DEPARTMENT OF THE ARMY
SOUTH PACIFIC DIVISION, CORPS OF ENGINEERS
1455 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94103

REPLY TO
ATTENTION OF

CESPD-DE

MEMORANDUM FOR Commander, Los Angeles District, ATTN: CESPL-ED-DB, Mr Stephen Vaughn.

SUBJECT: Review Plan Approval for the Harbor South Bay Water Recycling, Los Angeles County, California Section 219 Project

1. The South Pacific Division, District Support Team (DST) has reviewed the enclosed Review Plan for the Harbor South Bay Water Recycling, Los Angeles County, California Section 219 Project and finds it prepared in accordance with EC 1165-2-209 (Encl 1).

2. In accordance with the provision of CECW-P Policy Memorandum, Subject: Continuing Authority Program Planning Process Improvements, dated 19 Jan, 2011, the Review Plan does not require Independent External Peer Review (Encl 3).

3. The District will make the Review Plan available for public comment, and will incorporate the comments received into the Review Plan.

4. I hereby approve this Review Plan, which is subject to change as project circumstances require, consistent with project development under the Project Management Business Process. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.

5. The point of contact for this memorandum is Mr. Paul Devitt, 415-503-6558, paul.a.devitt@usace.army.mil.

Building Strong from New Mexico All The Way To The Pacific!

Joseph F. Calcara.
Director
Programs

3 Encls
1. Review Plan
2. Checklist
3. Policy Memo

REVIEW PLAN

HARBOR SOUTH BAY WATER RECYCLING
LOS ANGELES, CALIFORNIA

Prepared by:

U.S. Army Corps of Engineers
Los Angeles District

Revised: November 17, 2011

US Army Corps of Engineers
Los Angeles District

REVIEW PLAN

HARBOR SOUTH BAY WATER RECYCLING

LOS ANGELES COUNTY, CALIFORNIA

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REVIEW PLAN

HARBOR SOUTH BAY WATER RECYCLING
LOS ANGELES COUNTY, CALIFORNIA

November 17, 2011

1. INTRODUCTION.

a. Purpose. This Review Plan defines the scope and level of quality management activities for the Harbor South Bay Water Recycling, Los Angeles County, California project.

b. References.

(1) ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 Aug 1999
(2) ER 1110-1-12, Engineering and Design Quality Management, 21 Jul 2006
(3) WRDA 2007 H. R. 1495 Public Law 110-114, 8 Nov 2007
(4) EC 1165-2-209, Civil Works Review Policy, 31 Jan 2010
(5) Army Regulation 15–1, Committee Management, 27 November 1992 (Federal Advisory Committee Act Requirements)
(6) National Academy of Sciences, Background Information and Confidential Conflict Of Interest Disclosure, BI/COI FORM 3, May 2003

c. Review Requirements. This review plan was developed in accordance with EC 1165-2-209, which establishes the procedures for ensuring the quality and credibility of U.S. Army Corps of Engineers (USACE) decision and implementation documents through independent review. This Review Plan describes the scope of review for the current phase of work. All appropriate levels of review (DQC, ATR, IEPR and Policy and Legal Review) will be included in this Review Plan and any levels not included will require documentation in the Review Plan of the risk-informed decision not to undertake that level of review. The RP identifies the most important skill sets needed in the reviews and the objective of the review and the specific advice sought, thus setting the appropriate scale and scope of review for the individual project.

2. PROJECT DESCRIPTION

a. Project Authority. The Harbor South Bay Water Recycling project was authorized for design and construction assistance for water related environmental infrastructure and resource protection and development projects pursuant to Section 219 of the Water Resources Development Act of 1992 SEC. 219 ENVIRONMENTAL INFRASTRUCTURE. (a) IN GENERAL.-The Secretary is authorized to provide assistance to non-Federal interests for carrying out water-related environmental infrastructure and resource protection and development projects described in subsection (c), including waste water treatment and related facilities and water supply, storage, treatment, and distribution facilities.

b. Location and Description. Project area of the Carson Mall Lateral Project, and booster pump facilities hereby presented are located in the South Bay Area encompassing Torrance, Compton, Carson, and unincorporated areas of LA accordingly, , The projects hereby presented are part of the Harbor South Bay Project, a part of the West Basin Municipal Water District's (WBMWD) recycled wastewater distribution system expansion that encompasses 27 laterals and supporting distribution facilities to serve with recycled water through the construction of over 30 miles of pipe the southwestern Los Angeles County and cities of Los Angeles, Torrance, Palos Verdes Estates, Rancho Palos Verdes, Rolling Hills, Lomita, El Segundo, Carson, and Inglewood

3. WORK PRODUCTS. Plans and Specifications for construction will be developed for each of the project sections described below or for a portion of these sections as funding allows. All design for this project will be performed by AE Contractors as proscribed by Section 219 of WRDA 1992.

Carson Mall Lateral: The Carson Mall Lateral will be constructed within the City of Carson, California and will convey approximately 85 acre-feet per year of recycled water to serve multiple customers and uses, including irrigation and potential industrial uses. The Carson Mall Lateral will include an estimated 1 mile of recycled water pipeline of 12-inch diameter. This project lateral will extend primarily within Main Street through the City of Carson. Construction will include connection to an existing 42-inch pipeline and major bridge channel and freeway underpass crossings.

Anza Pump Station: To provide adequate hydraulic system pressure and water quality to customers served from planned Harbor-South Bay Project Laterals, two booster pump stations will be constructed. The location of the pump stations have been identified within the Cities of Torrance and Carson. The Torrance site booster pump station will complement service to customers along the planned Anza Lateral and is to be located off of Del Amo Boulevard adjacent to a City of Torrance recycled water customer. The Carson site booster pump station will complement service to customers along the planned Dominguez Lateral and is to be located within the City of Carson off Victoria Street between Central Avenue and Bishop Street. Each booster pump station will connect to planned Harbor-South Bay Project Laterals and will include multiple pumps, a dedicated hypochlorite injection system for water quality, masonry building structure, and electrical control and instrumentation.

4. SCOPE OF REVIEW. In April 2009, West Basin contracted with Psomas Engineering to prepare plans and specifications for construction of the Carson Mall Lateral; and with Tetra Tech Inc., to prepare plans and specifications for the Anza Booster Pump Station at Carson. The Los Angeles District awarded an Architect-Engineer (A/E) contract to the firm AKM Engineering to prepare Plans and Specification for construction of the West Basin Booster Pump Station in Torrance. The Scope of this Review Plan is for the review of the three features: the Carson Mall Lateral and the Anza Booster Pump Stations at Torrance and Carson of the Harbor South Bay project as described above.

Since this project is normally not included in the President's Budget and is funded only by Congressional Add to the Appropriations Bill, if and when additional project features are funded, this Review Plan will be revised to include those new features. SPL was notified on 28 April 2009 of Harbor South Bay's inclusion in the ARRA Program. The ARRA approved work to award construction contract for the Carson II Lateral in the amount of $1,000,000; the Dominguez Lateral – Phase 1B (a portion of Lateral 7) in the amount of $1,500,000 of the total approved $5,000,000; and the Anza Pump Station in the amount of $1,000,000.

a. District Quality Control Activities. DQC is the review of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). The District Quality Control activities for the Carson Mall Lateral, and the Anza Booster Pump Stations designs of the Harbor South Bay Water Recycling project are being completed under the previous Corps of Engineers policy of Independent Technical Review. For the features of the Harbor South Bay project, PDT members and/or supervisory staff will conduct this review for major draft and final products provided by contractors, or the non-Federal sponsors as in-kind services following review of those products by the A/E and WBMWD. The following ITR procedures were followed by the Los Angeles District for the Plans and Specifications for construction of the Harbor South Bay Water Recycling project:

(1a) The responsible engineer(s) for the Carson Mall Lateral, Psomas Engineering worked on the development of the pipeline project plans and specifications (P&S), as contracted by WBMWD, developed quality control procedures for their work product. The quality control plan includes the breakdown of the responsibilities of each member of the A/E's engineering design staff and the A/E's independent technical review team.

(1b) The responsible engineer(s) for the Anza Booster Pump Station at Torrance site, AKM Engineering Inc., working on the development of the pipeline project plans and specifications (P&S), as contracted by SPL, will submit a quality control procedures for their work product as part of the design package. The quality control plan will include the breakdown of the responsibilities of each member of the A/E's engineering design staff and the A/E's independent technical review team.

(1c) The responsible engineer(s) for the Anza Booster Pump Station at Carson site, Tetra Tech Inc., working on the development of the pipeline project plans and specifications (P&S), as contracted by WBMWD, developed quality control procedures for their work product. The quality control plan includes the breakdown of the responsibilities of each member of the A/E's engineering design staff and the A/E's independent technical review team.

(2) The A/Es perform an independent technical review of the products before submitting to WBMWD and the Corps for the District for Quality Assurance review. The A/Es provide an independent quality control team, which is an independent team of engineers not working on the project, to complete the review of the documents. The A/Es provide a certification that the plans and specifications (P&S) have followed the A/E's quality control procedures and that the plans are ready for advertising. It is also noted that the A/E is required to have all final design drawings stamped by a registered professional engineer.

(3) In addition to the Independent Reviews conducted by the A/E, West Basin provides a review team. West Basin's reviews the projects' plans and specifications for technical adequacy. Their Engineering and Maintenance Departments have been involved in the review of the A/E's package and was provided the opportunity to review the 90% and the final 100% packages. WBMWD provides a quality assurance documentation stating that it concurs with the project design and that it is ready for advertising.

(4) The Los Angeles District of the Corps of Engineers also reviews the final design packages. Design, cost, and construction engineers provided Quality Assurance reviews on the A/E's pipeline design from the standpoint of contracting and managing the construction of this project.

b. Agency Technical Review. In light of the extensive review process discussed above, a separate agency technical peer review is not proposed as part of the quality management process for the Plans and Specifications for construction of the Carson Mall Lateral and the Anza Pump Stations features of the of the Harbor South Bay Water Recycling Project. Any additional reviews are not likely to develop significant additional comments or changes to the final plans and specifications. The expertise for this type of design project lies with the local entities and their engineering staffs that have been involved in the review of this project as described above.

c. Independent External Peer Review. EC 1165-2-209 requires that a Type II IEPR (also known as a Safety Assurance Review) shall be conducted for any project addressing hurricane and storm risk management or flood risk management or any other project where the Federal action is justified by life safety or the failure of the project would pose a significant threat to human life.

Other factors to consider for conducting a Type II review of a project or components of a project are:

(1) The project involves the use of innovative materials or techniques where the engineering is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices;

(2) The project design requires redundancy, resiliency, and robustness.

(a) Redundancy. Redundancy is the duplication of critical components of a system with the intention of increasing reliability of the system, usually in the case of a backup or failsafe.

(b) Resiliency. Resiliency is the ability to avoid, minimize, withstand, and recover from the effects of adversity, whether natural or manmade, under all circumstances of use.

(c) Robustness. Robustness is the ability of a system to continue to operate correctly across a wide range of operational conditions (the wider the range of conditions, the more

robust the system), with minimal damage, alteration or loss of functionality, and to fail gracefully outside of that range.

(3) The project has unique construction sequencing or a reduced or overlapping design construction schedule; for example, significant project features accomplished using the Design-Build or Early Contractor Involvement (ECI) delivery systems.

The Harbor South Bay Recycling project is a Section 219 Environmental Infrastructure project and is not being constructed for the purposes of hurricane and storm risk management or flood risk management. The project is not justified by life safety. The failure of the project is not likely to pose a significant threat to human life. The project does not involve the use of innovative materials or techniques where the engineering is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices. The project design does not require redundancy, resiliency, and robustness. The project does not have unique construction sequencing or a reduced or overlapping design construction schedule.

Therefore, it is the Los Angeles District's conclusion that the Plans and Specifications for construction of the Harbor South Bay Water Recycling features do not require an Independent External Peer Review.

5. REVIEW TEAM In addition to the A/E's own independent reviewers, the PDT team that reviewed the design for the Carson Mall Lateral and the Anza Booster Pump Stations consisted of West Basin Municipal Water District staff from their engineering, utilities, and maintenance departments and SPL staff from Engineering, Planning, and Construction divisions. The following is a list of the review team members from each agency and a brief description of their technical discipline or expertise used during the review:

a. Psomas Independent Technical Review Team.

Vernon R. Weisman	Technical Review Leader	Technical Review Leader
Joseph L. Boyle	Vice-President at Psomas	Technical Review

b. AKM Independent Technical Review Team.

Raymond Hahn	Independent Technical Reviewer	Reviewer

c. Tetra Tech's Independent Technical Review Team.

Tom Epperson	Senior Project Manager	Civil / Mechanical
Michael Mollinari	Senior Project Manager	Electrical
Dale Wah	Chief Structural Engineer	Structural

d. West Basin Municipal Water District Review Team.

Veronica Govea	Water Resources Engineer	Project Manager, plan and specifications review
Marc Serna	Manager of the Engineering Department	Plan and specifications review
Uzi Daniel	Environmental Quality Analyst	Environmental Documentation
George Cook	Calwater superintendent	Plan review
Phil Lauri	Senior Engineer	Plan and specifications review

e. Los Angeles District Quality Assurance Review Team.

John Lei	Civil Engineer	PDT Team Leader, Review Civil
Nate Govan	Civil Engineer	Cost Engineering & Mii Estimate
Stan Fujimoto	Supervisory Civil Engr	Construction – General
Douglas Chitwood	Geotechnical Engineer	Geotechnical & Soils Engineering reviewer
Sharon Garcia	Hydraulic Engineer	Hydraulic Design
Kirk Brus	Physical Scientist Environmental Manager	Environmental Reviewer
John Killeen	Senior Archaeologist	Cultural Reviewer
John Madden	Biologist	Biological Reviewer
Priscilla Perry	Chief, Regional Planning Section	Environmental Oversight Reviewer
Jodi Clifford	Chief, Environmental Resources Branch	Environmental Oversight Reviewer

6. PUBLIC COMMENT To ensure that the peer review approach is responsive to the wide array of stakeholders and customers, both within and outside the Federal Government, this Review Plan will be published on the district's public internet site following approval by SPD at http://spl.usace.army.mil/review_plans . This is not a formal comment period and there is no set timeframe for the opportunity for public comment. If and when comments are received, the PDT will consider them and decide if revisions to the review plan are necessary. The public is invited to review and submit comments on the plan as described on the web site.

7. SCHEDULE The project schedule is shown below. No additional costs for reviews are anticipated.

Carson Mall Lateral

Final P&S Package	23- Dec-09
Complete QA Back Check Review	19-Feb-10
Review Plan Approved by RMO (SPD)	24-Mar-10
QC/QA Certification by SPL	26-Mar-10
BCOE Certification Complete	26-Mar-10

Approve Plans and Specifications	26-Mar-10
Request Proposal from POCA Contractor	29-Mar-10
Construction Contract Award	30-Apr-10

Anza Booster Pump Station at Torrance

Final P&S Package	31-Mar-10
Complete QA Back Check Review	23-Apr-10
Review Plan Approved by RMO (SPD)	24-Mar-10
QC/QA Certification by SPL	27-Apr-10
BCOE Certification Complete	27-Apr-10
Approve Plans and Specifications	27-Apr-10
Request Proposal from POCA Contractor	29-Apr-10
Construction Contract Award	28-May-10

Anza Booster Pump Station at Carson

Final P&S Package	17-Mar-10
Complete QA Back Check Review	31-Mar-10
Review Plan Approved by RMO (SPD)	24-Mar-10
QC/QA Certification by SPL	6-Apr-10
BCOE Certification Complete	6-Apr-10
Approve Plans and Specifications	6-Apr-10
Request Proposal from POCA Contractor	9-Apr-10
Construction Contract Award	14-May-10

8. DOCUMENTATION OF REVIEW The District Quality Control activities for the Carson Mall Lateral feature of the Harbor South Bay Water Recycling project was completed under the previous Corps of Engineers policy Independent Technical Review. The team used the Document Review and Checking System (DrChecks) to document the review process. Reviewers were responsible for backchecking the A/E's responses to the review comments and either close the comment or attempt to resolve any disagreements.

For the final submittal, the A/Es has provided a certification that the plans and specifications (P&S) have undergone the A/E's quality control procedure and that the plans are ready for advertising. It is also noted that the A/E is required to have all the design drawings stamped by a registered professional engineer.

In addition, a certification will be prepared once issues raised by the reviewers have been addressed to the review team's satisfaction. Indication of this concurrence will be documented by the signing of a quality assurance certification statement by the Technical Project Leader which states that the PDT team concurs with the project design and that it is ready for advertising.

The District Quality Control activities for the Anza Booster Pump Stations features of the Harbor South Bay Water Recycling project will also be completed under the previous Corps of Engineers policy Independent Technical Review. The team will use the Document Review and Checking System (DrChecks) to document the review process. Reviewers will be responsible for backchecking the A/E's responses to the review comments and either close the comment or attempt to resolve any disagreements.

For the final submittal, the A/Es will provide a certification that the plans and specifications (P&S) have undergone the A/E's quality control procedure and that the plans are ready for advertising. It is also noted that the A/E is required to have all the design drawings stamped by a registered professional engineer.

In addition, a certification will be prepared once issues raised by the reviewers have been addressed to the review team's satisfaction. Indication of this concurrence will be documented by the signing of a quality assurance certification statement by the Technical Project Leader which states that the PDT team concurs with the project design and that it is ready for advertising.

9. POINTS OF CONTACT Questions about this Review Plan may be directed to the Los Angeles District Project Delivery Team Lead Engineer, Mr. John Lei at (213) 452-3702, or to the Project Manager for the Harbor South Bay Project, Mr. SeYao Hsu at (213) 452-4016. The Chief, Engineering Division is Mr. Richard J. Leifield at (213) 452-3629. Inquiries to the MSC should be directed to the Mr. Paul Bowers at (415) 503-6556.

10. REVIEW PLAN APPROVAL As described above, the Los Angeles District recommends that Agency Technical Review is not required for the Plans and Specifications for construction of the Carson Mall Lateral Recycled Water Project and Anza Booster Pump Stations. The District Quality Control activities and the Independent Technical Review activities described above serve to satisfy the technical review that would have taken place with an Agency Technical Review. In addition, a Type II Independent External Peer Review (Safety Assurance Review) is not required for this project.

The Los Angeles District requests that the South Pacific Division endorse the above recommendations and approve this Review Plan as described in Appendix B of EC 1165-2-609.

APPENDIX A

QUALITY CONTROL PLAN

Psomas
District File No. 231/661

POLICY

Quality assurance at Psomas is a company-wide approach, supported by specific procedures, to ensure delivery of accurate, coordinated and complete plans, specifications and other engineering deliverables in support of the client's requirements. The Psomas quality assurance/quality control (QA/QC) program follows out standard "16-point" policies, procedures and internal documentation plan. This plan begins during the initial proposal and budget phase and concludes with project close-out. The plan also includes ongoing quality assurance with our "Checkmate" system that documents technical aspects of the project assuring accountability. The project's QA/QC Manager assists the Project Manager in successfully completing all aspects of the program. The QA/QC Manager is an experienced in-house, independent professional in his/her respective field who is not otherwise involved in the day-to-day execution of the project.

Engineering and design quality shall be achieved primarily through a systematic development of a comprehensive work plan, definition of procedural and technical criteria, appropriate coordination among the project team and the technical disciplines, and continuous coordination with the Project Manager. Quality is achieved by internal checking by qualified engineers; and, when appropriate, oversight by senior technical experts enhances quality.

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www.psomas.com

QUALITY CONTROL ACTIVITIES

Quality Control Plan – A Quality Control Plan will be prepared for each project. While the basic Quality Management Activities are typical for all projects, an individual Quality Control Plan (QCP) will be prepared for each project. The QCP will identify the products to be reviewed, the members of the review team and their responsibilities, the schedule and costs for reviews, the requirements of the customer, and the appropriate laws, regulations, policies and technical criteria applicable to the development of the product.

Project Information –

Project Name: Engineering Services for preparation of Final Plans and Specifications for Construction of West Basin Municipal Water District Carson Mall Recycled Water Lateral Project in Carson, California.

Project Description: Prepare complete Design Plans and Specifications and Cost Estimate for the construction of the Carson Mall Recycled Water Lateral Project; 12-inch diameter recycled water pipeline in Main Street and across a bridge in Carson, California.

Name and Location of Customer: USACOE Los Angeles District, Los Angeles, California, West Basin Municipal Water District, Carson, California

Contents of a QCP –The QCP will include all activities which are appropriate to the management of quality of the product based on the technical requirements and the complexity of the project. The following paragraphs summarize the items included in the QCP:

1. Psomas will develop and implement quality management practices, including quality assurance (QA) and quality control (QC), to ensure that technical products meet the agreed – upon requirements of the customer and appropriate laws, policies, and technical criteria, on schedule and within budget.

2. Psomas shall develop the QCP for this product with input from all the other functional elements involved in the development of the product.

3. Psomas' Quality Management Manager and independent review team leader will be led by Mr. Vernon Weisman, P.E. He will have overall responsibility for the technical quality of products. Other function leaders, the product development team, the project manager, the review team, and the review team leader also have significant roles and responsibilities in achieving quality products.

4. Other types of reviews to be performed

   a) Review by project manager prior to release for use by other team members.
   b) Review by Quality Management Manager

5. Major Milestones and their dates

a) Notice to Proceed	April 2, 2009
b) 60% Design Plans	May 13, 2009
c) 90% Design Plans & Specifications	August 11, 2009
d) 100% Design Plans & Specifications	November 25, 2009
e) Final Plans & Specifications	December 23, 2009

6. Sub-products shall be technically reviewed before they are integrated into the overall product. To insure this, product development team members shall consult with their counterparts at appropriate points throughout the development efforts to discuss major assumptions and functional decisions, analytical approaches, and significant calculations to preclude significant comments from occurring during the final independent technical review, which could adversely impact project schedules and costs.

7. Issues involving technical and policy interpretation shall be brought to the attention of the chief of the responsible functional element for resolution. In some cases, the chief of the responsible functional element may request that the project team hold an issue resolution conference to resolve major policy or technical issues. The project team may also arrange for HQUSACE participation in the issue resolution conference.

8. Development and execution of a QCP for products developed by Psomas shall be Psomas' responsibility. The QCP for the contractor product shall be reviewed and approved by the district. In order to maintain contractor responsibility, the contractor shall be responsible for QC of its own work. The District may perform independent technical review of the contractor's work only for special cases when special expertise is required.

9. Final Documentation and QC Certification: Proper documentation is another key component of an effective quality control process. Significant comments, issues, and decisions must be recorded, and the entire process must leave a clear audit trail. The documentation and certification of the quality control activities and the District's quality assurance processes prescribed in a product's QCP, shall be made part of the project file and shall be included with the submission of a specific product to project team.

10. Psomas' quality control plans, product specific, generic and programmatic, shall be updated as warranted. QCPs shall be updated whenever significant changes require modification of the QCP. Upon identification of a needed change, the revised QCP shall be submitted to the Contracting Officer for review and approval within 30 days.

Approval of Quality Control Plans – It is expected that the USACE will review the QCP promptly and their comments and/or approval will be returned appropriately.

Revisions – The QCP should be revised whenever changes occur in the project that requires significant changes in the review process. The approved QCP and all its revisions should be recorded in the project file.

Quality Control Files – A quality control file will be established for each project by the Project Manager or the Review Team Leader to provide documentation of the quality control activities defined by the QCP. The quality control files will be kept current and will be available for customer audit during visits by customer staff. Each project file will contain the following:

- Copy of the approved QCP. (Keep a copy of the draft QCP until replaced by the approved plan and the certificate of approval.)
- Comments and responses from other reviews should also be included in the quality control file.
- Originals of construction plan check comments documenting Technical Review Strategy Sessions; conflict resolution memorandums.

QUALITY CONTROL ACTIVITIES For SUB-CONSULTANT'S WORK

Sub-consultant's Quality Control Plan – Sub-consultant will be required to follow a QCP for the work for which they are responsible. This will be the first task in the project for the sub-consultant.

During the course of the project Psomas will monitor the Sub-consultant's performance of his QCP and may participate in the technical review of the Sub-consultant's work. Both the Sub-consultant and Psomas will maintain records of all activities in the project files. Sub-consultant will provide to Psomas copies of all records.

CONTRACTOR STATEMENT OF QUALITY CONTROL

COMPLETION OF QUALITY CONTROL

Psomas has completed the Plans and Specifications for West Basin Municipal Water District Carson Mall Recycled Water Lateral Project, in Carson California. Notice is hereby given that all quality control activities, appropriate to the level of risk and complexity inherent in the project, as defined in the Quality Control Plan have been completed. Compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Corps policy. Documentation of the quality control process is enclosed. The undersigned recommends certification of the quality control for this product.

Vernon R. Weisman

Vernon R. Weisman, P.E., Technical Review Team Leader

12/23/09

Date

CERTIFICATION OF QUALITY CONTROL

Significant concerns and the explanation of the resolution are as follows:

As noted above, all concerns resulting from the independent technical review of the West Basin Municipal Water District Carson Mall Recycled Water Lateral Project, Final Plans and Specifications have been considered.

Joseph L. Boyle, Vice President

12/23/09

Date

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APPENDIX B

West Basin Municipal Water District

QA/QC Plan

Dominguez Booster Pump Station

AUGUST 2010

Prepared by:

TETRA TECH

17885 Von Karman Avenue, Suite 500
Irvine, CA 92614
(949) 809-5000

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PROJECT

Project Name:	Dominguez Booster Pump Station
Project Descriptions:	Prepare construction drawings, specifications and a cost estimate for the construction of a booster pump station to deliver recycled water for landscape irrigation use to the Dominguez Technology Center and other commercial complexes along the distribution system alignment.
Project Location:	The booster pump station will be located within the City of Carson. The booster pump station will be constructed off of Victoria Street between Central Avenue and Bishop Avenue.
Project Owner:	The project is being constructed for West Basin Municipal Water District.

PURPOSE

The purpose of the quality assurance/quality control plan is the following:

- Achieve a top quality project.
- Provide consistent and uniform QA/QC procedures to all team members for their use in performing the work.

DEFINITIONS

- Quality: The degree of excellence which a product or service possesses or exhibits; meeting your client's expectations with minimum variation.
- Quality Control/Quality Assurance: A system for maintaining desired standards in production of a product or the execution of a service.

SCOPE REQUIREMENTS

- Review all deliverables prior to submittal.
- Perform individual technical reviews by independent, qualified individuals.
- Perform integrated review of multi-disciplinary documents by qualified individuals prior to submittal.
- Check calculations, drawings, specifications, and reports by the responsible discipline.

DESIGN SUBMITTAL REQUIREMENTS

- Coordination check of drawings and specifications.
- Compliance with permit requirements.
- Location of utility conflicts.
- Constructability review.

CONTRACTOR STATEMENT OF QUALITY CONTROL

COMPLETION OF QUALITY CONTROL

Tetra Tech, Inc. has completed the Plans and Specifications for Dominguez Booster Pump Station in Carson, California. Notice is hereby given that all quality control activities, appropriate to the level of risk and complexity inherent in the project, as defined in the Quality Control Plan have been completed. Compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Corps policy. Documentation of the quality control process is enclosed. The undersigned recommends certification of the quality control process for this product.

Tom Epperson, P.E., Senior Project Manager — Date: 08/03/10

CERTIFICATION OF QUALITY CONTROL

Significant concerns and the explanation of their resolution are as follows:

As noted above, all concerns resulting from the independent technical review of Dominguez Booster Station, Final Plans and Specifications have been considered.

Steve Tedesco, P.E., Senior Vice President — Date: 08/09/10

APPENDIX C

U.S. Army Corps of Engineers, Los Angeles District

QUALITY CONTROL PLAN

Indefinite Delivery Contact for Architect/Engineer Services for Civil Works
West Basin Municipal Water District, Harbor South Bay Water Recycling Project,
Anza Pump Station at Torrance CA

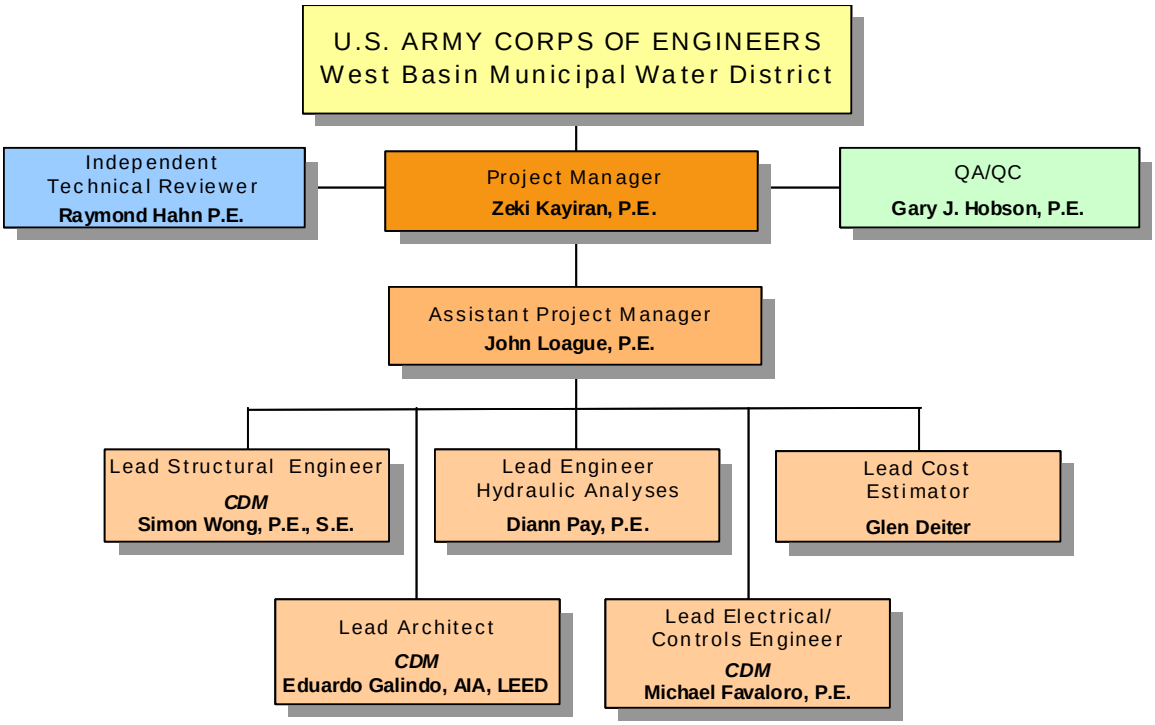
INTRODUCTION

This Quality Control Plan (QCP) is prepared in accordance with CESPL-OM 1105-1-2, Appendix B, Chapters B-4 and B-5; and CESPD Regulation 1110-1-8. The purpose of the QCP is to ensure that product development and independent technical review of the work items as defined in the Task Orders are completed in accordance with industry and professional standards.

MANAGEMENT AND COMMUNICATION STRUCTURES

The engineering organization proposed by AKM is structured to respond to the technical and managerial requirements of the project by assigning senior, highly qualified personnel. They will function in a simple organization shown below with clear lines of delegated authority and responsibility. Our Project Manager and Assistant Project Manager/Project Engineer will be the principal points of contact with the U.S. Army Corps of Engineers, and will have full technical and administrative responsibility for the project. The team assembled for the project includes all of the major disciplines required for the project.

PROJECT ORGANIZATION CHART



MANAGEMENT PHILOSOPHY

A key element in the successful completion of any project is the implementation of a quality assurance/quality control program. Success is achieved through the efforts of qualified professionals effectively employing their skills and following a program of quality assurance to monitor and verify that the quality control plan is followed. For this project, AKM will utilize a project QCP that includes the following items:

- ✓ Definition of project deliverables, procedures and required standards.
- ✓ Description of specific quality control procedures to be followed in specific activities, including the level and frequency of review required.
- ✓ Identification of elements of the project, if any, requiring special quality control attention or emphasis.
- ✓ Identification of technical experts required for review and consultation.
- ✓ Estimate of resources required for quality control functions.

MANAGEMENT APPROACH

The Project Team will utilize the Integrated Project Management (IPM) approach for execution of this project. Key elements of the IPM are outlined as follows:

Project Identification

- Listen to Client/User
- Ascertain Project Needs
- Identify Problem/Constraints
- Review Schedule
- Review Budget
- Site Review
- Data Review
- Determine Expectations
- Determine Approval Process
- Establish Scope of Technical Services
- Listen to Client/User

Work Program

- Establish Preliminary Work Plan & Schedule
- Establish Work Breakdown Structure (WBS)
- Resource Determination
- Review and Adjustment In Plan & Schedule
- Establish Project Milestones

Technical Execution

- Project Execution
- Internal Quality Control
- Third Party Review

Project Management

- Progress Reporting: Resource Balance & Tangible Evidence
- Comparison of Progress Reporting with WBS and Resource Loaded Schedule
- Resolution of Discrepancies
- Identification of Source(s)
- Identification of Impact(s)
- Development of Mitigation(s)
- Continuous Coordination

CONSTRUCTION COST ESTIMATE CONTROL

Cost estimates for construction of this project will be based on equipment and material supplier provided estimates, historical construction cost data from similar recent projects, and by contacting contractors for construction estimates.

DESIGN TOOLS

Design tools to be used in execution of this project are MICROSTATION for CADD, structural design software and H2OMAP hydraulic modeling software.

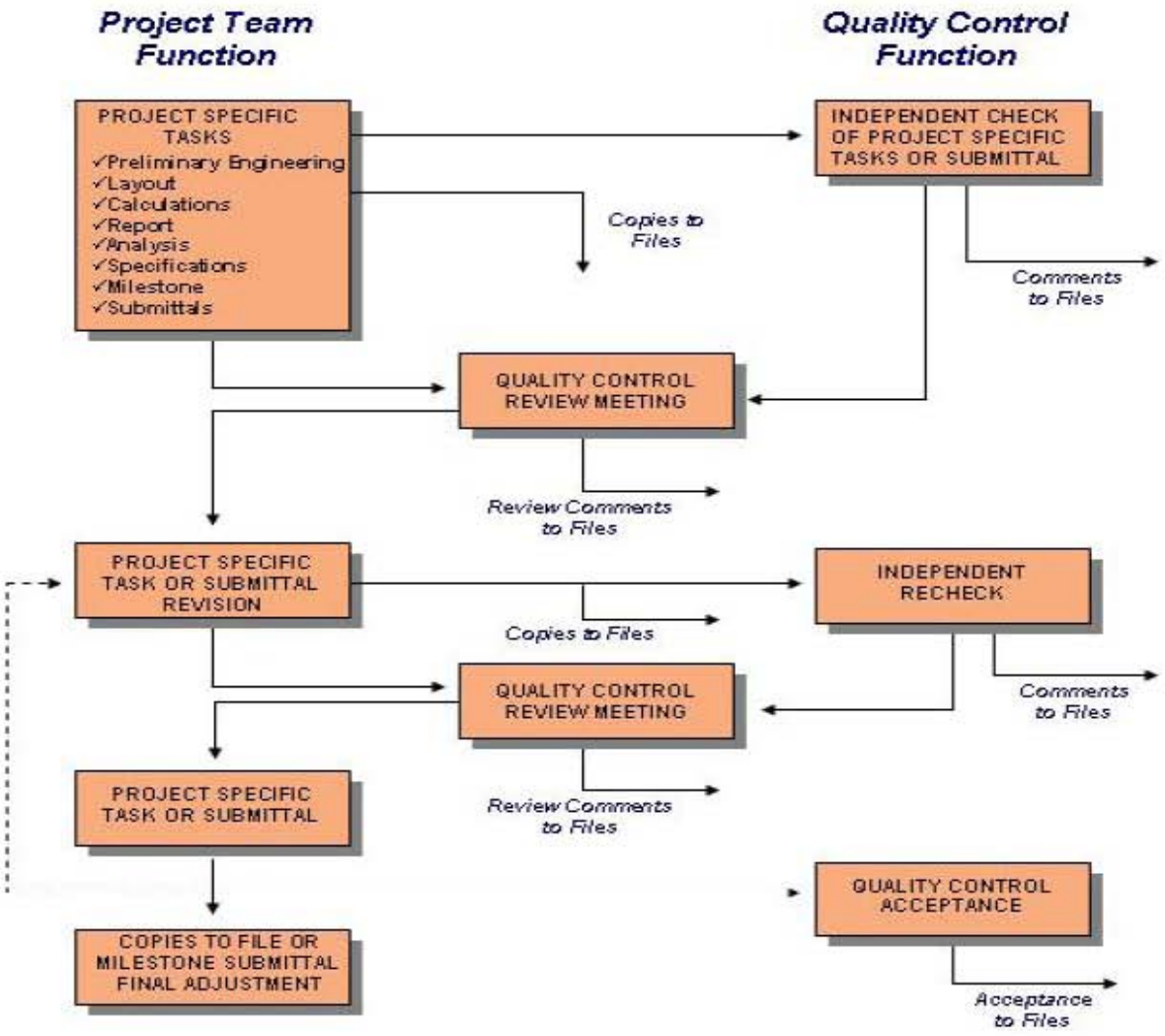
QUALITY CONTROL TEAM

Quality Control Manager	Gary Hobson, P.E.
Independent Technical Reviewer	Raymond Hahn, P.E.
Review Structural Design	Ronald Wong, P.E., S.E.
Review Electrical Design	Justin Lee, E.I.T
Review Civil Design	Morgan Ying, P.E.
Review Mechanical Design	James Quintana, P.E.
Architectural Design	Sava Necic, P.E.

QUALITY CONTROL FLOW CHART

Our Project QCP is graphically presented on the following page. Our detailed quality control program is attached.

Quality Control Flow Chart



AKM CONSULTING ENGINEERS

DESIGN QUALITY ASSURANCE /

QUALITY CONTROL PLAN

SECTION **PAGE**

1.0 Purpose

This procedure establishes methods and requirements for developing, approving, and documenting design criteria.

2.0 Scope and Definitions

2.1 Scope

This procedure applies if design criteria needs to be developed for the project.

2.2 Definitions

2.2.1 Design criteria are those input, bases, or other design requirements upon which detailed final design is based. Design criteria may be identified in scoping documents, calculations, drawings, reports, specifications, agreements, and Design Criteria Memoranda.

2.2.2 A Design Criteria Memorandum (DCM) is a formal design document used to identify design input, bases, seismic considerations, and other requirements that govern the design of project structures, systems and components.

3.0 Responsibilities

3.1 The Design Manager (DM) is responsible for compliance with this procedure.

3.2 The DM is responsible for determining the need for developing or revising design criteria.

3.3 The Lead Engineer (LE) and/or Design Engineer (DE) is responsible for the technical adequacy of the design criteria, preparation, coordination of Review, and obtaining necessary acceptance or approval of the DCM.

3.4 The LE is responsible for Reviewing and approving DCMs prior to issue of any other final design documents.

4.0 Procedure

4.1 Determining Need for Design Criteria

4.1.1 The DM will determine the need for developing or revising existing design criteria. A LE should be assigned to identify the items and documents that require design criteria preparation or revision.

4.1.2 The LE will determine the extent of design criteria preparation or revision required based on but not limited to the following:

a) Design criteria is inadequately defined or deficient in areas (i.e. component criteria is not addressed sufficiently in design criteria for the structure or system).

b) There is sufficient justification based on good, prudent engineering practices.

c) Replacement in kind or expansion of existing facilities with similar equipment and requirements may not need design criteria, provided existing documentation adequately define the criteria.

4.1.3 If a formal DCM is not required, design criteria will be adequately addressed and documented in other project, design or procurement documents in accordance with applicable procedures and project requirements.

4.2 DCM Preparation

4.2.1 The DCM or similar document will contain (as applicable), functional requirements, basic data, applicable codes, standards, and regulations from which design calculations, drawings, and specifications are to be developed. Refer to Attachment A, for a suggested list of design criteria factors to be considered.

4.2.2 During the course of design criteria development, the LE or DE will coordinate the draft DCM with appropriate stakeholders prior to final review and signoff.

4.3 Acceptance and Approval

4.3.1 The LE will have the DCM and its revisions reviewed and signed as accepted by the appropriate interfacing stakeholders including other discipline engineers, appropriate construction personnel and the DM.

4.3.2 The DCM will be reviewed and signed as approved by the LE prior to final issue of other related design documents such as calculations and drawings. An exception to this would be if it were necessary to issue preliminary documents in order to obtain data, from a supplier or others that will be needed to complete the design criteria.

4.4 Issue and Control

4.4.1 The LE will issue and distribute the DCM to parties listed on the cover sheet. The DCM will be controlled and maintained in project files.

4.4.2 Revisions to the DCM will be reviewed, accepted, approved, and distributed in the same manner as the original.

5.0 Attachments

5.1 Attachment A, “Design Criteria Memorandum Checklist”

Attachment A

DESIGN CRITERIA MEMORANDUM CHECKLIST

1. Basic functions of each structure, system, and component.

2. Performance requirements such as capacity, rating, and system output.

3. Codes, standards, regulatory and quality requirements, including the applicable issue, addenda, and portions thereof.

4. Design conditions such as:

    a) Pressure, temperature.

    b) Hydraulic requirements, such as pump net positive suction head (NPSH), allowable pressure drops, minimum and maximum pressures, and allowable fluid velocities.

    c) Electrical requirements, such as source of power, voltage, raceway requirements, and motor requirements.

    d) Operational requirements under various conditions, such as startup, normal operation, shutdown, emergency operations, special or infrequent operation, and system abnormal or emergency operation.

5. Load requirements, such as seismic, wind, thermal, static, and dynamic.

6. Environmental conditions anticipated during storage, construction and operation, such as pressure, temperature, and humidity.

7. Interface requirements including definition of the functional and physical interfaces involving structures, systems, and components.

8. Material requirements, including such items as compatibility, electrical insulation properties, protective coating, and corrosion resistance.

9. Layout and arrangements based on requirements of others (for example ease of maintenance and construction).

10. Instrumentation and control requirements.

11. Reliability requirements for major structures, systems and components, such as redundancy, diversity, or separation requirements, and a definition of those events and accidents that they must be designed to withstand.

12. Test requirements and the conditions under which they will be performed.

13. Accessibility, maintenance, repair and in-service inspection requirements including the conditions under which these will be performed.

14. Transportation requirements, such as size and shipping weight, limitations, and I.C.C. regulations.

15. Fire resistance and fire protection requirements.

16. Handling, storage, and shipping requirements.

17. Other requirements to prevent undue risk to the health and safety of the public and work force.

18. Materials, processes, parts, and equipment suitable for application.

19. Safety requirements for preventing personnel injury, including restricting the use of dangerous materials, escape provisions from enclosures, and grounding of electrical systems.

Attachment B

MEMORANDUM COVER SHEET

DCM No._____ Revision:_____

File No. _____

Structure, System, or Component:

Prepared by:_____ Date: _____

Accepted by:

Interfacing Engineering_____ Date:_____

_____ Date:_____

_____ Date:_____

Construction Personnel (as applicable)

_____ Date:_____

_____ Date:_____

Approved by:

Design Manager _____ Date:_____
(as applicable)

Lead Engineer _____ Date:_____

Design Engineer _____ Date:_____

Pages 2 through____, attached, describe design input.

Distribution:
Interfacing Engineers and/or Construction personnel

_____ _____ _____

_____ _____ _____

_____ _____ _____

- Lead Engineer

Design Engineer

1.0 Purpose

This procedure establishes methods and requirements for preparing, reviewing, approving, revising and documenting engineering drawings.

2.0 Scope and Definitions

2.1 Scope

This procedure applies to engineering drawings produced or revised by the design organization and their subconsultants that are necessary to support the design, procurement, and construction activities for the Project. It applies to drawings produced by others only when those drawings are revised by the design organization.

3.0 Discussion

The main Purpose of engineering drawings is to provide information required to direct construction activities or depict an as built condition. They are generally the design output product, and as such the approvers bear the responsibility for their portion of the design.

4.0 Responsibilities

4.1 The Design Manager (DM) is responsible for compliance with this procedure.

4.2 The Lead Engineer (LE) and or Design Engineer (DE) is responsible for the technical adequacy of the drawings and compliance with this procedure.

4.3 Project Engineer is responsible to control the issue of drawing numbers, record drawings, provide secure storage for originals, retrieve drawings for charge-out to users and record the location of charged-out drawings.

5.0 Procedure

5.1 Prepared drawings or revisions will comply with applicable approved design criteria and requirements and design calculations:

5.1.1 Production

Drawings will comply with COE and West Basin Municipal Water District criteria for general drafting standards and CADD requirements for the preparation of all drawings for construction.

5.1.2 Identification & Control

The description of each revision change shall include, as appropriate, reference to any formal document, which documents the reason for the change such as a design change notice, or RFI's, etc.

5.1.3 Coordination

Periodically, during the course of drawing production, progress prints will be coordinated with and reviewed by other disciplines having responsibilities in the same area to identify and eliminate any design conflicts as early as possible. The preparer and DE or LE will see to it that appropriate coordination takes place and is documented in the coordination block adjacent to the title block. Specific coordination deemed not necessary should also be documented (e.g. NA).

5.2 Review Checking and Approval

Each drawing will be checked to verify that it satisfies design criteria, is supported by approved calculations, is technically accurate and complies with recognized drafting practices. Where required, drawings will be signed and sealed by a professional engineer or a licensed architect in accordance with the California Business and Professions Code.

5.2.1 Types of Reviews

Ongoing Reviews: Inter- and intra-discipline review, managed by the LE or DM that focuses on day-to-day accuracy and coordination with other disciplines.

Formal Reviews: Formal Reviews of deliverables by persons designated by the management that may include outside specialists, if needed.

Outside Reviews: Reviews by persons who are not directly involved in the project to provide independent reviews for reasonableness, logic,

constructability and coordination of design between sections and disciplines.

Ongoing Reviews will be conducted throughout the project. Formal Reviews will be conducted at the initial, intermediate, and final submittal. Outside Reviews involving people who have not been involved in the project will be conducted as needed.

5.2.2 For each design drawing, a professional engineer will be assigned by the LE, who will be responsible for the final design and approving and sealing the drawing. For each drawing a qualified reviewer, who was not involved with the original design, will be identified by the DM.

5.2.3 The following procedure is to be used for the review of drawings.

1. Before transmittal to reviewers, the DE will check the drawing for content, clarity, completeness, accuracy, and typographical errors. The following criteria will be considered as appropriate to the level of completion:

   - Required information is provided to meet the requirements of the various levels of review (i.e., initial, intermediate and final)
   - The drawings conform to the contract documents, design criteria, calculations, requirements and applicable standards.
   - The drawings are consistent with adjacent design sections (i.e., match lines).
   - Previous comments have been addressed (both in written formal response and, if applicable, on the drawings).
   - Materials, equipment, and elements of the work have been designed satisfactorily for the purpose intended and are in conformance with other project documents such as geotechnical report requirements. Constructability requirements of the project are met.
   - Applicable health and safety, environmental and regulatory requirements are satisfied.
   - The design is consistent with other plans and documents.

- The plans are legible, complete, well organized and technically and grammatically accurate.

The reviewers will clearly note any additions or changes to the drawing. Comments requiring major changes or additions will be reviewed by the LE in consultation with the DE and the reviewers. If there is concurrence that the change is absolutely necessary (as opposed to preferred or desirable), a copy of the comments along with a description of actions to be taken will be noted. A target date for completed action will be established and any effect on project schedules will be communicated on a need to know basis.

2. After all corrections have been made, the drawings will be stamped with a "check print" stamp and signed and dated by the DE.

3. The marked-up check print will be sent to the reviewer, who will review the changes and forward to the CADD operation for correction upon completion.

4 The reviewer or DE will make a final check to ensure all the corrections have been made.

5.3 Documentation

5.3.1 Revision 1 and all later revisions of a drawing will be recorded, reproduced, distributed, and controlled in accordance with project document control procedures.

5.4 Issue and Distribution

5.4.1 The DE shall arrange for appropriate issue, reproduction and distribution of the drawing.

6.0 References

6.1 Business and Professions Code, State of California

1.0 Purpose

This procedure establishes the responsibilities and requirements for the review, issue, and change of design documents and data.

2.0 Scope

This procedure is applicable to contract documents, design documents prepared by the Project Team, documents prepared by suppliers and subconsultants, field design documents, and records retained in accordance with the Contract.

3.0 Responsibilities

3.1 The Design Project Engineer is responsible for ensuring documents and data that relate to the Project are controlled from receipt through review, approval and issuance. These controls shall ensure that only current and properly approved design documents and data are available at the place of work.

3.2 The Design Manager is responsible for performing audits of the documents and data, including documents from subconsultants and suppliers.

4.0 Procedure

4.1 Review Approval and Issuance

4.1.1 All design documents and data related to design services provided by AKM and its subconsultants shall be reviewed and approved for conformance to the design documents and appropriate rules and regulations. The originator shall review the document and data for these items prior to inclusion into the Project document and data control system.

4.1.2 Changes to approved design documents and data shall be subject to the same review and approval as the original document and data.

4.1.3 The Project Engineer will establish a Design Document and Data Control System in the office. The documents and data contained in the file will be maintained as the Project Record Documents and Data, will be protected from damage, deterioration and loss through the term of the project. A Master List of these documents and data will be established in the “Project Office Database” (POD) by the document

and data control staff identifying the current revision status of the design documents and data.

4.1.4 Documents will be entered into the Design Document and Data Control Master List upon receipt. Authorized personnel will then review documents and data for adequacy and completeness. Needed corrections identified during this review will be resolved with the originator of the document and/or data

4.1.5 The Project Engineer will ensure that each department or organization providing design documents and data to the Project Team, or receiving them from the Project Team is provided with a copy of the current Master List. The department or organization providing to or receiving documents and data from the Project Team is responsible to ensure that only pertinent issues of appropriate documents and data are available at all locations where work is performed. The Design Document and Data Master List will be updated as documents and data are received, and distributed to all Master List holders on a monthly basis.

4.1.6 Invalid and/or obsolete documents and data will be promptly removed from all points of issue or use to preclude inadvertent use.

4.1.7 Any obsolete document and data retained for legal and/or other purposes shall be identified and segregated from current approved design documents and data to preclude inadvertent use.

4.2 Changes to Approved Documents and Data

4.2.1 All changes of documents and data will be reviewed and approved by the same departments or organizations that performed the original review and approval.

4.2.2 Where practical, the nature of the change will be shown on the document and data or the appropriate attachments.

4.3 Quality Assurance Review

4.4.1 The Project Manager will perform frequent audits to verify that only current and approved documents and data are available at the location of the work.

1.0 Purpose

This procedure establishes how AKM will verify and document the adequacy of designs.

2.0 Scope and Definitions

2.1 Scope

This procedure applies to engineered structures, systems and components.

2.2 Definition

Design verification is the process of confirming or substantiating that the design, as recorded in approved design documents, meets the design criteria and requirements. Design documents include, but are not limited to, calculations, drawings and specifications.

3.0 Discussion

Routine review and checking of designs does not constitute the design verification required by this procedure. Design verification activities include performing alternative calculations, conducting design reviews and undertaking qualification tests.

4.0 Responsibilities

4.1 The Design Manager (DM) is responsible for compliance with this procedure.

4.2 The DM and Lead Engineers (LE) are responsible for identifying and documenting designs requiring verification. They are responsible for having the verifications completed and documented in design verification reports.

4.3 The LE and/or Design Engineers (DE) are responsible for resolving and correcting any deficiencies during the design verification.

5.0 Procedure

5.1 General

5.1.1 Design verification will be performed by any competent individual or group other than those who performed the original design. The

verification will not be performed by the originator's supervisor except when the supervisor is the only technically qualified individual available. Under such conditions, the justification will be documented.

5.1.2 Design verification will be accomplished using any acceptable method such as those listed below:

a) Design reviews

b) Alternate calculations

c) Qualification tests and demonstrations

5.1.3 At the inception (or as early as practical) of the project, the item (s) requiring design verification will be listed and documented and approved by the design manager.

5.1.4 The extent of design verification required is a function of the item's importance to safety/reliability, the complexity of the design, the degree of standardization, the state-of-the-art, and the similarity to previously proven designs. However, the applicability of standardized or previously proven designs will be verified for each application.

5.1.5 The design verification process need not be repeated for identical designs verified previously using this procedure. However, the original design, verification measures, and results will be adequately documented and referenced in a design review report.

5.1.6 Design verification will be completed before approved and issued drawings, specifications and other documents are utilized for construction. If procurement of major systems or components is involved, design verification will be completed to the extent that the verifier is assured that the procured item will meet its intended function, before manufacturing is allowed to proceed.

If these requirements cannot be met, the completion of design verification may be deferred with the provision that the unverified portion of the design documents, and any other documents affected, are identified as being "on hold" pending completion of the design verification.

When design verification is "not complete", construction and/or procurement associated with design shall not proceed if the installation may require extensive rework. In all cases, the design verification will

be completed before the structure, system or component is relied upon to perform its intended function.

5.2 Design Review

Design reviews are performed to assure that final design is correct and satisfactory.

5.2.1 Depending on the importance of the function and/or the complexity of the structure, system the lead engineer will assign reviewer with appropriate qualifications to conduct the review.

5.2.2 The reviewer will:

a) Develop and implement a written plan or checklist to assure that critical aspects of the design and reference documents that govern or influence the design are examined, The plan or checklist will include, but not be limited to, the applicable general questions of Attachment B.

b) Prepare a report of their findings when the design review has been completed. The report will note any apparent deficiencies and give an explanation for the applicable general questions on Attachment B which were answered "No". If certain design aspects were omitted from the review, the reason will be given in the report.

The report will contain as a minimum:

1) A completed cover sheet, Attachment A
2) A plan or checklist,
3) Attachment B completed.
4) The findings of the reviewer(s), including the discussion, evaluation, conclusions, and recommendations.

5.2.3 The report will be submitted to the LE for review. The report will be discussed with the reviewer(s) and the engineers responsible for the design. The LE will take appropriate actions to correct deficiencies that require resolution.

5.2.4 When the deficiencies are corrected, the LE will prepare a memorandum describing the disposition of each deficiency. If no action is taken, an explanation will be provided.

5.3 Alternate Calculations

Some types of calculations or analyses may be verified by comparison with alternate methods of calculations.

5.3.1 Where alternate calculations are performed to verify correctness of the original calculation, the original calculations will be reviewed to assure that the original assumptions, input data, criteria, and codes or other calculation methods used are appropriate.

5.3.2 The alternate method may be more simplified or a less rigorous approach, such as when a hand calculation is used to check a computer output. Although this method may not fully check the original calculation or analysis, the results must be consistent with them.

5.3.3 The results will be documented in the report that has a cover sheet (Attachment A), the contents, results of the alternate calculations and the actions taken to correct any errors or deficiencies.

5.3.4 The report will be given to the LE for review and disposition in accordance with paragraphs 5.2.3 and 5.2.4.

5.4 Qualification Testing

Design verification for some designs or specific design features can be achieved by suitable qualification testing of a prototype or a production unit as specified by the DE.

5.4.1 In cases where adequacy of design is to be verified by a qualification test, such testing will demonstrate adequacy of performance under the most adverse design conditions. All pertinent operating modes will be considered in determining those design conditions where it is intended that the test program confirm the adequacy of the overall design.

Where the test is only intended to verify a specific design feature, other features of the design will be verified by anyone of the applicable design verification methods.

When tests are being performed on models or mockups, the scaling laws will be established and verified. The results of the mockup tests will be subject to error analysis, where applicable, prior to use in final design work.

5.4.2 The test configuration will be clearly defined and documented.

5.4.3 Test results will be evaluated by the engineer responsible for the design to assure that test requirements have been met. The test results will be documented in a report that contains a cover sheet Attachment A, the test criteria, test procedures and results. The completed report will be submitted to the LE for Review and disposition in accordance with paragraphs 5.2.3 and 5.2.4.

5.5 Design Changes

Where required, previous design verification will be re-examined for effects of a design change.

6.0 Attachments

6.1 Attachment A, Design Verification Report Cover Sheet

6.2 Attachment B, Design Review General Questions

Attachment A

DESIGN VERIFICATION REPORT COVER SHEET

DVR No._____

File No._____

Sheet 1 of _____

System, Structure, or Component_____

_____

Design Engineer _____

_____

Method of Verification _____

_____

Prepared and Verified by: _____
(Date)

Approved by: _____
(Date)

Attachments: (list all)

Attachment B

DESIGN REVIEW GENERAL QUESTIONS

DVR No._____
File No._____
Sheet 1 of 1_____

System, Structure, or Component:	Yes/No	Initials/ Date
1. Were inputs correctly selected and incorporated into design?		
2. a) Are assumptions necessary to perform the design activity adequately described and reasonable?		
b) Where necessary, are assumptions identified for subsequent re-verification when the detailed design activities are completed?		
3. Are appropriate quality control and quality assurance requirements specified?		
4. Are applicable code, standards, and regulatory requirements Including issue and addenda, properly identified and are their requirements for design met?		
5. Have applicable construction and operating experience been considered?		
6. Have design interface requirements been satisfied?		
7. Was an appropriate design method used?		
8. Is output reasonable compared to input?		
9. Are specific materials compatible with each other and design environment conditions to which material will be exposed?		
10. Have adequate maintenance features and requirements been specified?		
11. Are accessibility and other design provisions adequate for performance of needed maintenance and repair?		
12. Has adequate accessibility been provided to perform in-service inspections expected to be required for the life of the system.		
13. Are acceptance criteria incorporated in design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?		
14. Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?		
15. Are adequate handling, storage, cleaning, and shipping requirements specified?		
16. Are adequate identification requirements specified?		
17. If a component, has overall system design been verified?		

Checking Project Drawings

1.0 Purpose

To provide a uniform, orderly, and efficient method for checking the Project drawings.

2.0 Scope

This procedure applies to all drawings except railroad signal drawings, including revisions to checked drawings that are the basis for study, construction, or procurement documents.

3.0 Introduction

The checking of drawings, like any other checking, requires a minimum of two individuals: a Checker/Verifier, and an Originator/Back Checker.

Timely checking of drawings is important for efficient performance. A drawing used as a base by several disciplines shall be checked and corrected before further additions are made; this will eliminate the need to check correct the same items on subsequent drawings.

3.1 This Procedure:

3.1.1 Checks that the drawings are planned controlled, and uniformly prepared per USACOE/West Basin Municipal Water District requirements.

3.1.2 Establishes the record-keeping processes (documentation) for originals and check prints:

3.1.3 Requires the drawing to be checked against checked calculations.

3.1.4 Requires checking to be performed by an individual in the organization competent to perform the check. Cursory supervisory reviews do not satisfy the intent of this procedure. No Engineer or Designer shall be the checker of his/her own work.

3.1.5 Requires the originals and check prints of all drawings to be indexed, and stored in the project files by the Project Manager or a designee.

4.0 Responsibilities

4.1 Design Manager

4.1.1 Responsible for the drawings being checked and implementing this procedure. Ensures that the personnel assigned to the project are capable of performing the analysis or calculations required, or directs a peer review or senior technical advisor assignment. Ensures that Checkers are senior experienced engineers with:

a) Significant relevant qualifications and experience in the design discipline and type of work being checked.

b) An equal of higher level of qualifications and experience than the Originator.

4.1.2 Ensures that Checkers are not involved with the preparation of the design documents being checked. Ensures that the Checker assigned to do independent analysis and check of structural items is a California-registered engineer.

4.2 Product Manager

4.2.1 Responsible for ensuring that all product drawings are reviewed and checked for completeness and accuracy in accordance with the procedures set forth in this document.

4.2.2 Assembles or appoints a designee to assemble index and maintain in orderly fashion a record of all the original and check print drawings, which are stored in the project files.

4.3 Engineer-in-Responsible Charge

4.3.1 Responsible for determining the drawing requirements and making assignments

4.3.2 Reviewing drawings for adequacy.

4.3.1 Maintaining a record of all drawings.

4.4 Designers

4.4.1 Responsible for reviewing the project assignment and performing the required drawings.

4.4.1 Preparing and presenting drawings to USACOE/West Basin standards.

4.4.2 Maintaining and updating drawings to reflect project design changes and modifications.

4.4.3 Advising the Engineer-in-Responsible Charge of problems that may occur as a result of design modifications.

4.4.4 Initialing and dating each original drawing.

4.5 Checkers

4.5.1 Checking the drawings independent of the Product Manager or Designer and in accordance with these procedures.

4.5.2 Asking questions of the Designer in areas that are not clear or seeking technical advice if unsure of any particular element of the drawing. The Checker does not request or suggest alternative technical approaches if the design presented meets all applicable requirements.

4.5.3 Initialing and dating each check print copy in checked by box after checking.

4.5.4 Initialing and dating each original drawing after he has verified all changes have been correctly made.

5.0 Procedure

5.1 Completing the Drawing — As each drawing or as revisions to a previously checked drawing is deemed ready for checking, the Originator signs or initials and dates the title block, makes a check print copy, and affixes numbers, and dates the check print stamp on the print of each drawing. The drawing original is put under the control of the Project Manager in order to prevent further changes to the drawing that would invalidate the checking process. When the drawing original is a CADD file, the Project Manager shall have the CADD Manager secure the CADD file.

5.1.1 The Originator also makes certain documents available to the Checker to perform the check. The following listing identifies those documents that could be required, singly or in combination with, to perform a calculation check.

- Checked calculation
- Specifications
- Project criteria
- Design standards or criteria
- Client directives
- Vendor data
- Local codes
- Design handbooks or acceptable references for specific designs
- Geotechnical reports
- Survey data

5.2 The Checker reviews the drawings and uses the checklist shown in Attachment A. The Checker verifies that the Originator has signed and dated the "design by" box on all calculation sheets. If these requirements are not met, the Checker returns the calculations to the Originator to rework the presentation or complete the preparation as required.

5.3 Checking

5.3.1 The Checker checks the check print of the drawing for technical adequacy and conformance to any applicable standards and forma, and performs specific accuracy checks required for that type of drawing. Checking activity is recorded directly on the check print.

5.3.2 The Checker is responsible for ascertaining that the drawing is consistent with the corresponding calculations, and signing off that those calculations have been properly checked.

5.3.3 The Checker identifies and uses the design checklists appropriate for the discipline.

5.3.4 When there are earlier comments, the Checker must review these comments and verify that the comments have been incorporated into the calculations.

5.3.5 In order to document the checking process the Checker highlights in yellow on the check print each part checked that is found to be correct, and marks in red on the check print corrections, additions, or deletions.

NOTE: Neither red nor yellow shall be used to note comments or instructions. These colors are reserved for the checking process. Comments or instructions shall be written in black pencil.

5.3.6 The Checker signs and dates the check print stamp upon completion of the checking.

5.3.7 In the case where no corrections, additions or deletions are found, there is no need to back checking or further signatures on the check print stamp. The check print stamp and original drawing, signed in the appropriate checked block, should be returned to the Originator for placement in the project's file.

5.4 Back Checking

5.4.1 The originator (acting as Back Checker) reviews the Checker's marks on the check print. To document the back checking process, the Originator:

5.4.2 Checkmarks in green each of the Checker's red-marked changes if in agreement that the original should be changed, and adds in green, with the concurrence of the Checker, any additional changes not picked up by the Checker.

5.4.3 Furthermore, the Originator crosses out in green each of the Checker's red-marked changes that both the Originator and the Checker agree should not be changed. The Back Checker should not obliterate the Checker's marks.

NOTE: The Back Checker and Checker should resolve differences encountered during the checking process so they are not repeated over and aver again, if resolution cannot be achieved by the two individuals, the appropriate Engineer-in Charge or higher authority should be requested to resolve the differences.

Notes, questions, and clarifications between the Originator and the Checker are made in black pencil on the check print copy and are not entered on the original calculations.

5.4.4 The Back Checker signs and dates the check print stamp upon completion of the back checking.

5.5 Correcting the Drawing Original

5.5.1 The Project Manager releases the drawing original (or CADD file) for correction. Correction of the drawing original is supervised by (or drafted by) either the Originator or Checker, since both know exactly what needs to be done.

5.5.2 To document that the corrections have been made, the Engineer, Draftsperson, or CADD operator circles in blue on the check print each correction as incorporated on the drawing original.

5.5.3 The person correcting the drawing signs and dates the check print stamp upon completion of the corrections.

5.6 Verifying the corrected Drawing Original

5.6.1 The Verifier, who may be either the Originator, Checker or a third party but not the person who corrected the drawing original, verifies that that the agreed to corrections have been incorporated without error by comparing the corrected drawing original and the check print. When the original drawing is a CADD file, the check print is compared to a plot to the corrected drawing original.

5.6.2 The Verifier circles in green each blue-circled item after reviewing its incorporation on the original drawing. If the corrections are not made or are erroneous the check print with penciled instructions is returned to the Corrector.

5.6.3 The Verifier signs and dates the check print stamp after all of the corrections are verified.

5.6.4 After the corrections have been verified the Checker initial the “checked by” block on the title block of the drawing original.

5.7 Disposition of the Checked Drawing

5.7.1 The verified drawing original (or CADD file) is put under the control of the Project Manager in order to prevent further changes in the drawing that could invalidate the checking which has been done. When the drawing original is a CADD file, the Project Manager shall have the CADD Manager secure the CADD file.

5.7.2 Copies of the verified drawing originals, the check prints, and the checklists are then indexed and placed in the project files by the Project Manager.

5.7.3 The Project Manager releases the checked drawing to other disciplines to use as a baseline for their input, or to the client.

NOTE: When there is a change to a checked drawing, a new check print must be made to check the area that has been changed. The check print is stamped and labeled check print 2,3,4, etc., as applicable and attached to the previous check prints(s), the checking follows the same procedure, except that only the portions that changed are marked up as having been checked.

5.8 Incorporating Client Review Comments

5.8.1 If changes mandated by the client at the final review are simple in nature, the Design Manager or Project Manager may abbreviate the checking process by noting the changes in red on a new check print (which should be sequentially numbered), signing the check print as the Back Checker, and indicating that the changes do not materially affect the design. Then the normal correcting and verifying processes should be used.

Checking Engineering Calculations

1.0 Purpose

To provide a uniform, orderly, efficient method for checking of engineering calculations for the Project.

2.0 Scope

2.1 This procedure applies to all calculations for non-structural items, including revisions to checked calculations, which are the basis for study, construction, or procurement documents.

2.2 The design of structural items shall be checked by independent analysis.

3.0 Introduction

3.1 A calculation is defined as something deduced or determined by using mathematics, reasoning, or evaluation. Because the engineering calculations, drawings, and specifications constitute the legal documentation of a project, all calculations shall be presented in an efficient, organized method from the initial concept to the final filing.

3.2 This Procedure:

3.2.1 Checks that the calculations are planned, controlled, and uniformly prepared per ~ requirements.

3.2.2 Establishes the record keeping processes (documentation) for originals and check prints.

3.2.3 Requires backup documentation from other design efforts to ensure adequate inter- discipline coordination.

3.2.3 Requires the calculations to include backup material that are traceable to the calculations input.

3.2.5 Provides verification and alternate calculation procedures for checking calculations.

3.3 All calculations are to be done on pre-printed calculation sheets. All information is to be printed, title boxes filled in completely, initials used in the

sign-off blocks, pages numbered, sketches used as required to clarify the calculations, and all assumptions, references, units, and conclusions are to be clearly stated.

3.4 Checking shall be performed by an individual in the organization competent to perform the check. Cursory supervisory reviews do not satisfy the intent of this procedure. No engineer or designer shall be the checker of his/her own work.

3.5 The originals and check prints of all calculations are to be indexed, and stored in three-ring binders by the Product Manager or a designee.

4.0 Responsibilities

4.1 Design Manager

4.1.1 Responsible for the calculations being checked. Ensures that the personnel assigned to the project are capable of performing the analysis or calculations required, or directs a peer review or senior technical advisor assignment. Ensures that checkers are senior experienced engineers with:

a) Significant relevant qualifications and experience in the design discipline and type of work being checked.

b) An equal of higher level of qualifications and experience than the Originator.

4.1.2 Ensures that checkers are not involved with the preparation of the design documents being checked. Ensures that the checker assigned to do independent analysis of structural items is a California-registered engineer.

4.2 Product Manager

4.2.1 Responsible for:

a) Ensuring that all product calculations are reviewed and checked for completeness and accuracy in accordance with the procedures Set forth in this document.

b) Assembling or appointing a designee to assemble and maintain a record of all the original and check print calculations for the design in orderly fashion.

4.3 Engineer-in-Responsible Charge

4.3.2 Responsible for:

a) Determining the calculation requirements and making assignments.

b) Reviewing calculations for adequacy.

c) Maintaining a record of all calculations.

4.4 Designers (Originators)

4.4.5 Responsible for:

a) Reviewing the project assignment and performing the required calculations.
b) Using standard calculation sheets.

c) Presenting all calculations in a neat and logical manner that is conducive to checking.

d) Maintaining and updating calculations to reflect project design changes and modifications.

e) Advising the Engineer-in-Responsible Charge of problems which may occur as a result of design modifications.

f) Initialing and dating each original calculations sheet.

g) Providing photocopies of signed and dated original calculations and all relevant documents to the Checker in a timely fashion.

4.5 Checkers

4.5.1 Checkers are responsible for

a) Checking each calculation to verify that the design is in accordance with the procedures specified herein.

b) Thoroughly checking the calculations starting with assumptions, mandated parameters, references, given values and formulas, omissions, and correctness of arithmetic.

c) Asking questions of the Designer in areas that are not clear or seeking technical advice if unsure of any particular element of the calculation. The Checker does not request or suggest alternative technical approaches if the design presented meets all applicable requirements.

d) Signing and dating all checklists used during checking process.

e) Signing and dating any alternate calculations made and clearly identifying its relationship to the original checked calculation

f) Initialing and dating each check print copy in checked by box after checking.

g) Initialing and dating each original calculation sheet after he has verified all changes have been correctly made.

5.0 Procedure

5.1 When a calculation or series of calculations or when revisions to previously checked calculations have been completed, the Originator signs and dates the design by box and makes a photocopy of the original and provides it to the Checker for checking. The Originator also makes certain documents available to the Checker to perform the check.

5.1.1 The following listing identifies those documents that could be required, singly or in combination with, to perform a calculation check.

- Design sketches
- Specifications
- Project criteria
- Design standards or criteria
- Client directives
- Vendor data
- Local codes
- Design handbooks or acceptable references for specific designs

- Geotechnical reports
- Survey data

5.2 The Checker reviews the calculations using the checklist shown in The Checker verifies that the Originator has signed and dated the "design by" box on all calculation sheets. If these requirements are not met, the Checker returns the calculations to the Originator to rework the presentation or complete the preparation as required.

5.3 The Checker marks up the photocopy of the calculations in yellow (checked and is correct) and red (corrections) and signs the "check print copy" of the calculation sheet in the "checked by" block.

a. The Checker shall determine that all information shown is correct, complete, and consistent. To do this, a logical method shall be followed and he shall ensure that the data has not missed verification.

b. The Checker identifies and uses the design checklists appropriate for the discipline.

c. The first thing a Checker of calculations must do is to verify the validity of all assumptions, given parameters, formulation, design criteria, and applicable codes and standards. This cannot be done through experience only. The Checker must review the contractual requirements to see if there were specifies upon which the design was to be based, and whether they were indeed used.

d. In cases where parameters or other input to the calculations come from other hand calculations or computer runs, or other disciplines or sub-consultants, these calculations must be reviewed for applicability and to see if they were checked. If unchecked data is used as design input, the calculation cannot be checked.

e. When there are earlier comments, the Checker must review these comments and verify that the comments have been incorporated into the calculations.

f. The last element of checking hand calculations is to check the math for correctness.

g. If a computer program is used for design calculations, the Checker shall ensure that the program was verified and validated for the

specific range of application and identifies software data input and revision number. The computer program input data shall be checked for accuracy and consistency. All supporting work, such as system diagrams and input assumptions shall be verified. The Checker shall verify that the design output is reasonable, consistent, and compared to the design input data.

h. Where computerized spreadsheets and databases are used, either (1) the equations and program logic shall be checked; or (2) an alternate calculation shall be made to prove the results of the original calculation.

i. When directed by the Engineer-in-Responsible Charge, a check shall be made by using an alternate calculation to prove the results of the original calculation.

- An alternate calculation is an original calculation prepared by the Checker. The preparation and presentation of alternate calculations is the same as required for original calculations with the additional requirement that each page is clearly marked as an alternate calculation. The objective and the design basis (design input) should be the same for both the alternate and original calculations except the methods to be used may be different.

- The original of any alternate calculation used as a check shall be initialed in the "checked by" block and dated by the Checker. The alternate calculation is then attached to the original calculation.

5.4 The Originator back-checks the Checker's marks on the check print and if in agreement, changes the original set of calculations to reflect the checker's comments.

5.4.1. To document the back-checking process, the Originator:

- Makes check marks in green next to each of the Checker's red-marked changes if in agreement and adds in green, with the concurrence of the Checker, any additional changes not picked up by the Checker.

- Crosses out in green each of the Checker's red-marked changes that both the Originator and the Checker agree should not be changed. The Back-checker should not obliterate the Checker's marks.

Note: The Back Checker and Checker should resolve differences encountered during the checking process so that the differences and/or problems are not repeated over and over again. If resolution cannot be achieved by the two individuals, the appropriate Engineer-in-Responsible Charge or higher authority should be requested to resolve the differences.

5.4.2 For calculations that are not turned in to the client at the conclusion of the contract, corrections that do not materially alter the end design do not have to be recopied on the original calculations.

5.4.3 Notes, questions, and clarifications between the Originator and the Checker are made in black pencil on the check print copy and are not entered on the original calculations.

5.5 The Checker examines the original calculation sheets to see that the agreed-to corrections have been made, marks all agreed to red and green marked changes in yellow to show the changes have been made, and signs and dates the "checked by" block on the original calculation sheets. Attachment B is a sample of a completed check print.

5.6.1 The original calculations and check prints, including all checklists and alternate calculations, are then reviewed by the Product Manager and Engineer-in- Responsible Charge for completeness, adequacy for project criteria and scope, and proper checking. The Product Manager then indexes and places the documents in the project files.

6.0 Attachments

Attachment A: Preparation and Presentation Checklist for Computation with Index Numbers

1. Are computations in a loose leaf, three-ring binder?

2. Is there a numerical index page(s) for the computation set? Does the index system show:

a. The calculation's title, its index number, the originators design by date shown on the original calculation, and the check date shown on the original calculation or a place for the check date if the calculation has not been checked? If the calculation supersedes another calculation, the superseded calculation's index number?

b. If a calculation is revised, is the revision history shown, including its revision number and date when each revision was checked or a place for the check date if the revision has not been checked?

c. If a calculation is voided, that the calculation is voided and the date when it was voided?

d. If a calculation is superseded, that the calculation is superseded, the index number of the superseding calculation, and the date when it was superseded?

e. Is the index page complete?

3. Calculations voided check for the following:

a. Are voided calculations clearly marked that they are voided?

b. Is the reason noted on the calculation and why it was voided?

c. Is the date of voiding shown on the calculation?

4. Superseded calculations check for the following:

a. Are superseded calculations clearly marked that they are superseded? b. Is the reason noted on the calculation and why it was superseded?

c. Is the date the calculation was superseded shown on the calculation?

d. Is the index number of the superseding calculation shown on the calculation?

5. Are the computations on 8-1/2 by 11-inch or 11 by 17-inch standard computation sheets?

6. Do the computation sheets bear letterhead of firm performing the calculation?

7. Are they neat and legible?

8. Does the computation title box include:
   a. Calculation title
   b. Sheet number and total sheet number
   c. Initialed and dated "Design By" box
   d. "Checked By" box for the checker to initial and date
   e. Computation index number
   f. Revision number(s)

9. Does the computation include the following four parts:

   a. Objective - The reason for the calculation and alternatives that were examined

   b. Design Basis (Design Input) - States all of the design input used to develop the calculation. Is the design input organized to the following five headings:

      (1) Criteria and Source - Are the appropriate and controlling design requirement documents referenced?

      (2) Given or Known Data - Are the sources for the data used in the calculation referenced?

      (3) Methods to be Used - Are analysis and design methods used in the calculation identified?

         - If computer programs are used in the calculation, are their names and versions given?

         - Is the analysis or design method used by the computer program stated?

      (4) References -Are the specific paragraph and section numbers shown when codes or standards are referenced?
      (5) Backup Material- is the source of all backup material and supporting data used in the calculation indicated?

   c. The Calculation

(1) Are the calculations neat, legible, logical, easy to follow, and identifiable as to purpose and function?

(2) Are all design assumptions noted?

(3) Are all formulae and symbols adequately and clearly defined?

(4) When criteria, standards, codes, methods, known or given data, backup material is used, is it clearly identified for future reference?

(5) Are sufficient sketches used to clarify the calculations?

- Drawn to scale?
- Show relevant dimensions?
- Show feasibility of prescribed spacing?
- Show adherence to required clearances?

(6) Revisions

- When revisions are made to previously checked calculations, are the revisions neat and distinct from the original calculation?
- Is the revised portion(s) of the calculation annotated with a revision triangle containing the revision number?

d. Findings and Conclusions - Are the results clearly stated?

The computations sighted above have checked affirmatively for the items in this checklist.

CONTRACTOR STATEMENT OF QUALITY CONTROL

COMPLETION OF QUALITY CONTROL

AKM Consulting Engineers has completed the Plans and Specifications for Torrance Booster Pump Station in the City of Torrance, California. Notice is hereby given that all quality control activities, appropriate to the level of risk and complexity inherent in the project, as defined in the Quality Control Plan have been completed. Compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Corps policy. Documentation of the quality control process was previously submitted under separate cover. The undersigned recommends certification of the quality control process for this product.

John Loague, P.E., Project Manager — 11/16/11 Date

CERTIFICATION OF QUALITY CONTROL

Significant concerns and the explanation of their resolution are as follows:

As noted above, all concerns resulting from the independent technical review of Torrance Booster Station, Final Plans and Specifications have been considered.

Zeki Kayiran, P.E., Principal-In-Charge — 11/16/11 Date

APPENDIX D

17140 S. Avalon Blvd., Carson CA 90746 310-217-2411 www.westbasin.org

STATEMENT OF QUALITY ASSURANCE

COMPLETION OF QUALITY ASSURANCE REVIEW

West Basin Municipal Water District (West Basin) staff reviewed and commented on the plans and specifications of the Carson Mall Lateral Recycled Water Project through the various percent submittals and development stages along the design of the project. Notice is hereby given that all quality control activities, appropriate to the level of risk and complexity inherent in the project, are in compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Corps policy. The reviews were accomplished by our West Basin's staff including Veronica Govea, Project Manager; Wyatt Won, Operations Manager; Uzi Daniel, Environmental Quality Analysis, and Marc Serna, Manager of Engineering. Hereby is West Basin's quality assurance statement. The WBMWD has completed a quality assurance review and the subject project is in compliance with the contract requirements. The undersigned recommends certification of the quality assurance process for this product.

Marc Serna, P.E.
Manager of Engineering

3/12/10
Date