



**U. S. Department
of Transportation
Federal Highway
Administration**



"Commitment to Excellence"
Federal Lands Highway

**Contractor Quality Control Plans
Contractor Guidelines
and
Example Quality Control Plan**

These guidelines are intended to assist FLH Contractors in the preparation of acceptable Quality Control Plans. They are based on the requirements contained in Section 153 of the Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP). The guidelines are not contractual requirements, and do not supplement or supersede any contractual requirements.

**Federal Highway Administration
Federal Lands Highway Office
Engineering and Operations Division (HFL-20)
Washington, DC 20590**

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Contractor Quality Control Plans

Contractor Guidelines

	Page
A. INTRODUCTION	3
B. FAR AND FP REQUIREMENTS	3
C. PLAN DEVELOPMENT	5
1. ORGANIZATIONAL STRUCTURE	5
2. PROCESS CONTROL TESTING	5
3. INSPECTION/CONTROL PROCEDURES	6
4. CATEGORIES OF CONSTRUCTION	7
5. PRELIMINARY, STARTUP AND PRODUCTION PHASES	7
6. WHO, WHAT, WHERE, WHEN AND HOW?	8
7. SUBCONTRACTORS AND SUPPLIERS	8
8. MANUFACTURED MATERIALS	9
9. RECORDS AND DOCUMENTATION	9
10. PERSONNEL QUALIFICATIONS	9
11. PARTIAL PLANS	9
D. CONTRACTOR EVALUATION	9
 Appendices	
A. EXAMPLE QUALITY CONTROL PLAN	11
B. EXAMPLE GOOD, FAIR AND POOR QC PLAN ELEMENTS	17

Contractor Quality Control Plans

A. Introduction

A contractor quality control plan (CQCP) is the documentation of the contractor's process for delivering the level of construction quality required by the contract. This document is intended to provide guidance to Federal Lands contractors, subcontractors and suppliers as to what is expected from CQCPs, and what the criteria for accepting and using the requirements for these plans will be.

The CQCP is a framework for the contractor's process for delivering quality construction. The plans and specifications define the expected results or outcome. The CQCP outlines how those results will be achieved. While it is not possible to determine from the CQCP whether the level of construction quality will be acceptable, it is possible to verify that the contractor, as an organization, has addressed the basic elements of its quality process. These guidelines address, not only what should be in the CQCP in order for it to be acceptable to the Government, but also what elements the Government's QA process needs to have in order to assure quality without usurping the contractor's responsibilities.

It is not possible to determine from the content of the CQCP whether quality construction will result. The plan is not approved, but accepted based only on whether the plan clearly addresses all the issues it is required by the contract to address.

B. FAR and FP Requirements

FAR Clause 52.246-12 Inspection of Construction is the foundation and basis for all contract requirements dealing with quality control and quality assurance. In summary the clause:

- Requires the contractor to maintain an adequate inspection system and perform inspections that will ensure contract compliance.
- Requires the contractor to maintain inspection records and make them available to the Government.
- Allows [but does not require or obligate] the Government to do its own tests and inspections and requires the contractor to assist.
- Says that Government tests and inspections are for its benefit and do not take the place of the contractor's quality control obligations.
- Says that anytime the contractor tells the Government that work is ready for inspection and it is not [i.e. it is in noncompliance], the Government may charge the contractor for the costs of its inspections and tests.
- Says that the contractor is obligated to comply with the contract whether or not a Government inspector is present.
- Says that the Government may order previously completed work torn apart for inspection, and that if it is noncompliance, the Contractor will pay for the inspection and the correction of the work. If it is in compliance the Government will pay for the inspection and disruption to the work.

Note that nothing in the FAR clause requires that the contractor's inspection system be described in writing, or that it be submitted to the Government for approval in advance of the work. These requirements are contained in the FP-96, Section 153. In addition, Section 153 contains a basic outline of what should be included in the CQCP. The outline should be repeated for each major category of construction.

**Outline of Contractor Quality Control Plan Requirements
FP-96, Subsection 153.02**

(a) Process control testing. List the material to be tested, tests to be conducted, the location of sampling, and the frequency of testing.

(b) Inspection/control procedures. Address each of the following subjects in each phase of construction:

(1) Preparatory phase.

- (a)* Review all contract requirements.
- (b)* Ensure compliance of component material to the contract requirements.
- (c)* Coordinate all submittals including certifications.
- (d)* Ensure capability of equipment and personnel to comply with the contract requirements.
- (e)* Ensure preliminary testing is accomplished.
- (f)* Coordinate surveying and staking of the work.

(2) Start-up phase.

- (a)* Review the contract requirements with personnel who will perform the work.
- (b)* Inspect start-up of work.
- (c)* Establish standards of workmanship.
- (d)* Provide training as necessary.
- (e)* Establish detailed testing schedule based on the production schedule.

(3) Production phase.

- (a)* Conduct intermittent or continuous inspection during construction to identify and correct deficiencies.
- (b)* Inspect completed phases before scheduled Government acceptance.
- (c)* Provide feedback and system changes to prevent repeated deficiencies.

(c) Description of records. List the records to be maintained.

(d) Personnel qualifications.

- (1) Document the name, authority, relevant experience, and qualifications of person with overall responsibility for the inspection system.
- (2) Document the names, authority, and relevant experience of all personnel directly responsible for inspection and testing.

(e) Subcontractors. Include the work of all subcontractors. If a subcontractor is to perform work under this Section, detail how that subcontractor will interface with the Contractor's and/or other subcontractor's organizations.

C. Plan Development

Unless the contractor already has a documented company QC plan, it may be helpful to discuss what is required, and how detailed it will be. Generally, discussion of the basic who, what, where, when and how should comprise three to six pages, with an additional two to four pages of detailed information for each major category of work. This is not including supplemental materials such as subcontractor/supplier plans, certifications, test data and personnel resumes. Also, if the QC Plan contains a lot of repetitions of contract specifications, meaningless platitudes from quality textbooks and other fluff, its necessary length will be longer.

Quality and the processes that deliver quality is a somewhat open ended concept. No matter how much detail is in the plan, it can always be argued that more could be, or should be included.

1. Organizational Structure

One of the first issues a contractor, or any organization must face when designing its QC/QA procedures, is how these systems will relate to, and impact its organizational structure.

Separate Quality Staff -Testing is a very specialized function. A contractor may elect to hire a separate staff or subcontractor to perform testing and to generate the documentation required by the FAR Clause and the FP. But the testing and documentation are only part of the inspection system required by the contract. If the entire inspection system is performed by personnel separate from production personnel, that would mirror the traditional relationship between contractor and agency organizations. If a contractor has a separate quality staff, it is important to define the relationship between those personnel and the production organization. What will be the disposition of failing tests/inspections? Who will have authority to order production ceased? Under what circumstances? What will be the conditions of restarting production?

Combined Staff - Quality management experts generally discourage separating quality control personnel from production personnel. It pits one part of the organization against another. This built in adversity is seen as both inefficient and requiring additional staff. Ideally quality control should be achieved by developing an organizational culture which encourages quality - a culture which is embraced by everyone in the organization. However, for an organization transitioning from a traditional to a quality management system, superimposing a QC/QA staff on its existing organization may make sense while that organizational culture is being developed.

2. Process Control Testing

Testing provides a reflection of quality and the process. But only changes to the process can improve quality. Extensive testing needed to identify defects so that they can be corrected is an indication of a poor process. Ideally frequencies of QC testing are dependent on characteristics of the overall process. In a transition environment however, when contractors are not used to designing comprehensive QC systems, it may be necessary for the agency to provide guide frequencies to minimize the risk of serious deficiencies undetected until late in the process.

It is easy to become preoccupied with testing when describing the plan. Testing is easily defined and leaves a clear documentation trail. But the organizational resources that actually will control the quality of the construction are by far, the most important part of the plan, even though describing these resources and procedures [the process] in writing is often difficult.

The contract may contain a listing of mandatory contractor testing including sampling points, frequencies and time limits for delivering results. This testing is intended primarily for the agency's use in documenting quality assurance and accepting the work. Some contracts require additional testing identified as *process control* testing which is intended to provide real time information during the construction and production of materials to allow the contractor to adjust or control the process and ensure that quality assurance testing at the end of the process will indicate compliance. Whether or not the contract specifies process control testing, it is up to the contractor to address whether or not it is needed in the CQCP.

The standard acceptance plan in Section 106.05 of the contract is used for most pavement structure and structural concrete items. While much of the work is not accepted statistically, the criteria on which the statistically based plan is structured are consistent with the intended acceptance criteria of all work. In general these are the criteria:

- ◆ The plan is based on an acceptable quality level [AQL] of 5 percent defects. That is, if production is uniform and no more than 1 out of every 20 quality assurance tests fails, the process can be assumed to be in control and additional process control testing [and other actions] are not indicated.
- ◆ If defects rise to 10 percent [1 out of 10 QA tests fail], that suggests additional process control testing and other actions may be indicated.
- ◆ If defects rise to 15 percent or higher [more than 1 out of 6 QA tests fail], that is approximately equivalent [depending on sample size] to a pay factor of less than 0.90. This indicates serious process control problems and the Government may require that process to be suspended while the contractor modifies the process control procedure [including testing] to address the problem.

In addition to those tests specifically required by the contract, the contractor is required to tabulate in the CQCP all process control testing which will be necessary to assure that the work and material comply with the terms of the contract when they are ultimately subjected to quality assurance testing. Note that although process control testing is listed first in Subsection 153.02, it may make more sense to not complete or finalize this section until after the inspection/control procedures are defined.

3. Inspection/Control Procedures

This is the narrative portion of the CQCP, and is the hardest part of the plan to develop and describe. Most organizations are used to intuitive processes, or processes which have evolved over time to reflect the personalities and desires of supervisory personnel. Describing and documenting these processes concisely in writing is often difficult. There is almost no physical limit to the length and detail included in this section. Every requirement, every sentence in the contract could precipitate a paragraph or more of detailed process control procedures to describe how that requirement will be fulfilled. From a practical point though, this is excessive. For most typical FLH construction projects the narrative covering inspection/control procedures should adequately address the quality process basics in two to four pages for each phase of construction (see below). This does not include testing schedules, certifications, personnel resumes and other attachments. In addition, if the narrative includes excessive redundancies, paraphrasing of the contract and other extraneous materials, that will add to the required length. The fact that many of the detailed requirements of the contract are not specifically addressed in the CQCP does not mean they can be ignored. The contract itself is the foundation for the outcomes expected from the CQCP.

The failure of the contractor to inspect and control any aspect of the construction process, whether or not it is specifically addressed by the CQCP is a basis of adverse action under the contract, which may include required enhancement to the CQCP itself

4. Categories of Construction

A typical contract may be divided into three to five categories depending on the nature of the work and the organizations performing the work. These categories are referred to as *phases* in Subsection 153.02, but to avoid confusion with sequential phases described below, they are referred to as categories here. For example stakeout, erosion control, clearing, excavation, embankment, drainage and slope protection might be grouped together as a single category of Grading and Drainage.

Sometimes how categories are defined is influenced by which subcontractors or crews do the work, since each may have its own organizational relationships. It should be left up to the contractor to group items of work in logical categories to facilitate the development of the COCP. Other typical categories are as follows.

Pavement Structure

Structures

Masonry

Safety Appurtenances

Seeding and Landscaping

Permanent Traffic Control

Temporary Traffic Control

5. Preliminary, Startup and Production Phases

The FP requires each of the three sequential phases to be addressed separately. So for five categories of construction, a five by three matrix is generated which constitutes the inspection/control part of the CQCP.

The preliminary phase includes evaluation of equipment, materials and other resources prior to work being started. It also involves comparing contract requirements with training and other needs.

Startup includes the additional management, training and inspection resources usually needed when a new operation is started.

Production addresses the routine QC resources necessary after the process is established.

6. Who, What, Where, When and How?

For each category and phase of the operation, the QC plan should answer these questions as they relate to the category and phase:

Who will be responsible for QC during the operation? The Quality Control Technician may be assigned responsibility for testing and documentation and perhaps even training and monitoring of startup. As the operation moves toward production however, foremen or other supervisory personnel will probably be assigned increasing responsibility. If the management official is too high in the organization - say the overall project superintendent - then it is less likely he/she will have the time to perform detailed QC functions. In that case subordinate personnel should be specifically identified.

What will that person do to ensure contract compliance? What authority will the person have over operations? What portion of the time the operation is in progress will the identified person actually be present to perform QC responsibilities? Testers and inspectors cannot control quality if their responsibilities are limited to testing, measuring and documentation. "What" should address not only personnel, but materials and equipment used in the construction. These items often have stated or implied contract requirements, and the QC system must verify that those requirements are met.

Where will these activities be performed? Will optional process control testing be performed onsite, or at a commercial laboratory? Will manufactured materials be inspected at the plant, at the contractor's facility or at the site of work? Will the equipment be inspected at the yard, or will inspections be performed at the site?

When will these activities be performed? The earlier QC activities are performed, the more latitude the contractor has in dealing with problems. However, when activities are performed too early there is a risk of unforeseen changes or glitches prior to actual construction. When will test results be available? This is a key component of the QC Plan, which determines largely how responsive it can be to deficiencies.

How will inspections be performed? Using a standard checklist? Using the specifications themselves [quality assurance criteria], etc.? The more generalized and vague the inspection procedures are, the more likely they will not be consistently effective. However, not having a checklist is not a cause for disapproving a QC plan, unless a checklist is specifically required.

The CQCP should minimize any parroting or paraphrasing of requirements in the contract, and should avoid simply promising to comply with the contract. These kinds of statements and assurances are of essentially no added value. The CQCP must go beyond the contract requirements and address the contractor's organizational process for consistently delivering those requirements.

7. Subcontractors and Suppliers

When subcontractors and suppliers [other than suppliers of commercial items] provide part of the work, then the QCP needs to be clear whether their QC responsibilities will be independent, or a part of the prime contractor's responsibilities. If they are independent, then the subcontractors or suppliers QCP must be developed and submitted for approval, through the prime. Otherwise, the prime must address how it will monitor and verify subcontractor/supplier quality as a part of its plan. In either case the prime is contractually responsible for all the work, but being contractually responsible is not the same as having an active role in the quality delivery process.

8. Manufactured Materials

An important part of the CQCP is the process for verifying that manufactured materials comply with the requirements of the contract.

Commercial Items - These are materials manufactured and sold to the general public, as opposed to materials made to the unique specifications of the agency. For most commercial items, the contractor's responsibilities are limited to verification that the materials are as required or permitted in the contract, and that the delivered materials are in fact those approved materials. Some materials, which are arguably commercial, are considered of critical importance, and have specific QC/QA requirements in the contract.

Non-commercial Items - These are materials manufactured offsite, but specifically to agency specifications for this project. QC plan coverage for non-commercial items should be a separate document from the manufacturer, or the manufacture of those items should be included in the QC plan of the contractor or a subcontractor. Like critical commercial items, critical non-commercial items may have specific QC/QA requirements in the contract.

9. Records and Documentation

While good documentation is often a reflection of good quality control, documentation is not the same thing as quality control. Documentation should be the minimum necessary to concisely document the adequate function of the process.

10. Personnel Qualifications

While some contracts may have specific required qualifications for contractor quality control and testing personnel, the initial judgment as to whether a given person is or is not qualified is generally left to the contractor. However, during contract administration (see below), the agency may be more assertive in monitoring the qualifications of these personnel. When the contract has specific experience requirements, the contractor should describe how the person's previous training and experience addresses these requirements.

11. Partial Plans

It is possible that subcontractors, suppliers and overall responsibilities for some latter phases of the construction, will have not been arranged at the time the prime is ready to begin on the initial phases. It is permissible for the contractor to submit, and the agency to accept a partial plan. However, the work not covered by the plan may not begin until the plan is supplemented to cover that work.

D. Contractor Evaluation

The performance of all contractors is required to be evaluated in accordance with FAR 36.201. Although most contractors are evaluated as satisfactory or better it is important to understand the agencies process for dealing with serious or chronic unsatisfactory performance. Evaluations are made of five individual elements, plus an overall evaluation:

- ◆ Quality of Work
- ◆ Timely Performance
- ◆ Effectiveness of Management
- ◆ Compliance With Labor Standards
- ◆ Compliance With Safety Standards

The first of these five elements, Quality of Work, essentially overlaps the contractor's inspection system requirements under FAR Clause 52.246-12, Inspection of Construction. That is, a contractor which fails to maintain an effective quality control (inspection system), will generally warrant an unsatisfactory rating in the Quality of Work category. Deficient contractors must be clearly notified of the deficiencies and provided an opportunity to correct them.

Evaluations may be shared with other contracting agencies and private entities. FLH Divisions may participate in the Corps of Engineers' Construction Contractor Appraisal Support System (CCASS), which make evaluations available to other participating Federal agencies.

Evaluations may be used in part, for determinations of responsibility prior to award of sealed bid contracts or in evaluating past performance as a part of source selection for a negotiated contract.

If the prime contractor's performance would be evaluated as satisfactory, but for the performance of a major subcontractor, it is permissible to execute a separate evaluation of the subcontractor, following the same rules as if they were a prime.

**Appendix A
Example Quality Control Plan**

*ABC Construction Company
P.O. B.. 357
Red River, CA 94781*

August 18, 1997

Federal Highway Administration
P. O. Box 78
Sutterville, CA 94832

Gentlemen:

Re: CA FH 93-1(3), Gold Rush Highway
Quality Control Plan

The following items comprise our Quality Control Plan (QCP) required by Subsection 153.02 of the Contract.

1. All work will be performed in accordance with the contract requirements. ABC will maintain an inspection system which assures compliance with the contract requirements. Any indication of system deficiencies whether discovered as a result of the Government's or ABC's checks and tests, will result in modifications to the system to correct these deficiencies.
2. This QCP does not endeavor to repeat or summarize contract requirements. It describes the process which ABC will use to assure compliance with those requirements. The QCP documents broad categories of contract work in accordance with Subsection 153.02. Necessary details dealing with minor items that may be overlooked in this plan will be addressed informally between the Quality Control Technician (QCT) and the Project Engineer (PE), as the work progresses; and will be documented in writing if so requested by the PE. It is understood that the level of QC accountability and control exercised by ABC on these items will be consistent with the details of this plan.
3. The Project Superintendent, Mr. Ralph Altway will have overall responsibility for quality control on the project. Mr. Altway has had similar responsibilities on other Federal (Corps of Engineers) and State (CALTRANS) projects. He is a NICET Level IV Technician and Certified by CALTRANS as a QC Technician.
4. Mr. Leon Williams will be the QCT for the project. He will report directly to Mr. Altway. Mr. Williams is also a NICET Level IV Technician and Certified by CALTRANS and Nevada DOT as a QC Technician. He has been employed in this role by ABC for nearly three years. He will be responsible for overseeing day-to-day construction operations from a QC standpoint. He will assure that all required tests and documentation are completed, and that the results are furnished to the Government in the time frame required. Mr. Williams is empowered to suspend any operations which he deems to be in noncompliance with the contract, and/or order corrective measures to assure compliance. Mr. Williams will complete the Inspector's Daily Record required by Subsection 153.04.
5. As the number of operations or their dispersion on the project starts to overextend Mr. Williams, QC responsibilities will specifically be assigned to ABC's supervisory personnel specifically responsible for given operations; or an assistant to him will be provided. In either case, standards of application of the QCP will be the same. The names, experience and qualifications of any personnel assuming QCP responsibilities will be provided to the Government in advance.
6. ABC has an experienced and highly professional staff that is used to the responsibility entailed by the QC requirements. We therefore do not anticipate any personnel or training problems in complying with them. If any such problems occur, ABC will take whatever actions are necessary to correct them including retraining, providing more supervision or removal of poorly functioning personnel.

7. Grading

Preparatory Phase -

QCT will go over erosion control requirements with Project Engineer and order silt fence and other authorized materials at least two weeks before work starts.

QCT will go over clearing limits and slope limits with PE and Grading Foreman.

Startup Phase -

ABC will install silt fences and temporary culverts as necessary along Pioneer Road.

QCT will obtain materials samples for T -99 proctor tests as soon as cuts are started. Provide PE with splits of samples. Provide completed proctor worksheets within 48 hours.

Grading Foreman's name will be provided to Government as soon as known.

QCT will go over lift thickness and other contract requirements with Grading Foreman.

Production Phase –

After startup, Grading Foreman will be responsible for continuous monitoring of QC.

QCT will periodically monitor work and density with a nuclear gauge. These tests will be at about one (passing) test per 1000 m³ of compactable (non-rock) material. Final test on each lift will include a one point proctor and rock correction. QCT will advise Grading Foreman of test results.

Failing tests will be followed by appropriate corrective (reworking/recompaction] efforts, and retesting. If the rate of initial failing tests exceeds one out of five, the QCT and Grading Foreman will meet and formally document the corrective actions to the embankment construction process, which will be taken to resolve the problem.

Grading Foreman will order drying operations or more water when compaction tests or appearance of fills material indicate that moisture is a problem.

Density tests will be documented in tabular form showing date, time, location, offset, depth below grade and test result. Results will be provided to PE by the next working day.

Each day QCT will plot test results on control charts in the ABC project lab.

8. Drainage

Preparatory Phase -

QCT will obtain survey crews' stakeout notes and review culvert design prior to submittal to PE for approval. QCT will obtain approved designs and order culvert and end section materials.

Precast inlets and similar items will be obtained from Williams Precast Co. of Susanville. Copies of their materials data, mix designs and QC plan will be obtained and furnished to PE 30 days prior to start of work.

Cast-in-place concrete will be furnished under Section 601 and obtained from Sutterville Quality Concrete (SQC). QCT will obtain documentation from SQC. QCT will go over their procedures with them before production.

QCT will identify a source of backfill material to be used if natural material is too rocky or otherwise unsuitable. QCT will test the material (proctor) and provide results to PE.

QCT will inspect culvert materials upon arrival and obtain valid materials certifications and submit to PE.

QCT will go over stakeout notes and contract requirements with pipe crew foreman prior to start of work. Pipe foreman will be identified to PE prior to start of work.

Startup Phase -

QCT will work nearly continuously with the pipe crew on the first day to verify layout procedures, bedding preparation and assembly.

QCT will go over proctor data and operation of nuclear gauge with pipe foreman. They will agree on what passing density readings are for the borrow backfill and other possible backfill materials.

QCT will go over backfill, lift thickness and density monitoring procedures.

For cast-in-place concrete, QCT will be at plant to verify QC procedures at the start of production. QCT will perform required QC at the site.

Production Phase -

Pipe foreman will be responsible for QC during construction.

QCT will visit each installation on a random basis to take density tests required by the contract. For each of these tests, a one point proctor will be run. Record of density tests will be furnished to the PE by the following working day.

For cast-in-Place concrete QCT will obtain all required documentation and furnish to PE. QCT will be at placement site enough to perform required QC tests. QCT will go over QC procedures with foreman, who will be responsible for QC when the QCT is absent

9. Subgrade

Preparatory Phase -

QCT will coordinate with grading foreman and survey crew as to how subgrade will be staked, controlled and finished.

QCT will go over with grading foreman, any problems with subgrade materials quality - rocky material, clay or other unsuitable. Such materials will be used in other than subgrade locations.

Startup Phase -

QCT will coordinate with grading foreman and PE, the acceptable standards and tolerances for subgrade finishing.

Production Phase -

Grading foreman will be responsible for day to day QC.

Grading foreman will advise PE when each segment of subgrade is ready for acceptance.

QCT will take subgrade density tests at required frequency using nuclear gauge. One point proctors will be run about once every two to three tests or whenever materials change.

Test results will be plotted on control charts by QCT and also furnished to the PE by the next working day.

10. Base Course

Preparatory Phase -

Base course will be obtained from Whippel Mountain Aggregates, Inc. (WMA)

QCT will obtain suppliers quality tests and samples of material for the PE at least 30 days prior to base work beginning.

QCT will perform proctor tests on base course. QCT will also perform initial gradation tests on stockpile just prior to startup.

QCT will review supplier's QC procedures including stockpiling, moisture control, process control testing, and weighing.

QCT will develop dumping spreadsheets for base course foreman.

Startup Phase -

QCT will go over delivery and dumping procedures with base course foreman.

QCT will go over spreading and compaction procedures with base course foreman.

Base course will be pugmill mixed and delivered at optimum moisture and in nonsegregated condition so that processing on the grade will be minimal.

Production Phase -

WMA will be responsible for plant QC. WMA will perform at least one gradation test per day as long as at least 80% of tests pass. Frequency will be increased if there are more failing tests.

Grading foreman will be responsible for receiving, dumping, tabulating tonnages and delivering receiving reports to PE at the end of each day.

Grading foreman will perform occasional (at least one per day) depth checks to verify spread rates.

QCT will obtain gradation samples at the required frequency. Samples will be split, with the splits delivered to the PE.

11. Asphalt Items

Preparatory Phase -

All asphalt items will be furnished by Allied Paving (AP) of Sutterville. Materials will be hauled to the site by ABC's hauling sub, and paving or installation of materials will be by ABC.

AP has a lab certified by Caltrans at the plant. Lab supervisor is William Brown, Certified Asphalt Technician in California.

QCT will obtain required mix design submittals and samples from AP and deliver to PE at least 30 days before work is scheduled to start. AP's QC/Mix Design technician is Allen Rockford who has 15 years in this position and is a certified asphalt technician in California and Nevada. Mr. Rockford will be the contact for any technical discussions during the mix approval process.

With the mix designs, AP will furnish a separate QC plan dealing with their plant operations, personnel, etc.

Startup Phase -

QCT will review all specification requirements with paving foreman prior to start of work.

QCT will be in charge of production start up procedures. Documentation and tests will be at his directions and submitted to the PE. Full production will start when approved by PE.

Production Phase -

Paving foreman will be responsible for QC on a daily basis. QCT will conduct periodic inspections.

QCT or designee will obtain mix sample and cores. Splits will be provided to PE for acceptance. Contractor samples will be delivered to AP's plant lab for testing. Results will be provided through the QCT by the following day. We will attempt to set up a system to provide results by FAX.

AP will obtain AC samples at the plant and deliver (through QCT) to PE for testing.

Test results will be plotted on control charts in ABC's onsite lab. QCT will run QL Pay at the end of each day, or the beginning of the next. Quality problems evident either from inspections or test results will be dealt with under the direction of the QCT. Work will be suspended if problems cannot be resolved expeditiously.

12. Structural Concrete

Preparatory Phase -

Wahoo Readymix in Martin, CA will provide PC concrete under Section 552 for the box culverts. Wahoo's plant is certified by CalTrans as is their Quality Supervisor, Mr. Larry Ryland. Mr. Ryland will provide documentation [through ABC's QCT] of proposed mix design (previously approved by CalTrans) and all materials 30 days or more prior to first delivery. Wahoo will also be responsible for all plant QC and inspection of trucks.

QCT will be responsible for onsite QC operations other than the concrete mix itself, e.g. resteel, forming, concrete placement, finishing, etc. Resteel will be inspected upon delivery for proper certification, dimensions, storage, etc. QCT will be responsible for stakeout and foundation preparation prior to forming.

Startup Phase -

QCT will coordinate with Wahoo to schedule delivery operations. Wahoo will send one or more certified concrete technicians to each concreting operations. Technicians will be responsible for any final mix adjustments, delivery ticket validation, screening (air, slump, temperature) and acceptance testing as required by FHWA inspector. Cylinders will be cured onsite at ABC's lab, and taken to Wahoo's lab for breaking. QCT will advise FHWA of scheduled breaks and provide opportunity for witnessing.

QCT will inspect forming and resteel operations from their inception and work with crews to assure acceptable tolerances and other compliance. QCT will inspect placement operations including vibrating and finishing. QCT will inspect curing operations and work with ABC crews to resolve any problems. All required documentation will be completed by QCT and delivered to FHWA by the day following each placement operation.

Production Phase -

Wahoo will continue to provide onsite QC for each concrete delivery.

Once resteel and forming crews are lined out, QCT will make spot checks of their operations, plus a final inspection two hours or so prior to each placement. QCT will inspect curing. QCT will inspect all surfaces upon stripping, and go over any necessary repairs and finishing operations.

13. Miscellaneous Items

This covers items, mostly involving installation of manufactured items such as guardrail, delineators, fencing, etc.

Preparatory Phase -

QCT will verify all certification requirements, inspect material upon delivery and submit certifications and other documentation to PE.

QCT will work with survey crew and PE to verify exact stakeout requirements and resolve any potential stakeout problems.

Startup Phase -

QCT will go over the specification requirement and stakeout data with the foreman in charge of installation.

QCT will normally be present when any operation begins to resolve problems and verify specification compliance.

Production Phase -

Foreman will normally be responsible for QC during production. QCT will make spot checks approximately once a day or more frequently if there are problems.

QCT will perform tests required by the contract and furnish results to PE. QCT will advise PE when segments of the work are ready for acceptance.

Please advise me if there are any additions or supplements you would like us to make to this QCP. If there are changes to any items (personnel, suppliers, etc.) we will attempt to provide the PE notice in advance of their impact on the work.

We need concurrence to proceed with at least the clearing and grading portion of the work by June 1 in order to stay on our schedule.

Sincerely yours,

Ralph Altway

Ralph Altway
Superintendent

Good, Fair and Poor Elements of QC Plans

Guardrail, Preliminary

Poor	Fair	Good
<p>All guardrail materials will be checked for contract compliance before use. All employees are empowered to inspect and reject materials not complying with the contract.</p>	<p>All guardrail materials will be checked by the QCT for contract compliance before use. Materials not in compliance will be isolated and rejected. Survey crew will layout guardrail in accordance with the plans before construction.</p>	<p>Upon delivery of guardrail posts, & hardware QCT will check for proper identification, certification and damage during shipment. Before scheduled construction, components will be reinventoried, checked and compared to layout requirements. QCT will review layout procedures with the Engineer. Will coordinate with survey crew on stakeout. Will check each stakeout for possible transition problems. Will notify Engineer of opportunity to check.</p>

Guardrail, Startup

Poor	Fair	Good
<p>QCT will inspect guardrail crew's operations during startup. Any deficiencies will be brought to the attention of the foreman.</p>	<p>QCT will continuously work with stakeout crew and installation crew when operations begin, to assure a common understanding of contract requirements and standards/tolerances etc.</p>	<p>Prior to scheduled beginning of installation, QCT will verify that stakeout has been accomplished in accordance with requirements. QCT will go over with foreman, a checklist of required quality characteristics. Foreman will be responsible for routine quality monitoring after startup.</p>

Guardrail, Production

Poor	Fair	Good
<p>The QCT will periodically check on operations during construction to assure contract compliance.</p>	<p>The QCT will inspect installation operations everyday to verify specification compliance and document completion of each installation.</p>	<p>The QCT will inspect installation operations at least twice a day, verifying compliance with stakeout, as well as rail height, post plumbness, etc. The QCT [or the Foreman if QCT is not available] will document completed work and cleanup and advise the PE of such completed work for acceptance. Additional inspection/training will be provided if installation crew personnel changes or deficiencies are noted.</p>