none"> Establish a system to document and to control items, services, or activities that do not conform to requirements? 			
<ul style="list-style-type: none"> Provide for disposition of non-conforming items, e.g., reviewed and accepted, rejected, repaired, or reworked? 			
<ul style="list-style-type: none"> Establish responsibility and authority for disposition of nonconforming items? 			
<ul style="list-style-type: none"> Establish measures for further handling of non-conforming or defective items, pending a decision on its disposition? 			

QUALITY PROGRAM ELEMENT	SPECIFICATION REFERENCE	REQUIRED Y / N	QUALITY PROGRAM REFERENCE
<ul style="list-style-type: none"> Provide a method for identifying non-conforming items, such as by tagging, marking, or physically segregating them and identifying them as non-conforming and controlled and for documenting the acceptability of items that are to be repaired or used as is? 			
XVI. CORRECTIVE ACTION			
<p>Does the contractor's / supplier's quality program:</p> <ul style="list-style-type: none"> Have a mechanism for promptly identifying and correcting, as soon as possible, those conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, defective material and equipment? 			
<ul style="list-style-type: none"> Have provisions to prevent repetition of significant conditions adverse to quality and to report these to appropriate levels of management? 			
XVII. QUALITY RECORDS			
<p>Does the contractor's / supplier's quality program:</p> <ul style="list-style-type: none"> Provide for the collection of documenting evidence of the quality of activities affecting quality? 			
<ul style="list-style-type: none"> Include preparation or collection of results of reviews, inspections, tests, monitoring of work performance, and material analyses and closely related data, such as personnel procedure and equipment qualification data? 			
<ul style="list-style-type: none"> Require inspection and test records to identify the data of inspection or test, the inspector or data recorder, type of observation, results, acceptability, and action taken if deficiencies are identified. Have a reference to an article of the specification requiring the testing or inspection? 			
<ul style="list-style-type: none"> Establish how records are to be transmitted and maintained after the completion of work in accordance with contract documents? 			
<ul style="list-style-type: none"> Provide proper storage to minimize deterioration or damage while they are retained at its facility? 			

QUALITY PROGRAM ELEMENT	SPECIFICATION REFERENCE	REQUIRED Y / N	QUALITY PROGRAM REFERENCE
XVIII. AUDITS			
<ul style="list-style-type: none"> Does the contractor's/supplier's quality program incorporate a suitable written system of planned and documented audits to verify compliance with all aspects of the quality program? 			

QA-05—Purchasing Quality Assurance

1 Purpose

This procedure provides instructions to Quality Assurance personnel for performing in-depth reviews of material requisitions and contract packages.

2 Scope

This procedure applies to Program and project activities associated with the preparation, processing, and approval of procurement documents for materials, equipment, and services for the Program.

3 Responsibilities

The Program QA Manager is responsible for conducting selected reviews of purchasing documents and packages to evaluate the adequacy of the quality program requirements imposed on the contractor or supplier.

4 References

Quality Management Plan (QMP): Section 5—Purchasing

5 Procedure

The Program QA Manager shall conduct selected reviews of purchasing documents for evidence of the following:

- Preparation, review, approval, and processing are being performed in accordance with approved procedures, as specified in one or more of the following documents.
 - contract implementation plan
 - Program procurement policies and procedures
 - design/build contractors procedures, written to satisfy contract requirements
- Purchase memoranda, material requisition, general conditions, specifications, drawings, forms, etc., are available to evaluate the adequacy of quality program requirements.
- Prescribed document controls have been implemented specifying quality testing and surveillance requirements, including hold and witness points.
- Attachments and referenced documents required by project procedures have been included.

The above review may also be included as part of a checklist in the contracts oversight review of quality implementation by the design/build contractor, supplier, or construction contractor.

6 Definitions

Refer to Appendix B in this manual for a list of definitions.

7 Attachments

None.

QA-06—Contractor & Supplier Surveillance

1 Purpose

This procedure provides instructions for QA personnel performing contractor or supplier surveillance and providing feedback to Program management regarding compliance to quality program requirements.

2 Scope

This procedure describes the method of performing and documenting the surveillance of project activities by assigned QA personnel.

3 Responsibilities

The Program QA Manager is responsible for implementing a surveillance system to monitor program and project activities and determine compliance with the Program quality requirements.

4 References

Program Quality Assurance Procedures:

QA-01 Program

QA-02 Quality Planning

5 Procedure

5.1 Surveillance

Quality Assurance personnel may be assigned to specific contracts, products, or engineering disciplines to conduct surveillance of project activities and monitor the performance of those activities for compliance to quality program requirements.

Surveillance activities shall be structured to verify the implementation of a procedure, groups of procedures, or specific technical requirements. The surveillance activity shall be documented on form QA-06-1, Surveillance Report.

Surveillance should be of limited scope and be accomplished within one to two working days.

Surveillance may be scheduled or unscheduled. The Program QA Manager scheduled surveillance activities as approved by TJPA Program Management are shown on the QA planning schedule and are attached to the monthly QA activity report.

Surveillance should be commensurate with the scope, schedule, significance, and complexity of each activity or contract.

Before surveillance activity begins, a checklist of requirements to be verified should be prepared. It is not necessary to prepare a detailed checklist if procedure verification is the purpose of the surveillance. It is recommended that, at a minimum, the procedure requirements to be verified be "highlighted" on a copy of the procedure. The marked-up procedure is then the basis for conducting the surveillance.

Objective evidence of compliance to specific quality program requirements is examined during surveillance. Notes should be kept as to samples taken and persons contacted.

If during surveillance, areas of non-compliance are found that do not violate the issuance mandates of the NCR procedure, efforts should be made to resolve them immediately. If comments are not resolved, or if non-compliant areas that require follow-up and resolution are found in the normal course of surveillance activities, they shall be identified in a corrective action request (CAR) (form QA-09, Corrective Action) or a nonconformance report (form QA-08, Nonconformance Reports).

5.2 Documentation

Surveillance shall be documented on a surveillance report. Surveillance reports shall be distributed to the TJPA Executive Director, TJPA Program Management, PMPC Program Manager, Program QA Manager, QA file, and applicable project manager.

Surveillance reports shall be logged and maintained in the Program QA files. Checklists, if used, and supporting notes shall be maintained as backup to the surveillance report in Program QA files for the duration of the project.

6 Definitions

Refer to Appendix B in this manual for a list of definitions.

7 Attachments

QA Forms:

QA-06-1	Surveillance Report
QA-06-2	Inspection Checklist (Example)
QA-06-3	Surveillance Report Log

Referenced Forms:

QA-08-1	Nonconformance Reports (NCR)
QA-09-1	Corrective Action



SURVEILLANCE REPORT

Page _____ of _____	
Contract No. _____ Company _____	
Date Performed: _____	
1. Personnel Contacted: _____	
2. Location: <input type="checkbox"/> Office <input type="checkbox"/> Field _____	
3. Standard / Code / Procedure / Specification / Tools Used: _____	
4. Details of Surveillance: _____ _____ _____ _____ _____ _____ _____ _____	
5. Results of Surveillance Inspection: <input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs Improvement <input type="checkbox"/> Unsatisfactory	
6. Recommendations: _____ _____ _____	

Signature	Date



INSPECTION CHECKLIST (EXAMPLE)

SPEC. REFERENCE	C-7: EARTHWORK
Specification Caltrans LAPM Chapter 16	<p>Before starting earthwork, the following characteristics of earthwork shall be reviewed:</p> <ol style="list-style-type: none"> 1. Contractor quality plans are approved by the PMPC Quality Assurance/TJPA Engineering Manager. 2. Material sources are approved. 3. Adequate water supply is available. 4. Provisions are adequate for dust abatement. 5. Project survey markers/monuments are established and maintained. 6. Site plans note any underground structures to be removed or avoided (pipes, utilities, etc.).
	<p>Clearing and Grubbing:</p> <ol style="list-style-type: none"> 1. Utilities and underground structures as noted on the drawings are disconnected and removed in accordance with the regulations of the utilities concerned. 2. All surface pavements, rocks, debris, trash, and all trees, stumps, roots, and other vegetation are removed to the areas and required depth as shown on the drawings. 3. Remove all debris from the site and leave the site in a neat and orderly condition. 4. Stockpile organic soils for future use in landscaped areas.
	<p>Excavation:</p> <ol style="list-style-type: none"> 1. Excavation is performed to the lines, grades, elevations and dimensions as shown on the drawings or as directed by the responsible engineer to obtain suitable sub-grade/foundation material. 2. Care is taken during excavation work to prevent damage by construction equipment to adjacent structures. 3. Edges of the excavation are benched (2:1 slope). 4. Disposal of contaminated soils, if present, is performed in accordance with environmental requirements. 5. Ditches or dikes are constructed around excavation work to prevent surface water entering the work area. Open-cut slopes are properly protected to minimize sloughing. 6. Completed excavation is inspected, tested and accepted by the geotechnical engineer prior to placement of structural concrete foundations/slabs, and/or structural backfill.

SPEC. REFERENCE	C-7: EARTHWORK
	<p>Fill Operations:</p> <ol style="list-style-type: none"> 1. Area to receive fill material is properly prepared, (disked and scarified as specified). 2. Provisions are adequate for control and disposal of surface and subsurface water. 3. Fill material is from approved sources and is free of roots, limbs, stumps, boulders, mud, and organic material. 4. Fill and borrow areas are maintained to provide effective drainage and are protected against erosion.
	<p>Materials Testing:</p> <ol style="list-style-type: none"> 1. Field and laboratory tests are conducted at frequency specified to verify physical requirements of the fill material. 2. Fill material meets moisture requirements. 3. Fill material is placed in proper lift thickness. 4. Fill material meets compaction (density) requirements. 5. Dimensional requirements are being maintained. 6. Moisture and density tests are performed at random locations and at specified frequency. 7. Fill material was brought to final grade and inspected, tested and accepted.
	<p>Controlled Density Fill (CDF)</p> <ol style="list-style-type: none"> 1. Mixing and Delivery: CDF materials are properly batched at ready-mix plant and delivered in transit mixing trucks. 2. CDF is placed in the excavations to the indicated elevations in level layers. 3. CDF material is not vibrated to consolidate or compact. 4. Equipment and traffic shall not be permitted on the CDF until the surface will withstand the weight of the equipment or traffic without displacement or damage. 5. Steel trench plates are provided where required. 6. CDF material was sampled and tested as directed by the Engineer.
	<p>* Exceptions:</p>

QA-07—Inspection and Testing

1 Purpose

The purpose of this procedure is to describe how Quality Assurance monitors the inspection and testing programs implemented by contractor and construction management firms.

2 Scope

This procedure covers the oversight carried out on the actual implementation of the methods, procedures, equipment, references, and forms used to ensure that adequate inspection and testing is performed on the project.

3 Responsibilities

The Program QA Manager is responsible for monitoring and auditing the Program participants' field operations for compliance to their approved quality control programs. The Program QA Manager is also responsible for providing initial quality awareness training in the application of the Program QMS Manual and its associated procedures.

The construction manager's resident engineer or inspector is responsible for monitoring the implementation of the contractor's quality programs through inspection and independent assurance sampling and testing. The resident engineer's activities are guided by and outlined in detail in the construction quality plan and procedures.

Each contractor shall be responsible for performing its own quality control inspection and completing the required documentation that will be turned over as part of the project deliverables and record documents.

The contractors shall also assume responsibility for the inspection of work being performed by their subcontractors and suppliers.

4 References

Quality Management Plan (QMP): Section 8—Inspection and Tests

Appendix E—Inspection Guidelines

5 Procedure

5.1 Quality Assurance Oversight Monitoring

The Program QA Manager will conduct oversight monitoring to verify that appropriate examinations, tests, measurements, and inspections are being properly performed and documented by the contractor, independent testing laboratory, and resident engineer or inspector.

5.2 Inspector's Authority

The resident engineer or the contractor's QC supervisor charges the inspectors and field engineers with performing construction inspections within the following parameters:

- They may not exceed the resident engineer's authority.
- They have no authority to allow deviations from contract requirements, or give instructions to the contractor.
- They may approve minor alterations that do not affect contract time or price, or exceed authorized scope, but must inform the resident engineer.
- They may not order work to stop except in an emergency, where safety may be compromised.

5.3 Inspector's Daily Reports

Inspectors and field engineers document their inspections on an inspector's daily report. The reports are numbered consecutively by contract day and must be completed on the same day the work described was performed. Daily reports are completed in ink, with any mistakes "lined through" (no obliteration or white-out), and the correction initialed by the inspector.

Instructions for completing the inspector's daily report shall be included in each project's construction quality plan and procedures.

Resident engineers or inspectors should note on their daily reports any conditions of improper materials, workmanship, or safety and notify the contractor immediately. If necessary, resident engineers or inspectors shall complete an NCR.

Quality Assurance will use surveillance or audit procedures to perform periodic reviews of inspector's daily reports to ensure that they are being used properly.

5.4 Punch Lists

Prior to generating a final punch list, the contractor shall request a preliminary final inspection. The construction manager's resident engineer will lead the inspection (with input from various disciplines) within three days of the requested date.

A punch list will be generated during the preliminary final inspection and will include the following:

- list of missing documents, corrections and revisions to documents
- items remaining from the previous punch lists
- new items discovered as a result of recent inspection or damage caused by the close-out of any outstanding nonconformances

When the contractor is ready for final inspection (after the punch list is generated), the inspection team will record any outstanding items that have not been properly remedied, and corrective action will be implemented, as necessary.

If the remaining punch list items are minor, the resident engineer, with concurrence from Program QA, will prepare a certificate of substantial completion (as described in the Program Procedures Manual) for the project to accept the work on the condition that corrective measures will be completed in the shortest practical time.

Where work has not been substantially completed in accordance with the contract, and where significant items from the punch list are still outstanding or the contractor has caused damage that must be repaired, the resident engineer will prepare a new punch list, and the procedure will be repeated.

5.5 Testing

As described in the contract documents, all contractors must submit for approval before construction starts a testing plan that describes the schedule, types of materials and tests, test parameters, geographical test locations, equipment, testing services and manpower to be used on the project. The PMPC team and Quality Assurance may use an independent testing laboratory for added assurance that project testing is being performed adequately. The Program QA Manager or project managers will identify selected test areas and items of the project that may be targeted for inspection and testing.

Prior to selecting a testing laboratory, the contractor shall review the qualifications of potential firms for adherence to the American Society of Testing Materials' General Criteria Used for Evaluating Laboratory Competence (ASTM E 548), or equivalent criteria.

6 Definitions

Refer to Appendix B in this manual for a list of definitions.

7 Attachments

None.

QA-08—Nonconformance Reports

1 Purpose

This procedure is to describe the nonconformance reporting system, instruct its users on the proper method of using nonconformance report (NCR) forms, and provide the PMPC team and other Program participants with a benchmark by which to measure project quality. The system allows deficiencies and the disposition of discrepancies to be easily traced.

2 Scope

This procedure applies to identified nonconformances and all designers, contractors, subcontractors, and suppliers implementing the Program-approved nonconformance reporting system. It encompasses all materials and services used in the construction of the project.

3 Nonconforming Item

A nonconforming item is equipment, components, parts, and materials that deviate in form, fit, or function from specified requirements. The lack of required documentation may also be cause for a nonconformance.

4 Nonconformance Report

A nonconformance report is a document recording an identified nonconformance, its disposition, and resolution. A sample NCR form is attached.

5 Responsibilities

All members of the engineering and construction teams on the Program are responsible for reporting to management or quality personnel any nonconformance that they observe in the course of their work.

The Program QA Manager is responsible for implementing and administering the Program Quality Management Plan and the PMPC Quality Plan, and has been delegated the authority and organizational freedom to identify and evaluate quality problems; to initiate, recommend, or provide solutions; and to control further processing, delivery, or installation of nonconforming or deficient items or service through the nonconformance reporting system until proper disposition is obtained.

Quality assurance findings, as well as a corrective action request system, will also be implemented, as necessary, to document, address, and resolve quality issues.

6 References

Project Quality Management Plan (QMP): Section 11—Nonconformance

Appendix D Program Quality Assurance Procedure: QA-01—QA Program

7 Procedure

7.1 Evaluating the Contract Participant’s NCR Program

The Program QA Manager shall review the contractor quality plan submittals, and establish that the contractor has delineated a satisfactory system for identifying and controlling nonconforming items.

7.2 Who Can Write an NCR

NCRs can be initiated by any of the following Program participants: members of the contractor's, subcontractor's, or supplier's QC organization; field quality or resident engineers affiliated with the construction management consultant; members of the PMPC team; or anyone affiliated with the Program having the requisite technical competence to identify the nonconformance.

7.3 When to Write an NCR

An NCR should be completed if nonconformances are identified during any of the following stages of work:

- Receiving inspection—Nonconformances identified during the receipt of materials or products that have been delivered to the job site, or to a storage location, which are identified by the contract as being within the criteria for payment for materials-at-hand.
- During in-process work activities—Nonconformances discovered during in-process work activities that are not immediately correctable by further prescribed processing and within the authority of the Statement of Work.*

*Note: Discrepancies discovered prior to final inspection completion that are correctable by further prescribed processing may be controlled and documented by the use of open inspection report or deficiency lists.

- After completion of the work—All nonconformances discovered after the completion of work activities and related inspections and tests. Nonconformances discovered after acceptance will also be reported and corrected.

7.4 NCR Initiation Procedure

Immediately after identifying a nonconformance, the individual that detected the discrepancy shall initiate an NCR by completing part 1 of the NCR form. In the “Description of Nonconformance” entry, it is important to describe in detail, the nonconforming condition, and include sketches and photos at any opportunity where doing so may help to expedite the NCR disposition. It is also important to identify the requirement (e.g., drawing, specification) in reference to which the nonconformance is being written.

Once written, the NCR shall be forwarded to the contractor’s QC organization and to the Program QA Manager. The contractor’s QC organization will assign the NCR a unique serial number (by the order of initiation) and provide the serial number to the Program QA Manager to be entered in the master NCR log and database (Attachment QA-08-2), which serve to identify and track NCRs.

When the NCR is logged, an NCR tag shall be attached to the nonconforming item. Multiple tags shall be used to control multiple items. Where a large physical area is identified as nonconforming, the area may be identified for control purposes by the use of flagging ribbon or stakes, if necessary. Parts or materials that are easily transported should be taken to the contractor NCR storage area and

work suspended until the nonconformance is dispositioned. The supervisor in charge should be notified of the nonconformance as soon as practical.

Further work incorporating or using nonconforming items shall not continue until the approved disposition is implemented and accepted by the responsible quality organization.

7.5 Dispositioning

Each NCR shall include a description of its disposition. The description shall identify and document the action or procedure selected to correct the noted deficiency.

Nonconformances shall be dispositioned in a timely manner. Dispositions that are not obtained in 30 days will be reported to the construction management consultant and the PMPC Program Manager for management action.

NCRs shall be dispositioned by one of the four procedures or actions defined below.

7.5.1 Accept-As-Is

Field condition, while not in conformance to the approved design, that is acceptable as installed or constructed for intended use. No further field action is required. This must be supported by calculations or other engineering analysis showing the existing condition meets codes and specifications.

7.5.2 Repair

The responsible engineer defines a repair procedure that will ultimately produce a product that is based on an acceptable alternate design.

7.5.3 Rework

When neither “accept-as-is” or “repair” is supported by engineering analysis, the nonconforming item is rejected, and must be reworked to meet the approved design requirements.

7.5.4 Reject

The action taken to eliminate a nonconforming item found unsuitable for its specified use. The Engineer-of-Record shall make dispositions of “repair” or “accept-as-is”; such dispositions require concurrence by TJPA Program Management.

The contractor’s QC organization and the Program QA Manager shall review each dispositioned NCR prior to implementing the action required for resolution. This will ensure that the disposition is fully responsive to the condition described in the NCR and that proper authorization has been given.

7.6 Reinspection and Acceptance

Upon completion of the required rework or repair dispositions, the contractor’s QC organization shall reinspect the item(s) to establish conformance to the applicable requirements, including the NCR disposition.

If the item is found acceptable, the contractor’s QC organization documents the acceptance by signing and dating the original NCR.

If the item is found unacceptable after rework or repair, the disposition is updated to “reject.” The contractor’s QC organization shall sign and date the NCR disposition acceptance only after ensuring

that adequate measures have been taken to prevent inadvertent installation or use of the item, or the timely removal of already placed material.

7.7 NCR Tracking, Reporting, and Analysis

NCRs are copied and promptly routed to the construction management consultant's resident engineer and the Program QA Manager. Copies are required at the following junctures: at NCR initiation and logging, at assignment of NCR disposition, at implementation of the disposition, and at acceptance by the contractor's QC organization.

7.8 Corrective Action to Prevent Recurrence

When corrective action is deemed necessary, a copy of the NCR will be routed to the organization responsible for control of the activity during which the nonconformance was identified.

The Program QA Manager shall verify and document on the NCR form that corrective action(s) to prevent recurrence of the nonconformance were implemented.

7.9 NCR Coding and Trend Analysis

The Program QA Manager shall enter on the NCR form the three-digit code that identifies the nature of the nonconformance and allows for easy and quick quantitative and qualitative analysis of nonconformances, their causes, and corrective actions. Form QA-08-3 contains the NCR codes.

A trend analysis to identify a recurring nonconforming condition shall be performed no less than biannually and include a narrative analysis of the results, both of which shall be distributed to Program QA Manager.

8 Definitions

Refer to Appendix C of this manual for a list of definitions.

9 Attachments

QA Forms:

QA-08-1 Nonconformance Report

QA-08-2 Nonconformance Report Log

QA-08-3 Nonconformance Codes



NONCONFORMANCE REPORT

Nonconformance Report	NCR NO. _____
Contract No. _____ Drawing/Specification/Code _____ Contractor _____ Part/Lot No. _____ Location/Site _____ Quantity _____ Supplier _____ P.O. _____ Initiated by _____ Date Issued _____	
Description of Nonconformance:	
Code: _____	
Cause:	
Code: _____	
Recommended Field Engineering Disposition:	
<input type="checkbox"/> Reject <input type="checkbox"/> Rework Resolve as Follows: Project/Field Engineer _____ Date _____	
Project Engineering Disposition:	
<input type="checkbox"/> Accept-As-Is <input type="checkbox"/> Repair Resolve as Follows: Project Engineer _____ Date _____ Concurrence PMPC & TJPA Rep. _____ Date _____	
Disposition Results:	
Resident Engineer/Inspector _____ Date _____	
Corrective Action (C/A) (To prevent recurrence):	
Verified Inspection of C/A _____ Date _____ Code _____	



NONCONFORMANCE CODES (Discrepancy / Defect)

ASSEMBLY	MATERIAL / SOILS
001 Interference/Improper Fit	051 Incorrect Material Used
002 Dis-bonding/Adhesive Defect	052 Material Contaminated
003 Incorrect Part Used	053 Gradation Test Failure
004 Assembly Error	054 Moisture Test Failure
005 Soldering	055 Density (Compaction) Test Failure
006	056 Sand Equivalent Test Failure
007	057 Organic Content of Soils
008	058 Durability Index
009	059 Resistance (R-value)
010 Other Assembly Related Defect	060 Other Material Defect
CERTIFICATION / DOCUMENTATION	MATERIALS / CONCRETE & STEEL
011 Information Missing	061 Incorrect Materials Used
012 Information Incorrect	062 Concrete Slump Test Failure
013 Information Illegible	063 Concrete Air Content
014 Material Incorrect	064 Concrete Compressive Strength Test Failure
015 Inspection/Test Incorrect	065 Drying Shrinkage of Concrete
016 Data Out-Of-Spec.	066 Concrete Honeycombing
017	067 Concrete Rock-Pocket/Voids
018	068 Mis-fabricated Reinforcing Steel Assemblies
019	069 Missing or Incorrect Reinforcing Steel
020 Other Cert./Documentation Error	070 Other Material Defects
DIMENSIONAL	NON-DESTRUCTIVE EXAMINATION (NDE)
021 Thickness—Over/Under Size	071 Cracked Welds
022 Diameter – Over/Under Size	072 Foreign Material
023 Length/Width—Over/Under Size	073 Component Gap/Fit-up Defect
024 Depth Incorrect	074 Undercut
025 Slope Incorrect	075 Porosity/Slag
026 Angle Incorrect	076 Lack of Penetration/Fusion
027 Feature/Item Missing	077 Discontinuities
028 Position/Location Incorrect	078 Voids
029 Radius Over/Under Size or Missing	079 Delamination
030 Other Dimensional Defect	080 Other NDE Indications

NONCONFORMANCE CODES (Continued)

INSTALLATION		SURFACE DEFECTS	
031	Missing Hardware	081	Discoloration
032	Missing Equipment	082	Blisters
033	Non-Standard Installation	083	Sparing
034	Incomplete Installation	084	Burrs/Chips/Nicks
035	Non-Conforming Materials Used	085	Damaged/Bent/Torn/Twisted
036	Equipment Damaged	086	Contaminated
037	Incorrect Location	087	Foreign Material
038	Incorrect Orientation	088	Plating/Coating Defects
039		089	Cracks
040	Other Installation Defect	090	Surface Irregular/Finish
INSTALLATION / TEST FAILURE		VISUAL & OTHER DEFICIENCIES	
041	Inspection/Test Equipment Failure	091	
042	Equipment Not Calibrated	092	
043	Procedural	093	
044	Under-Test Condition	094	
045	Electrical Test Failure	095	
046	Leak Test Failure	096	
047	Environmental Test Failure	097	
048	Functional Test Failure	098	
049	Mechanical Test Failure	099	
050	Other Inspection/Test Failure	100	Other Visual Anomaly

QA-09—Corrective Action

1 Purpose

This procedure establishes a method for ensuring that deficiencies in project processes implementation or documentation that could adversely affect quality are identified, and that the cause of the deficiency is determined, actions are taken to prevent recurrence, and resolution is documented.

2 Scope

This procedure applies to all Program- and project-related activities performed by designers, contractors, subcontractors, and suppliers implementing a Program-approved corrective action reporting system.

3 Responsibilities

The Program QA Manager is responsible for implementing and administering the Program corrective action request (CAR) system.

Design, construction, construction management managers, subcontractors, and suppliers are responsible for establishing and implementing a CAR system within their projects.

Program or project personnel noting process issues that could adversely affect quality are responsible for identifying these to their managers and to the Program QA Manager.

The project manager is responsible for ensuring that the actions or conditions are investigated and initiating a CAR when appropriate.

The project manager is responsible for initiating analysis to determine the root cause of the nonconformance and initiating and implementing the necessary corrective action to resolve the nonconformance and prevent its recurrence.

The Program QA Manager supports the manager in undertaking the activities to analyze and diagnose the root cause of the nonconformance and formulating the appropriate corrective actions.

The Program QA Manager or designee is responsible for documenting and reporting all CARs and for follow-up to verify that corrective action has been taken and appropriate methods are being used to prevent recurrence of the deficiencies.

4 References

Quality Management Plan (QMP): Section 12 – Corrective Actions

Appendix D: Program Quality Assurance Procedures:

QA-01 QA Program

QA-08 Nonconformance Reports

5 Procedure

5.1 General

Requests for corrective actions to processes used by the Program team may arise in response to the following:

- findings from planned project activities, including quality audits, design reviews, and project control reviews
- nonconformances that are documented in findings from inspections and tests. Note that CARs may arise after final design is complete; in these cases, process improvement can be implemented on future project work.
- quality issues identified during the normal course of work.

5.2 CAR Procedure

CARs will be documented by the responsible project manager using form QA-09-1, Corrective Action Request.

- The project manager shall analyze the conditions that led to the nonconformance, determine the cause or causes of the specific nonconformance, and formulate and implement the corrective actions, with a schedule for implementation to eliminate or control, if not practical to eliminate, the cause to prevent recurrence of the nonconformance.
- This information will be recorded on, or attached to, the CAR and sent to Document Control for routing and filing.

Document Control routes the CAR to the Program QA Manager, who will review the suggested corrective actions.

The Program QA Manager or designee will review and preliminarily approve the planned corrective action and schedule an audit to subsequently verify that the corrective action is implemented and effective.

Copies of CARs shall be maintained as quality records. The QA Manager shall monitor the status and track corrective actions using a CAR log.

A CAR will remain open until closed by the Program QA Manager or designee following an audit verifying the effectiveness of the corrective action or finding for the need for additional corrective action.

The Program QA Manager shall monitor the status and track corrective actions using a CAR log, which will be entered in the project office database.

6 Definitions

Refer to Appendix C for a list of definitions.

7 Attachments

QA Forms:

QA-09-1 Corrective Action Request

QA-09-2 Corrective Action Log



CORRECTIVE ACTION REQUEST

(Control Number)

(Rev.)

Part 1

NCR Number
(if applicable)

Organization or Contractor _____

Initiated By: _____

Location: _____

Date Initiated: _____

System, Structure or Component: _____

Related Documents: _____

DESCRIPTION OF QUALITY ISSUE

CAUSE

RECOMMENDED DISPOSITION

Accept as is, Reject Retest or,

Resolve as Follows:

Reviewed by (Supervisor or Manager) _____

Date: _____

Reviewed by (QA Manager's Office) _____

Date: _____

Part 2

DISPOSITION RESULTS

QA Review/Acceptance _____

Date: _____

CORRECTIVE ACTION TO PREVENT RECURRENCE (If required)

QA Review/Acceptance _____

Date: _____

QA-10—Quality Audits

1 Purpose

This procedure provides instruction to QA personnel for conducting quality audits of Program participants including the PMPC Consultant, design consultants, design/build contractors, design integration consultants, construction contractors, construction management consultants, suppliers, and major subcontractors. Quality audits of program activities verify compliance with the Program QMS.

2 Scope

This procedure covers the QA activities of planning and scheduling, and conducting and reporting the audit results of Program participants' quality program implementation.

3 Responsibilities

The Program QA Manager is responsible for implementing a formal quality audit system of process and product audits and document reviews to determine compliance with the Program QMS requirements.

The Program QA Manager is responsible for designating qualified auditing personnel and including this information in the quality audit files. Auditors shall not have any responsibilities for the project activities being audited.

The auditor is responsible for performing audits of QMS implementation.

Program and project managers shall provide the appropriate records and assistance to perform audits.

The Program QA Manager is responsible for reviewing and evaluating the audit results and for making any recommendations for corrective action to TJPA Program Management.

The Program QA Manager or designee is responsible for apprising TJPA Program Management of audit results.

4 References

QMS Quality Management Plan (QMP): Section 14—Quality Audits

5 Procedure

5.1 Quality Audit Planning and Scheduling

The Program QA Manager selects participants to be audited.

On a quarterly basis, the Program QA Manager issues an audit schedule to identify those participants to be audited in the next three months. The Program QA Manager reviews the schedule with and obtains concurrence from the responsible project managers.

In developing the schedule, the following factors shall be considered:

- Schedule of contract work. The initial audit should be scheduled at approximately the 20% to 30% completion stage of the contract (design or construction).
- Critical nature of the work being performed or tested.
- Total value of the contract.
- Potential for problems (based on inspection reports, discussions with design and construction project managers, resident engineers, or others).
- Frequency of the audit. Participants should be audited at least once during the term of the contract.
- Scheduling of the audit. QA shall prepare an audit schedule in advance to ensure that project personnel and project teams are aware of the nature of and prescribed time for these audits.
- Audit plans. Plans are to be established prior to the audit and will cover:
 - specific areas to be audited
 - specific scheduled dates for the audit
 - preparation and review of checklists against specific documented criteria
 - implementation of corrective actions related to previous audits

5.2 Pre-Audit Preparation

As early as practicable, the following preparations are required:

- Request that the responsible project manager or resident engineer make the necessary arrangements with the participant. If the scheduled dates are unacceptable, reschedule the audit as necessary.
- Upon reaching verbal agreement, prepare a letter to the participant for the Program QA Manager's signature confirming the audit dates (form QA-10-1, Example Audit Agenda).
- Review the contract documents to determine the requirements for implementation and control of their quality program and other applicable contractual quality-related mandates.
- Review the participant's quality procedures, plans or manuals, if submitted.
- Determine the areas to be audited and methods to be used. Prepare an audit plan and develop a quality audit checklist (form QA-10-2, Example Audit Checklist). The specific checklist should include the quality control requirements contained in the contract, such as submittals, approvals, specified tests and inspections, and documentation requirements.

5.3 Audit Performance

The audit should be conducted as follows:

- Begin with an introduction meeting with the participants' quality and management personnel to discuss the scope of the audit; request a briefing on the organization and identify channels of communication for the audit; identify records, equipment, installations or tests to be reviewed; and establish a tentative time and place for the exit review meeting.
- Carry out the investigation phase of the audit by completing each item on the applicable checklist. The completed checklist should be retained in the audit file.

- Report and document any noted deficiencies on form QA-10-3, Quality Assurance Finding (QAF). Discrepancies of a minor nature that are corrected during the audit or which do not require follow-up do not have to be documented.
- Document deficiencies that do not appear to be the participant's fault on a QAF form for referral to the project manager or resident engineer.
- If, in the opinion of the auditor, the nature or number of deficiencies should warrant a "stop work" order, provide the recommendation immediately to the Program QA Manager.

5.4 Audit Exit Meeting

An audit exit meeting shall be held with the cognizant participant personnel and include the following steps:

1. Review details of the audit and discuss each unsatisfactory condition identified.
2. Record agreements as to recommended actions and completion dates.
3. Advise when the audit report will be issued.
4. Leave copies of draft QAFs and advise that needed actions should be started prior to receiving the formal audit report.

5.5 Audit Report

Within two weeks following the completion of the audit, a report shall be prepared that consists of the following:

- identification of the audited contractor or organization, dates of audit, the auditor(s), and persons contacted
- description that includes the scope of the audit, i.e., areas audited and pertinent documents such as specifications, procedures, quality manuals, and checklists
- summary of findings and corrective actions
- observations, such as overall performance and unusual occurrences
- QAFs detailing any deficiencies

The audit report is to be submitted to TJPA Program Management, the PMPC Program Manager, and the responsible project manager, accompanied by a cover letter to be sent to the participant requesting the necessary remedial action, as applicable.

Quality assurance findings that are a project responsibility shall be identified separately and addressed to the project manager.

A copy of the audit report shall be submitted to applicable project managers for their information and use.

5.6 Close-Out Verification

The QA auditor in coordination with the construction management consultant's resident engineer, as applicable, shall perform follow-up as necessary to verify the corrective actions. Copies of the closed-out QAFs shall be provided to the construction management consultant's resident engineer for transmittal to the participant.

5.7 Records

Completed quality audit reports and closed-out QAFs shall be forwarded to the Document Control supervisor for retention. A copy of the completed report shall be transmitted to TJPA Program Management, the PMPC Program Manager, and applicable project managers.

6 Definitions

Refer to Appendix B in this manual for a list of definitions.

7 Attachments

QA Forms:

QA-10-1	Example Audit Agenda
QA-10-2	Example Audit Checklist
QA-10-3	Quality Assurance Finding
QA-10-4	Audit Observation

EXAMPLE AUDIT AGENDA

DATE: _____

8:30 AM

- Open meeting.
- Introduction and audit plan overview.

9:00 AM

- Review any open issues, as applicable.
- Conduct audit of quality system per audit checklist.

12:00 PM

- Lunch.

1:00 PM

- Continue with the audit.

3:00 PM

- Daily review of audit performance and issues, as applicable.

DATE: _____

8:30 AM

- Continue with the audit.

Document Requirements:

- Contractor's QA Manual
- Contractor's QA Plan
- Contractor's Test Plan
- Calibration Log
- Nonconforming Material Listing
- QC Inspection Records
- Test Reports

POST AUDIT EXIT MEETING

- Review the overall audit performance; discuss each unsatisfactory condition identified.
- Record agreements as to recommended actions and completion dates.
- Advise that an audit report will be issued in approximately two weeks.
- Leave a copy of the draft quality assurance findings (QAFs) and advise the audited organization that the needed actions should be started prior to receiving formal audit report.

AUDIT CHECKLIST

ORGANIZATION: EXAMPLE "OPTIONAL" FORM
ADDRESS: _____

PAGE of 5
DATE XX/XX/XXXX

AUDIT ITEM	REQUIREMENT REFERENCE	STATUS		
		Satisfactory	Needs Improvement	Unsatisfactory
<p>Verify the following program attributes/activities:</p> <p>1. <u>Prior Quality Audit - Closeout/Review</u></p> <ul style="list-style-type: none"> Review the contractor's/supplier's response for completeness and effectiveness of corrective actions. <p>2. <u>Quality Organization</u> Does the contractor's/supplier's quality program provide that:</p> <ul style="list-style-type: none"> Quality assurance (QA) personnel are solely dedicated to the quality program? QA personnel are independent of those having responsibility for production? Verification activities include inspections, tests, and monitoring of procurement, re-manufacturing, assembly, testing, and shipping? Verification also includes internal audits of the quality program? The approved quality plan is reviewed at appropriate intervals by management to ensure its continued suitability and effectiveness? Records of the above quality program review are documented and maintained? <p>3. <u>Design Control</u> Does the contractor's/supplier's quality program require that:</p> <ul style="list-style-type: none"> Procedures are established and maintained to control and verify the design to ensure that the specified requirements are met? Audits of inspection and production drawings performed at appropriate intervals by QA? <p>4. <u>Supplier and Vendor Controls</u> Does the contractor's/supplier's quality program:</p> <ul style="list-style-type: none"> Ensure that purchased products and services conform to the specified requirements? Establish conformance to specified requirements, by use of process monitoring and control methods? 	<p>Contract Requirements</p> <p>Audit No. & Date</p> <p>Contract Requirements</p>			
<p>4. <u>Supplier and Vendor Controls (Continued)</u> Does the contractor's/supplier's quality program:</p>	<p>Contract Requirements</p>			

AUDIT CHECKLIST

ORGANIZATION: EXAMPLE "OPTIONAL" FORM
ADDRESS: _____

PAGE of 5
DATE XX/XX/XXXX

AUDIT ITEM	REQUIREMENT REFERENCE	STATUS		
		Satisfactory	Needs Improvement.	Unsatisfactory
<ul style="list-style-type: none"> • Require the Supplier to ensure, through quality audit and surveillance that the subsupplier and subcontractor quality controls are effective and properly implemented and these audits and surveillances are documented? • Ensure that the incoming material or equipment is not used in the work until it has been verified to be compliant through documented inspection or otherwise by documentation provided by the manufacture to conform to specified requirements? • Require that verification be in accordance with the quality plan and documented procedures? • Hold material and equipment until the necessary reports have been received and verified, or required inspection and tests have been completed? • Identify and control nonconforming material and equipment from inadvertent use? <p>5. <u>Control of Non-Conforming Items</u> Does the contractor's/supplier's quality program:</p> <ul style="list-style-type: none"> • Establish and maintain procedures to ensure that material, equipment, or work that does not conform to specified requirements is prevented from inadvertent use or installation? • Provide for control of nonconforming material, equipment, or work by identification, documentation, evaluation, segregation, (when practical), and disposition, and for notification to the functions concerned? • Provide that the proposed use or repair of material or equipment which does not conform to specified requirements be reported for concession to the owner/agency? Representative? • Provide that repaired or reworked material or equipment is re-inspected in accordance with documented procedures? 				
<p>6. <u>Corrective Action</u> Does the contractor's/supplier's quality program provide for:</p>	Contract Requirements			

AUDIT CHECKLIST

ORGANIZATION: EXAMPLE "OPTIONAL" FORM
ADDRESS: _____

PAGE of 5
DATE XX/XX/XXXX

AUDIT ITEM	REQUIREMENT REFERENCE	STATUS		
		Satisfactory	Needs Improvement.	Unsatisfactory
<ul style="list-style-type: none"> Investigating the cause of nonconforming material or equipment and the corrective action needed to prevent recurrence? Analyzing all processes, work operations, quality records, service reports, and Engineers' complaints to detect and eliminate potential causes of nonconforming material and equipment? Applying controls to ensure corrective actions are taken and that they are effective? Implementing and recording changes in procedures resulting from corrective action? <p>7. Inspection Does the contractor's/supplier's quality program provide for:</p> <ul style="list-style-type: none"> Documented procedures for in-process and final inspection and require that all specified inspections, including those either on receipt of material, equipment, or in-process inspection, are complete? Final inspection in accordance with the quality plan and documented procedures, to complete the evidence of conformance of the finished material, equipment, or element of work to the specified requirements? Establish and maintain records that provide evidence that each material, equipment, or element of work has passed inspection within defined acceptance criteria? <p>8. Testing Does the contractor's/supplier's quality program:</p> <ul style="list-style-type: none"> Require that all testing be performed in accordance with the quality plan and documented procedures, to complete evidence of conformance of the finished material, equipment, or element of work to the specified requirements? Require all tests be performed at the specified test frequency and test results are properly documented? 				
<p>9. Control of Measuring and Test Equipment Does the contractor's/supplier's quality program provide for the control, calibration, and maintenance of inspection, measuring and test equipment to demonstrate the conformance of product to the</p>	Contract Requirements			

AUDIT CHECKLIST

ORGANIZATION: EXAMPLE "OPTIONAL" FORM
ADDRESS: _____

PAGE of 5
DATE XX/XX/XXXX


AUDIT ITEM	REQUIREMENT REFERENCE	STATUS		
		Satisfactory	Needs Improvement.	Unsatisfactory
<p>specified requirements?</p> <p>10. Manufacturing and Process Control Does the contractor's/supplier's quality program establish conditions that include the following requirements and procedures:</p> <ul style="list-style-type: none"> Monitoring and controlling of suitable process and product characteristics during production and assembly? Criteria for workmanship, which is specified, to the greatest practicable extent, in written standards or by means of representative samples? Require special processes be afforded continuous monitoring and compliance with documented procedures to ensure that specified requirements are met? Require that special processes be qualified and that records be maintained for qualified processes, equipment, and personnel, as appropriate? <p>11. Shipping Does the contractor's/supplier's quality program establish, document, and maintain procedures for the handling, packaging, and delivery of material and equipment?</p> <p>12. Inventory and Material Control Does the contractor's/supplier's quality program establish, document, and maintain procedures for the handling and storage of material and equipment?</p>				
<p>13. Internal Audits Does the contractor's/supplier's quality program:</p> <ul style="list-style-type: none"> Provide for carrying out a comprehensive system of planning and documented internal quality audits to verify whether quality activities comply with planned arrangements and to determine the effectiveness of the Quality Program? Provide for audits and follow-up actions being 	Contract Requirements			


AUDIT CHECKLIST

ORGANIZATION: EXAMPLE "OPTIONAL" FORM
ADDRESS: _____

PAGE of 5
DATE XX/XX/XXXX

AUDIT ITEM	REQUIREMENT REFERENCE	STATUS		
		Satisfactory	Needs Improvement.	Unsatisfactory
<p>carried out in accordance with documented procedures?</p> <ul style="list-style-type: none"> • Provide for documenting the results of the audits and bringing them to the attention of the personnel having responsibility in the area audited? • Require management personnel responsible for the area to take timely corrective action on the deficiencies found by the audit? <p>14. <u>Product Quality</u> Perform Quality Oversight inspection of selected process and assembly areas and installed equipment for compliance with the latest approved drawings, specifications, manufacturing and quality standards.</p> <p><u>Examples</u></p> <p>Note: A list will be developed for each audit.</p>				

 QUALITY ASSURANCE FINDING		
<p style="text-align: right;">QAF NO. _____</p> <p>AUDITED ORG. / CONTRACTOR: _____ DATE _____</p> <p>CONTRACT NO. _____ PAGE <u>1</u> OF _____</p>		
Description of Audit:	Initiator:	
Where Found:	Discussed With:	<input type="checkbox"/> Surveillance <input type="checkbox"/> Office <input type="checkbox"/> Field <input type="checkbox"/> Audit <input type="checkbox"/> Contractor <input type="checkbox"/> Supplier
Reference Document(s):		
Requirements:		
Finding:		
Recommended Action:		
Responsibility For Action:	Scheduled Completion Date:	
Action Taken:		
Response Submitted By:	Signature:	Date:
Verification Actions:		DISTRIBUTION:
Signature:	Date:	

 AUDIT OBSERVATION	
CONTRACT NO. _____ PAGE <u>1</u>	
AUDIT NO. _____ AUDIT OBSERVATION NO. _____	
Organization Audited:	Date:
Location:	
Auditor:	
Observation Description:	
Recommended Action:	
Responsible Organization(s):	Scheduled Completion Date:
Corrective Action Taken:	
Responsible Authority:	Date Completed:
Verification Results:	
Signature:	Date:

QA-11—Qualification of Auditors

1 Purpose

This procedure defines the required qualifications of quality assurance auditors for the Program.

2 Scope

This procedure prescribes the minimum qualification requirements for personnel who perform management, project designer, contractor, and supplier quality audits, as auditor or lead auditor, in compliance with these Program QA Procedures.

3 Responsibilities

Selection, training, qualification, and assignment of auditors and lead auditors are the responsibility of the Program QA Manager. Personnel selected to perform audits shall be independent of any direct responsibility for performance of the activities that they will audit.

4 References

Program Quality Assurance Procedures:

QA-01 QA Program

QA-02 Quality Planning

QA-10 Quality Audits

5 Procedure

5.1 Qualification

The qualifications of personnel assigned to perform QA audits shall be commensurate with the scope, complexity, and special nature of the activities being audited.

Technical specialists who have special experience in the activities being audited may be assigned to audit under the direction of a lead auditor without being qualified in accordance with the full requirements of these procedures. Prior to the audit, they shall be trained in audit procedures.

5.2 Qualification for QA Auditor

To qualify as a QA auditor, an individual must meet all of the following criteria.

- Education and experience commensurate with the scope, complexity, and special nature of the activities to be audited.
- Knowledge and understanding of funding agency, TJPA, construction management, and contractual requirements.
- Knowledge of principles and techniques of auditing, including audit planning. Status as an American Society of Quality (ASQ) Certified Quality Auditor (CQA) is desirable as proof of competency.

- Effective participation in a minimum of three audits of similar scope within the past two years, including one performed in the past year. To obtain experience, an auditor-in-training shall perform or participate in three audits under the direction of a qualified auditor.
- Current supervisor's verification of audits performed.

These qualifications are documented on form QA-11-1, Record of Auditor Qualification.

5.3 Qualification for Lead Auditor

To qualify as a lead auditor, an individual must meet all of the following requirements:

- Education and experience commensurate with audit scope, complexity and special nature of the activities to be audited.
- Knowledge and understanding of funding agency, TJPA, construction management and contractual requirements.
- Effective written and verbal communication skills.
- Knowledge of principles and techniques of auditing, including audit planning. An ASQ CQA designation is desirable as proof competency in this area.
- Participation in at least five QA audits during the past three years.
- Examination that evaluates comprehension and ability to apply the body of knowledge identified above.

The test may be oral, written, or practical, or any combination of the three types. The Program QA Manager is responsible for providing and administering the examination. The results of the examination shall be recorded. ASQ CQA designation may be substituted for this exam.

The above qualifications are documented on form QA-11-2, Record of Lead Auditor Qualification.

5.4 Maintenance of Qualification

Auditors and lead auditors remain qualified by participating as a member of an audit team in at least one audit per year. Auditors' and lead auditors' participation in audits is recorded on the appropriate audit or qualification form.

The Program QA Manager shall perform an annual assessment of lead auditors in order to extend the qualification, or require retraining or requalification. This evaluation shall be documented.

5.5 Requalification of Auditors and Lead Auditors

If an auditor's qualifications have lapsed for one year, one or more of the following actions is required:

- re-evaluation in accordance with Qualification for QA Auditor
- for lead auditors, re-evaluation in accordance with Qualification for Lead Auditor
- participation as an auditor in at least one QA audit, with verification by the individual's supervisor

5.6 Records

Forms QA-11-1, Record of Auditor Qualification, and QA-11-2, Record of Lead Auditor Qualification, shall be maintained in the QA training file by the Program QA Manager. The records for each lead auditor shall be maintained and updated annually by the Program QA Manager.

6 Definitions


Refer to Appendix B in this manual for a list of definitions.


7 Attachments

QA Forms:

QA-11-1 Record of Auditor Qualification

QA-11-2 Record of Lead Auditor Qualification

	RECORD OF AUDITOR QUALIFICATION
NAME: _____	DATE: _____ EMPLOYEE NO.: _____
<u>QUALIFICATION REQUIREMENTS</u>	<u>RESULTS</u> S = Satisfactory N = Needs Additional Training *
1. CHECK LISTS PREPARED	
2. AUDIT CRITERIA	
3. CODES	
4. STANDARDS	
5. PROJECT REQUIREMENTS	
6. RESPONSIBILITIES	
EVALUATED BY _____	DATE _____
APPROVED BY _____	DATE _____

	RECORD OF LEAD AUDITOR QUALIFICATION
NAME: _____	DATE: _____
EMPLOYEE NO.: _____	
<u>QUALIFICATION REQUIREMENTS</u>	<u>RESULTS</u> S = Satisfactory N = Needs Additional Training *
1. PROJECT QUALITY POLICY	
2. AUDIT CRITERIA	
3. CHECKLISTS PREPARED	
4. CODES	
5. STANDARDS	
6. PROJECT REQUIREMENTS	
7. RESPONSIBILITIES	
8. EVALUATION OF CONTRACTOR/SUPPLIER PROGRAMS	
9. PREPARATION OF AUDIT REPORTS AND QUALITY ASSURANCE FINDINGS (QAF)	
EVALUATED BY _____	DATE _____
APPROVED BY _____	DATE _____

QA-12—Training

1 Purpose

This procedure describes the quality awareness training for the Program.

2 Scope

This procedure documents the process that the Program QA Manager uses to ensure that personnel assigned to the Program have knowledge of the QMS Manual to perform their assigned tasks in accordance with the QMS.

3 Responsibilities

The Program QA Manager and project QA managers are responsible for developing and implementing a training program for Program and project personnel on the overall approach to quality on the Program, on each individual's role and responsibility within the QMS, and implementation of the QMS.

The Program and project QA managers are responsible for providing knowledgeable trainers and appropriate materials for each training session.

Each Program and project manager is responsible for the indoctrination and training required to ensure that their personnel attain proficiency levels suitable for performing assigned quality tasks and activities.

All identified project personnel are responsible for attending and completing the training program. This training may be accomplished through training classes, general discussions of specific procedures, individual reading and review assignments, or individual training.

Objective evidence related to the indoctrination and training is to be maintained by the appropriate project manager(s) with copies sent to the Program QA Manager.

4 References

Quality Management Plan (QMP):
Section 1 Management Responsibility
Section 2 Documented Quality System
Section 15 Training

Appendix D Program Quality Assurance Procedures: QA-01—QA Program

5 Procedure

The Program QA Manager will schedule and provide QMS indoctrination and awareness training to the project's functional organizations. This training will focus on the Program QMS, and will cover the following topics:

- Program QMS
- project quality plans
- project-specific procedures and instructions
- use of specified forms and quality documentation

Attendance at the training will be documented and kept on record in the Program QA Manager's training file. If required, follow-up sessions will be held throughout the life of the project, and when significant revisions are made to the QMS. Forms QA-12-1, Training Record, and QA-12-2, Training Session Record, are example training records.

6 Definitions

Refer to Appendix B in this manual for a list of definitions.

7 Attachments

QA Forms:

QA-12-1 Training Record

QA-12-2 Training Session Record

Appendix E

Inspection Guidelines

The Program QA Manager for the Transbay Transit Center Program has identified a series of recommended inspection guidelines to assist construction managers in determining which inspection guidelines and checklists they will need to develop to assist field engineers and construction inspectors in their awareness and execution of quality verification and inspection.

The intent of these guidelines is to provide field engineering and construction inspectors with general inspection guidance, checklists, and reminders that are based on industry standards. This list is meant for guidance only; it is not an all-inclusive list of required guidelines.

These inspection guidelines are arranged according to the Construction Specification Institute's (CSI) *MasterFormat* 2004 Edition.

CSI Number	Element of Work/Specification	Inspection Checklist
Division 01	General Requirements	
01 45 00	Quality Control	Quality Control – General Inspection Guidelines
01 35 24	Construction Safety	Construction Safety
01 45 24	Testing Program Requirements	Testing Control
01 60 00	Materials and Equipment	Material Control
01 65 00	Product Delivery Requirements	Receiving and Storage
01 78 39	Project Record Documents	Design Document Control
Division 02	Existing Conditions	
02 41 00	Demolition	Demolition
02 41 19	Selective Demolition	Selective Demolition
Division 03	Concrete	
03 01 08	Concrete Restoration	Concrete Repairs & Restoration
03 05 15	Portland Cement Concrete	Portland Cement Concrete
03 05 18	Prestressed Concrete	Prestressed Concrete
03 11 00	Concrete Forming	Concrete Formwork
03 20 00	Concrete Reinforcement	Concrete Reinforcement
03 30 00	Cast-In-Place Concrete	Cast-In-Place Concrete
03 37 13	Shotcrete	Shotcrete
03 40 00	Precast Concrete	Precast Concrete
03 62 00	Nonshrink Grout	Nonshrink Grout
Division 04	Masonry	
04 01 20	Unit Masonry Restoration	Masonry Restoration
04 22 00	Concrete Unit Masonry	Concrete Unit Masonry
Division 05	Metals	
05 05 22	Welding	General Welding
05 12 00	Structural Steel	Structural Steel
Division 07	Thermal & Moisture Protection	
07 81 24	Intumescent Fireproofing	Intumescent Fireproofing
07 84 00	Firestopping	Firestopping
07 92 00	Joint Protection	Joint Protection

CSI Number	Element of Work/Specification	Inspection Checklist
Division 09	Finishes	
09 91 00	Painting	Painting
Division 20	Facility Services	
20 10 13	Common Materials and Methods for Facility Services	Non-Rotating Equipment
20 60 13	Motors for Facility Services	Motors
Division 21	Fire Suppression	
21 12 00	Fire Suppression Standpipe	Fire Protection Piping
21 13 13	Wet-Pipe Sprinkler System	
Division 22	Plumbing	
22 10 00	Plumbing Piping and Pumps	Plumbing Piping
22 11 00	Facility Water Distribution	
22 40 00	Plumbing Fixtures	
22 11 01	Water Distribution	Water Distribution (Flushing, Cleaning / Leak & Pressure Testing)
Division 23	Heating, Ventilating, Air Conditioning (HVAC)	
23 05 00	Common Work Results for HVAC	HVAC Installation
23 05 08	Vibration and Seismic Controls for HVAC Piping and Equipment	
23 05 93	Testing, Adjusting, and Balancing for HVAC	
23 09 00	HVAC Instruments & Controls	
23 31 00	HVAC Ducts & Casings	
23 32 00	Air Plenums and Chases	
23 33 00	Air Duct Accessories	
23 34 00	HVAC Fans	
23 83 00	Radiant Heating Units	
Division 26	Electrical	
26 05 00	Common Work Results for Electrical Systems	Electrical Equipment
26 05 24	Low and Medium Voltage Wires and Cables	Low and Medium Voltage Wires and Cables
26 05 26	Grounding and Bonding for Electrical Systems	Grounding and Bonding
26 05 33	Raceway and Boxes for Electrical Systems	Raceways
26 05 43	Underground Ducts and Raceways for Electrical Systems	
26 24 13	Switchboards	Switchboards
26 50 00	Lighting	Lighting
Division 31	Earthwork	
31 00 00	Earthwork	Earthwork
31 11 00	Clearing and Grubbing	
31 23 23	Fill	
31 23 25	Controlled Density Fill	
31 22 19	Finish Grading	
31 09 00	Geotechnical Instrumentation and Monitoring of Earthwork	Earthwork Instrumentation
31 23 16	Excavation	Excavation and Dewatering
31 23 19	Dewatering	
31 40 00	Shoring and Underpinning	Shoring and Underpinning
31 50 00	Excavation Support and Protection	Excavation Support and Protection

CSI Number	Element of Work/Specification	Inspection Checklist
31 52 00	Cofferdams	Cofferdams
31 56 00	Slurry Walls	Slurry Walls
31 62 00	Driven Piles	Driven Piles
31 63 23	Bored Concrete Piles	Bored Concrete Piles
31 64 16	Excavated Caissons	Caissons
31 71 00	Tunneling	Tunneling
31 71 11	Hand Excavated Tunnels	Tunneling (Hand Method)
31 71 19	Tunnel Excavation by Tunnel Boring Machine	Tunnel Excavation by Tunnel Boring Machine
Division 32	Exterior Improvements	
32 11 17	Aggregate Subbase Courses	Aggregate Subbase
32 11 23	Aggregate Base Courses	Aggregate Base
32 12 16	Asphalt Paving	Asphalt Concrete Paving
32 13 13	Concrete Paving	Concrete Paving
Division 33	Utilities	
33 01 00	Maintenance of Existing Utilities	Maintenance of Existing Utilities
33 01 11	Pipe Ramming (Cased Tunnels)	Pipe Ramming (Cased Tunnels)
33 01 22	Jacked Pipe	Jacked Pipe
33 05 28	Trenching & Backfilling for Utilities	Trenching & Backfilling for Utilities
33 11 00	Water Utility Distribution Piping	Water Distribution System
33 31 00	Sanitary Utility Sewerage Piping	Sanitary Sewer System
33 40 00	Storm Drainage Utilities	Storm Drainage Utilities
33 46 00	Subdrainage	Subdrainage
Division 34	Transportation	
34 05 17	Common Work Results for Trackway	Track Construction
34 11 00	Rail Tracks	
34 11 23	Special Trackwork	
34 11 24	Direct Fixation Track	
34 11 25	Running Rail	
34 11 27	Ballasted Track	

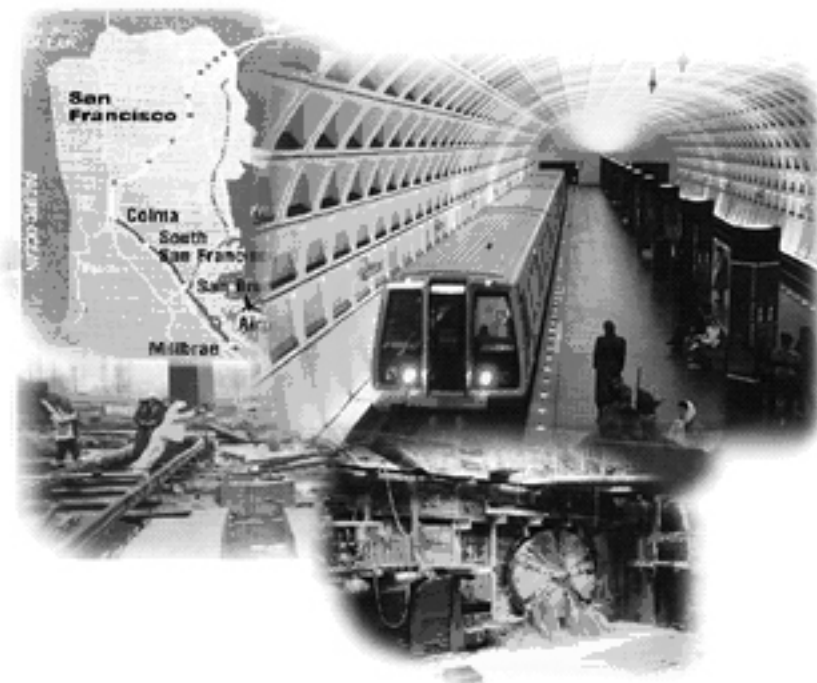
Appendix F

Federal Transit Administration (FTA) Quality Management System Guidelines (FTA--PA-27-5194-12.1, 2012)

The Quality Management System Manual is designed to meet all the requirements of the Federal Transit Administration's December 2012 Quality Management System Guidelines. The guidelines are located on the FTA's website and are included for reference. The original document and attachments providing sample programs are available at:

www.fta.dot.gov/FINAL_FTA_QMS__Guidelines_December_2012.pdf

COVER PAGE FTA-PA-27-5194-12.1 Quality Management Guidelines December 2012



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