

Glossary of Terms

Project Quality

Project Quality is a composite of Technical Quality, Cost Effectiveness, Schedule/Delivery and Stakeholder Expectations.

Technical Quality - Policies, Processes and Procedures of the Department are met.

Schedule/Delivery - Meet agreed schedule commitments.

Cost Effectiveness - Stay within Capital and Support Budget.

Expectations - Delivery of products that meet Stakeholder's needs.

Quality Control (QC)

The process, practices and activities performed at the project team level, during the project delivery process, providing the foundation for Quality Assurance.

Quality Assurance (QA)

The sum of all Quality Controls completed during the project delivery process that provide confidence that the project team has followed the established Project Specific Quality Control Plan.

Project Specific Quality Control (PSQC) Plan

The project specific plan, developed and managed by the PDT, is comprised of individual Functional Quality Control Plans and the interactions between them.

Functional Quality Control (FQC) Plan

Each functional unit's specific plan comprised of Quality Milestones and their associated Quality Control Elements that provide the foundation for Functional Quality Assurance.

Quality Milestone (QM)

Intermediate checkpoint to document progress of the Functional Quality Control Plan.

Quality Control Elements (QCEs)

The individual procedures and processes that each Functional Unit defines in their Functional Quality Control Plan. A determination that the sum of the QCE's from PID to RTL will result in a PS&E package that is complete and clear of constraints, and is ready for advertising and bidding.

Project Specific Quality Assurance (PSQA)

The sum of the Project Specific Quality Control Plans selected and documented during the project delivery process that provide confidence that the project team has participated.

Functional PS&E

Complete Functional PS&E's (Structures, Electrical, Signing and Striping, Landscape Architecture, etc.) are submitted to the Project Engineer along with that unit's documentation of Functional Quality Assurance.

Functional Quality Assurance (FQA)

Each functional unit's documentation at Functional PS&E that their Quality Control Plan has been followed.

RTL Certification

Design's certification that all applicable design, right of way, environmental, regulatory, and statutory conditions have been addressed in the PS&E such that the project is RTL.

Programmatic Quality Controls (PQC)

Departmental guidance and tools, outside of the Project Specific Quality Control Plan, which contribute to the overall quality for all projects. Some examples:

- Policies and Procedures
- Directives
- Process and Quality Checklists
- Training

Project Quality Matrix (PQM)

The PQM is a template designed to document decisions and activities made throughout each project phase and allow the PE to plan and track requests, tasks and deliverables from other functional units. It is also used by PEs for documenting Quality Control Elements that lead to Quality Milestones. The PQM is initiated at the beginning of a new project phase (PID, PA&ED, PS&E and RTL) and completed at the end of that particular phase. At the beginning of the next project phase the previous PQM will be reviewed by the PDT for initiating the PQM for the new project phase.

Introduction

The North Region Quality Management Plan (NR QMP) is a multi-functional approach to ensure Project Quality. Project Quality is comprised of the following elements: Technical Quality, Cost Effectiveness, Schedule/Delivery and Stakeholder Expectations. Change to any of these elements can have a positive or negative effect on the remaining elements, as well as the overall Project Quality. This plan is a product oriented quality roadmap that will be applied from Project Initiation through Ready-to-List (RTL).

This plan recognizes that the majority of the projects developed by Caltrans are produced with the Division of Design as the lead unit, with various functional units contributing components relative to their specialty (Surveys, Environmental, Right of Way, etc). This plan is also valid for those projects where Maintenance, Hydraulics, Landscape Architecture, Traffic, Engineering Service Center or another Division is the lead unit and provides the Engineer of Record.

Technical Quality is provided throughout the project development process by a team of NR personnel with a wide range of specialties and experience. The preparation of approval documents (PSR, PR, etc.) in accordance with the NR QMP, assures management that appropriate quality checks have been completed, and all documents and supporting data have been thoroughly reviewed. The effort of all members of the PDT in fulfilling their roles and responsibilities through participation and communication is critical to the success of Project Quality.

Schedule/Delivery and Stakeholder Expectations are identified during the Project Initiation phase and reviewed at subsequent PDT meetings as the project scope is refined. Cost estimates are updated as better project information becomes available and reported on an annual basis. Management is assured that Cost Effectiveness, Schedule/Delivery and Stakeholder Expectations are being met through regularly scheduled Delivery Hour and Status Meeting presentations.

When changes to any of the quality elements are proposed, they will be fully evaluated by the project development team (PDT). The PDT is tasked with evaluating project changes and documenting their decisions using the Project Quality Matrix (PQM). When the PDT fails to reach consensus, or the scope of change is outside of their authority, the issues will be raised through Management for a timely decision.

Quality risks are inherent to the Project Development process. The QMP includes the use of the PQM to document efforts to instill quality and identify risks due to intrinsic project constraints.

The true quality of a transportation improvement project is measured subjectively by the individual stakeholders as well as by those administering the construction contract. However, in order to measure the effectiveness of the NR QMP, it is proposed to have second level managers will evaluate the products at the end of each phase (PID, PA&ED, and RTL). During the Management Review circulation, second level managers will evaluate the products for quality from their own perspectives. To facilitate the evaluation/feedback process, the updated project specific Project Quality Matrix (PQM) should be provided to show what quality steps were accomplished during that phase.

Need and Purpose

In an effort to process projects in a more efficient and timely fashion, the Division of Engineering Services - Office Engineer (DES-OE) has replaced the existing PS&E procedures with the Ready to List Guidelines. As part of this revision Service Level 1 and Service Level 2 Ready to List processes were created.

Service Level 1 follows the previous DES-OE PS&E process. Service Level 2 is DES-OE's reduced level of service, currently only available for projects eligible under the Authority to Advertise District Delegation (AADD). These are the current California Transportation Commission (CTC) delegated projects: Minor A (less than \$1 million) and Maintenance projects, and Safety projects (201.010(HB1)) less than \$2 million.

Once the Department adopts a Quality Management Program and the Region implements a Quality Management Plan, projects of any size may be processed by the District or Region utilizing Service Level 2 to certify Ready to List with DES-OE concurrence.

Whether Service Level 1 or 2 is used for PS&E processing, according to the new Ready to List Guidelines the Design Engineer (DE) and Project Engineer (PE) are responsible for certifying that the project is RTL. By signing the RTL Certification, they are assuring the Technical Quality of the PS&E package, that all the necessary permits have been approved, and right-of-way and other constraints are cleared. This QMP identifies Quality Control Elements and Quality Milestones to aid the lead unit in not only instilling quality throughout the process but also maintaining responsible charge through Office Engineer activities.

A quality PS&E will have less rework, will be easier to review, will be more consistently biddable and buildable and will be easier to administer during construction.

Methodology

The NR Quality Management Plan has been separated into four phases for managing quality: Project Initiation Document (PID), Project Approval and Environmental Document (PA&ED), Draft PS&E and RTL. The PID corresponds to the "K phase" for EA charging; PA&ED corresponds to the "0 phase"; Draft PS&E and RTL correspond to the "1 and 2 phases". Other activities necessary for project development and construction include a pre-PID phase for identifying and sponsoring a project, an Advertisement phase for processing addendums, advertising and receiving bids, and a Construction phase for administering the contract and providing construction engineering. Quality management for activities during these phases is outside the scope of this document, but need to be addressed by another team.

The QMP is comprised of the following three components:

- Project Specific Quality Control (PSQC) Plan
- Project Specific Quality Assurance (PSQA)
- Programmatic Quality Control Tools (PQCT)

The Hierarchical Diagram (see Figure 1 on page 7) illustrates the relationship between the three components as well as the interaction between the lead unit and functional units. Each functional

unit is responsible for the quality of their product. Their FQC Plan identifies the QCE's to be put in place to ensure that their product adheres to quality standards and meets expectations. The functional units will provide FQA for their product and documentation that it was prepared in accordance with their unique quality control procedures.

The PSQC Plan consists of each functional unit's plan identifying the Quality Control Elements and Quality Milestones anticipated for a specific project. The lead unit PSQC Plan also identifies the interaction points between the functional units and the lead unit as Quality Control Elements. The PSQC Plans for the various functional units are presented in Appendices A thru M.

The Quality Control Elements identified in the PSQC Plans are tasks that provide quality controls to the project. These elements can be specific to a functional unit like peer reviews or Preliminary Geometric Approval, or can be multi-functional like assembling the PDT or reviewing the Project Report prior to circulation for District review.

Specific Quality Control Elements build to a Quality Milestone. The Quality Milestones in the PSQC Plans were identified throughout the project development process to provide cumulative quality assurance. Successfully reaching these milestones provides the project stakeholders assurance that the appropriate quality checks have been made and provides an opportunity to document both the level of quality elements applied, as well as level of risk associated with those not implemented.

Project quality assurance is provided at points along the project development process. The Project Study Report (PID phase) and the Project Report (PA&ED phase) are presented to management for approval. By preparing these documents in accordance with the PSQC Plan, management is assured that appropriate quality checks have been done, and that the documents and supporting data have been thoroughly reviewed both by the PDT and by district reviewers not directly involved with the project.

Cumulative quality assurance for the overall project is provided through the review and/or approval of documents that complete each phase. A Project Study Report or Project Scope Summary Report is approved at the end of the PID phase. The Environmental Document and Project Report are approved at the end of the PA&ED phase. Constructability and safety reviews (also held during PID and PA&ED phases) are conducted near the end of the Draft PS&E phase. Finally, the project is certified Ready to List at the end of the RTL phase.

The success of developing and using a PSQC Plan can be tied to three key areas: the empowerment of the PDT, continuous and effective communication, and the documentation of the tools and elements utilized along with their impacts on project deliverables. The following should be emphasized when developing a PSQC Plan:

- Coordinate Functional Unit Needs - The PDT develops a collaborative understanding of the project parameters and what information is required to produce each functional unit's deliverables.
- Submit to Functional Unit - The lead unit develops the required information and provides it to the functional units such that they can produce their deliverable within the parameters agreed to by the PDT.

- Follow-up with Functional Unit - Consistent follow up should occur between the lead and functional units to assure that the provided information meets the overall expectations agreed to by the PDT and Functional Unit.

A PQM will be used to document the PSQC Plan and track the individual elements/milestones. The PE would initially develop the PQM, with input from the PDT, at the beginning of a project for the needs and issues relevant and appropriate to the specific project. A PQM template has been developed for the PE's use. The PQM would be reviewed and approved by the PDT. The PQM is a living document that will be finalized at the end of each project phase. The PQM shall be updated based on information and experience gained during that phase and the anticipated needs of future project phases.

On some projects there is a time lag between completing one phase and beginning the next phase. Also project development staff occasionally changes between phases. For these reasons, at the start of each subsequent phase, the PQM, including PDT membership, will be reviewed and updated as needed.

Roles and Responsibilities

A variety of NR personnel with a wide range of specialties and experience contribute to the development of the RTL throughout the project development process. The effort of all members in fulfilling their roles and responsibilities through participation and communication is critical to the success of the PDT effort and quality of the final RTL. Each member of the PDT is committed to accomplish the work with the quality promised in a timely and cost effective manner. Each member of the PDT is accountable for meeting their commitments.

Project Engineer

The Project Engineer (PE) is the Engineer of Record and is in responsible charge of the project. The PE provides work assignments and technical direction to the design staff assigned to the project as well as requesting support from functional units. The PE is responsible for the project information provided to the functional units for which they base their work, and integrating the functional unit product into the overall project. At RTL the PE certifies that the project meets the project development requirements, is clear of constraints, and has the necessary permit approvals.

Design Engineer

The Design Engineer (DE) of the lead unit is ultimately responsible for the technical quality of the project and is also the Task Manager of various Work Breakdown Structure (WBS) activities. The DE supervises the PE as well as other design staff assigned to the project. The DE tracks the progress of the project and the technical decisions made. They review the project design at various milestone points to assure the quality of the design effort prior to information being sent to functional units or District reviews. The DE approves the project as developed by the PE including the cost estimate and any required design exceptions. The DE approves the PE's certification that the project is RTL.

Functional Specialist

The Functional Unit technical specialist develops that unit's product for Functional PS&E. They understand how their specific product fits into the overall project, and are responsible for the quality of their individual product.

Functional Manager

The Functional Manager supervises the technical specialist as well as other functional unit staff assigned to the project. They approve the direction of the functional unit effort and assure the quality of the product delivered to the lead unit.

Project Manager

The Project Manager has the responsibility, delegated from the District Division Chief for Program and Project Management, to produce the results that were intended, meet schedules, stay within budget and keep the sponsors and customers satisfied. The Project Manager retains these responsibilities over the entire life of the project, and is the primary point of contact for the project sponsor. The Project Manager will exercise an active role in coordinating with the PDT members to assist with development of overall project quality.

Task Manager

The Task Manager participates in the development of the Project Management Plan and provides expert knowledge and analysis for the preparation of project scope, schedule and resources. The Task Manager commits to the scope, schedule and resource estimates of their portion of the Project Management Plan, as well as to delivery of their portion of the project workplan.

The Task Manager is responsible for resolving resource and schedule conflicts between the functional units. This allows for timely and informed decisions to be made at the lowest level, improving the efficiency and quality of the project. Any unresolved conflicts will be brought to the PM's attention for resolution.

For more information on the North Region Task Management Plan and Directive, please see: <http://northregion/ProgProjMgmt/NR/TaskMgtWeb/index.htm>

Executive Management

Support from Executive Management is critical to the successful implementation of the North Region QMP. This support includes:

- Timely decisions on unresolved issues elevated by the PDT
- Assess and accept/reject risk as identified in the PQM
- Dedicating adequate resources to update policies, procedures and directives
- Provide sufficient staffing levels for QMP implementation and future Service Level 2 delivery on all projects in the North Region
- Provide adequate training and tools for staff
- Evaluation of projects to provide feedback on process

Implementation & Follow-up

Except for Minor B Projects, all projects (on-going and future) in the North Region will utilize the Quality Management Plan to develop their deliverables at the start of a new Project Development phase. The long-term goal in the North Region is for all projects to achieve Service Level 2 Delivery. Service Level 2 is DES-Office Engineer's reduced level of service, which provides delegation for the Districts to process RTL.

To facilitate the use of the NR QMP, representatives from each functional unit will be available to project delivery staff in the North Region to assist in developing the QMP for their projects and answer questions. A QMP Implementation Team will remain organized not only to provide support during the first two years of implementation but also to assess individual project and overall progress of the QMP and make adjustments to the plan as necessary.

Figure 1: Hierarchical Diagram

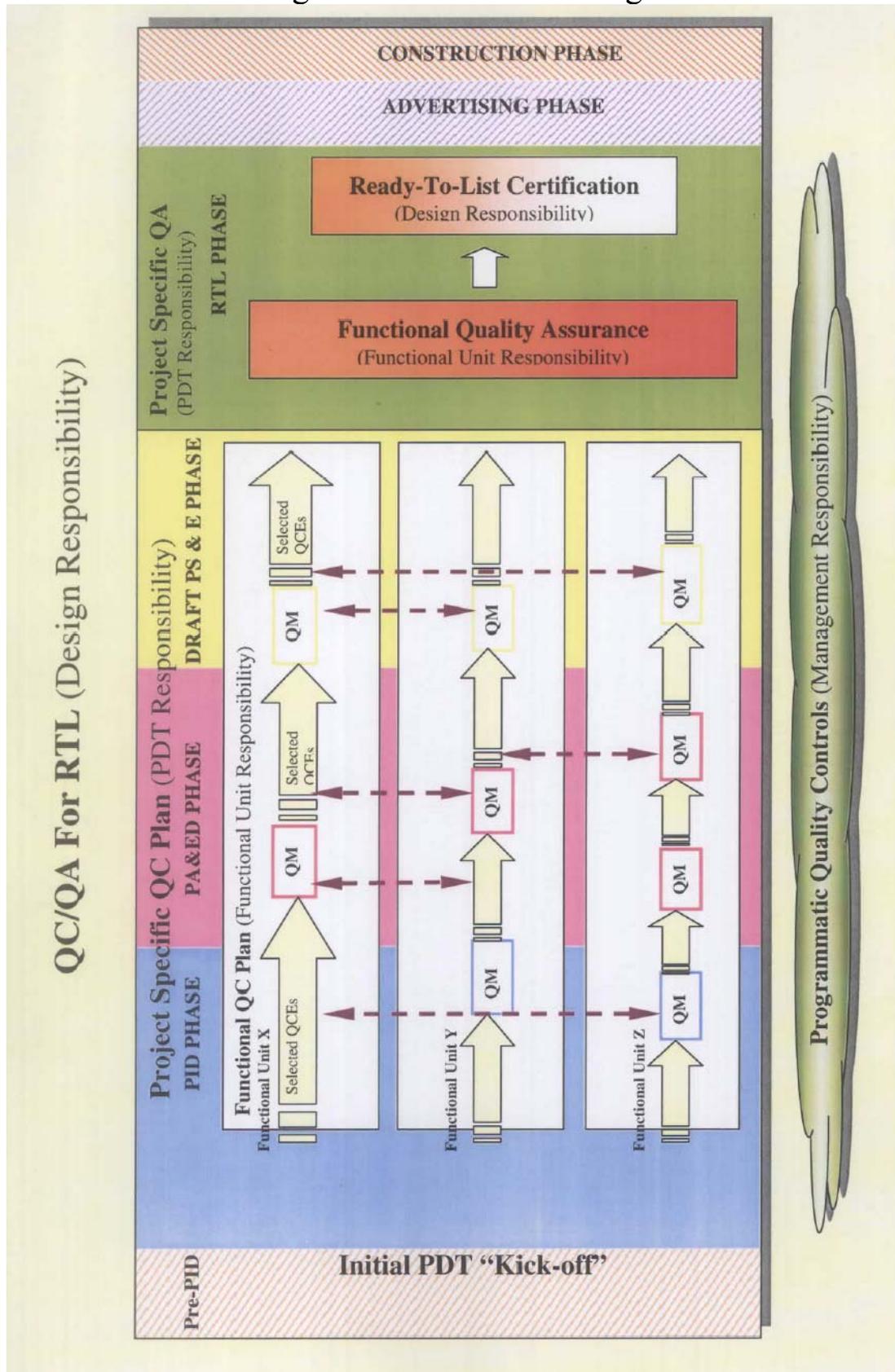


Illustration of the relationship between Quality Control and Quality Assurance and for the PID, PA&ED, Draft PS&E and RTL phases, and the interaction between the Lead Unit and Functional Units