



REPLY TO  
ATTENTION OF

**DEPARTMENT OF THE ARMY**  
SOUTH PACIFIC DIVISION, CORPS OF ENGINEERS  
1455 MARKET STREET  
SAN FRANCISCO, CALIFORNIA 94103-1399

06 APR 2016

CESPD-DE

MEMORANDUM FOR Commander, US Army Corps of Engineers, Los Angeles District, 915 Wilshire Blvd, Los Angeles, CA 90017 (ATTN: CESPL-PM-C, Mr. Damien Lariviere)

Subject: Santa Ana River Mainstem, CA, Lower Santa Ana River, Reach 9, Phase 5B, North Bank Protection, Review Plan (Addendum No. 02) Approval

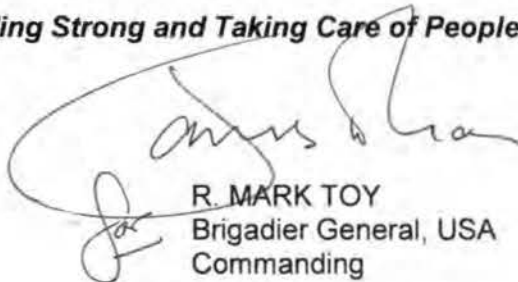
1. Santa Ana River Mainstem, CA, Lower Santa Ana River, Reach 9, Phase 5B, North Bank Protection, Orange County, California Review Plan (Addendum No. 02) that is enclosed is in accordance with Engineering Circular (EC) 1165-2-214, Review of Decision Documents, dated 15 Dec 2012. The South Pacific Division, Planning and Policy Division, Regional Business Technical Division, and Los Angeles District Support Team have reviewed the Review Plan that has been submitted. The South Pacific Division approves the subject Santa Ana River Mainstem, Lower Santa Ana River, Reach 9, Phase 5B, North Bank Protection Review Plan (Addendum No. 02).

2. With MSC approval the Review Plan will be made available for public comment via the internet and the comments received will be incorporated into future revisions of the Review Plans. The Review Plan includes Independent External Peer Review Type II Safety Assurance Review (SAR).

3. I hereby approve the Review Plan which is subject to change as study circumstances require. This is consistent with study development under the Project Management Business Process. Subsequent revisions to the Review Plan after public comment or during project execution which meet the criteria in EC1165-2-214 will require new written approval from this office.

4. Points of contact for this action are Mr. Marc Goodhue, CESPD-RBT, 415-503-6568, [marc.j.goodhue@usace.army.mil](mailto:marc.j.goodhue@usace.army.mil) and Mr. Paul Bowers, CESPD-PDC, 415-503-6556, [paul.w.bowers@usace.army.mil](mailto:paul.w.bowers@usace.army.mil).

***Building Strong and Taking Care of People!***



R. MARK TOY  
Brigadier General, USA  
Commanding

Encl



**US Army Corps  
of Engineers**  
Los Angeles District

SANTA ANA RIVER MAINSTEM  
Orange County, California

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## Review Plan (Addendum No. 02)



**Santa Ana River Mainstem**  
Lower Santa Ana River Channel  
Reach 9, Phase 5B, North Bank Protection  
Orange County, California.

04 February 2016

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REVIEW PLAN (Addendum No. 02)  
 SANTA ANA RIVER MAINSTEM, CALIFORNIA  
 Lower Santa Ana River Reach 9 –Phase 5B

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APPENDIX C – COMPLETION OF DISTRICT QUALITY CONTROL REVIEW  
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ATTACHMENT:

1. REVIEW PLAN: SANTA ANA RIVER MAINSTEM, INCLUDING SANTIAGO CREEK, CALIFORNIA, Lower Santa Ana River, (Weir Canyon Road to Prado Dam) Reach 9 - Phase 2A, 2B and Phase 3, Dated 03 June 2011 (APPROVED ON 10 JUNE 2011).
2. REVIEW PLAN: (ADDENDUM NO. 01) SANTA ANA RIVER MAINSTEM, INCLUDING SANTIAGO CREEK, CALIFORNIA, Lower Santa Ana River, (Weir Canyon Road to Prado Dam) Reach 9 – EDR, BNSF Railroad Bridge, Phases 1, 2A, 2B, 3, 4, and 5A, Dated 15 November 2013 (APPROVED ON 19 Feb 2014).

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PHASE 5B, NORTH BANK PROTECTION, ORANGE COUNTY, CALIFORNIA**

**SANTA ANA RIVER MAINSTEM,  
Lower Santa Ana River  
Channel  
Reach 9 –Phase5B  
North Bank Protection, Orange County, California**

04 February 2016

## **I. INTRODUCTION**

### **1.1 Purpose**

This Review Plan (RP) (Addendum No. 02) supplements the original RP dated 03 June 2011 and the updated RP (Addendum No. 01) dated 15 November 2013 that were approved on 10 June 2011 and 19 February 2014 respectively. Both approved RPs are attached for reference. The original RP described the levels of reviews required during the development of the engineering documents including the Design Documentation Report (DDR), the Plans & Specifications (P&S), the Operation, Maintenance, Repair, Replacement & Rehabilitation (OMRR&R) manual and the construction oversight required for the Reach 9 - Phases 2A, 2B and Phase 3 projects. The RP (Addendum No. 01) described the levels of reviews required during the development of the engineering documents and the construction oversight required for the Burlington Northern Santa Fe (BNSF) Railway Bridge protection, phase 4, and phase 5A. The levels of reviews for those projects remain valid as they are described in the respective RP's.

This RP (Addendum No. 02) provides the current information of the previous project features and updates to include a new bank protection feature and defines the levels of reviews required during the development of the engineering documents and the construction oversight for Phase 5B. The Phase 5B project was mentioned in Addendum No. 01. However, justification for the project to be within original project authority had to be confirmed and approved by the Engineering Documentation Report (EDR) as described in Addendum No. 01.

The Engineering Documentation Report was prepared by the Los Angeles District to include the additional phases in Reach 9. It was approved in July 2015. The EDR identified the phases within Reach 9 that are critical to the overall function of the Santa Ana River Mainstream (SARM) project.

### **1.2 References**

- Engineering Circular (EC) 1165-2-214, Civil Works Review Policy, 15 December 2012.
- Engineering Regulation (ER) 1110-2-1150, Engineering and Design for Civil Works Projects, 31 Aug 1999.
- ER 1110-1-12, Engineering and Design Quality Management, 21 Jul 2006.
- Engineering and Construction Bulletin No. 2013-18 - Use of Certified Engineering and Construction Community of Practice Members for Agency Technical Reviews on Civil Works projects, 24 September 2013.
- WRDA 2007 H. R. 1495 Public Law 110-114, 8 Nov 2007.

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- Army Regulation 15-1, Committee Management, 27 November 1992 (Federal Advisory Committee Act Requirements).
- National Academy of Sciences, Background Information and Confidential Conflict Of Interest Disclosure, BI/COI FORM 3, May 2003.
- Project Management Plan (PMP)

### 1.3 Review Requirements

This RP (Addendum No. 02) was developed in accordance with EC 1165-2-214, which establishes the procedures for ensuring the quality and credibility of U.S. Army Corps of Engineers (USACE). This RP (Addendum No. 02) describes the scope of review for the current and future implementation phases of the Reach 9-Phase 5B bank protection project. Each implementation phase for the subject project requires various levels of reviews include District Quality Control (DQC), Agency Technical Review (ATR), and Type II Independent External Peer Review or Safety Assurance Review (IEPR SAR). In addition, this RP (Addendum No. 02) identifies the most important skill sets needed in the reviews, the objective of the review, and the specific advice sought; thus, setting the appropriate scale and scope of review for the individual project. The USACE organization managing a particular review effort is designated as the Review Management Organization (RMO) for that effort. The DQC review will be managed within the home district, USACE Los Angeles District (LAD). The ATR and SAR will be managed outside of the home district.

## 2. PROJECT DESCRIPTION

### 2.1 Project Authority

Construction of the Prado Dam, a feature of the Santa Ana River Mainstem (SARM) Flood Risk Management Project was authorized by the Water Resources Development Act of 1986, P.L. 99-662 substantially in accordance with the plans and recommendations of the Chief of Engineers contained in his reports dated 15 January 1982 and 9 July 1987.

The full authorization language is presented in the Main Report of Design Memorandum (DM) No. 1 entitled "Phase II GDM on the Santa Ana River Mainstem, including Santiago Creek" Volume 3, dated August 1988.

### 2.2 General History

The Santa Ana River flows through Orange, Riverside and San Bernardino Counties in California. Several major flood control improvements to flood risk management features were approved as part of the District's SARM Project. Major flood control improvements, including raising Prado Dam, have been approved as part of the U.S. Army Corps of Engineers (USACE) Santa Ana River Mainstem Flood Control Project (SARP or SARM). The purpose of the SARM is to provide flood protection to areas susceptible to floods ranging from 100-year to 190-year frequencies. The SARM project area ranges over the counties of San Bernardino, Riverside, and Orange Counties and includes millions of people and numerous business and structures.



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The segment of the Santa Ana River between the mouth of the river at the Pacific Ocean and Prado Dam, approximately 30.5 miles in length, is known as the Lower Santa Ana River channel (LSAR). The LSAR is divided into ten reaches: Reach 1, Reach 2, Reach 3, Reach 4, Reach 5, Reach 6, Reach 7, Reach 8, Reach 9, and Reach 10.

Reach 9 of the LSAR begins at Yorba Linda Blvd/Weir Canyon Road and ends at the Prado dam outlet works structure and is approximately 8.1 miles, refer to Appendix A. The bank protection projects identified within Reach 9 have been divided into the following phases: Phase 1, Phase 2A, BNSF Railroad Bridge, Phase 2B, Phase 3, Phase 4, Phase 5A, and Phase 5B.

There are various features of the SARM Project that remain to be constructed within the Prado Basin and within Reach 9. Most of the features were addressed in the Phase II General Design Memorandum (GDM) and the 1988 Phase II GDM Supplemental Environmental Impact Statement (SEIS). However, since the GDM was written, some of the approved flood risk management features have been revised and others have been added based on refined evaluations of existing conditions and an updated scour study. The additional features have been determined to be within original project authority.

The various project features within the Prado Dam Basin and along LSAR are part of the SARM flood risk management system have been improved to increase the storage capacity within the Prado basin; release higher flows through the dam's outlet works; convey higher flows through the LSAR; and provide additional bank protection to withstand the erosion forces caused by flow impingement and higher velocities.

There are several projects within the Prado Dam basin, including raising the Prado Dam's crest; construction of a new outlet works; construction of interior dikes within the basin; and raising the dam's spillway. The project to raise the Prado Dam crest and build the new outlet works was completed in 2008. The projects to construct interior dikes within the basin are on-going and expected to be completed in 2016. The project to raise the spillway has not been undertaken and is anticipated to begin in 2018.

Construction of Reach 1 through Reach 8 and Reach 10 was completed prior to the implementation of EC 1165-2-214. Construction of the Reach 9 - Phase 1 project was completed prior to the implementation of EC 1165-2-214. Construction of Reach 9-Phases 2A, 2B and 3 projects was completed and addressed in the original Reach 9 RP. The BNSF Railroad Bridge is in the early stages of design and has been updated in Reach 9 RP - Addendum No. 01. Phase 4 and Phase 5A project designs have been completed and were also included in Reach 9 RP-Addendum No. 01.

In addition, a Supplemental Environmental Assessment (SEA) report was completed in May 2015 and approved in July 2015 that documented the environmental impacts and mitigation associated with the new features within Reach 9 - Phase 5B.

A Value Engineering (VE) study for the Santa Ana River basin, which includes the LSAR, was the vehicle used to evaluate alternatives and was the basis for selection of the preferred



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alternatives. The VE study team proposed specific methods of improvements for each of the various reaches of the LSAR, as described in the GDM. A full discussion of the VE study is available in the report titled Santa Ana River Basin, California, Phase I VE Study: Lower Santa Ana, Oak Street Drain, San Timoteo, Volume 1, dated February 1989.

A separate VE study was conducted for Phase 4 and Phase 5A in May 2013. The report analyzed various alternatives for each project based on the individual project's parameters and restrictions. The report evaluated a soil cement revetment for Phase 4 and sheet pile and grouted stone for Phase 5A projects.

A separate VE study was also performed on the BNSF Railroad Bridge protection in August 2013. The alternatives evaluated include streamlining of the protection walls, different wall types and lower wall heights to reduce impact to existing railroad structures and decrease project cost.

A separate VE study for Phase 5B is scheduled for Nov 2015.

## 2.3 Description of Projects in Reach 9

### 2.3.1 Phase 1

Phase 1 construction was completed in 2006. The Phase 1 bank protection project is divided into two segments. The first segment of Phase 1 is on the right bank, looking downstream (north bank), it begins approximately 0.4 miles upstream of Weir Canyon Road and extends approximately 600 feet upstream. The second segment of Phase 1 is on the left bank, looking downstream (south bank), it begins approximately 1.3 miles upstream of Weir Canyon Road and extends approximately 2,780 feet upstream. The low flow channel along segment 1 runs parallel and is adjacent to La Palma Avenue. The low flow channel along segment 2 runs parallel and is adjacent to State Route (SR)-91.

Prior to the Phase 1 project, a bluff located within segment 1 was subject to bank erosion caused by moderate flows impinging on the channel bank. An established commercial center located at the top of the bluff would have become vulnerable if the bank continued to erode. Similarly, the channel bank along segment 2 was subject to erosion caused by moderate flows impinging on the channel bank. The unimpeded and continued bank erosion could potentially impact SR-91. In addition, it was determined that the channel banks at both locations, prior to the Phase 1 project, would not withstand the future design flows from the SARM project.

The improvements of both segments were completed in 2006 prior to the implementation of EC 1165-2-214. The improvement to segment 1 included grouted stone, riprap, derrick stone and sheet pile wall. The improvement to segment 2 included grouted stone, riprap, and sheet pile with tiebacks. The review process for these two segments followed the recommendations in the superseded independent technical review.

### 2.3.2 Phase 2A

The Phase 2A bank protection project is located on the left bank, looking downstream. It is approximately 6,350 feet in length. The downstream end the project is located near the Green River Home Owners Association (GRHOA) property. The upstream end situates near the State Route (SR) 91. Phase 2A construction was completed in 2015.

Prior to the Phase 2A project, a levee was constructed by Caltrans to protect SR-91 that would be susceptible to erosion because of the future design releases due to the SARM project. The levee is located at the end of the Prado Dam outlet channel; therefore, high releases would have a direct impact on the levee. The levee had a riprap revetment but the protection was determined to be inadequate to protect against the future design releases. In addition, the higher releases would result in greater scour adjacent to the GRHOA; therefore, additional protection along the left channel bank was required to reduce the flood risk of the development.

The project was awarded in 2011 and construction was completed in March 2015. The major features in the project include approximately 2,000 linear feet of grouted stone bank protection combined with derrick stone at the toe along SR-91; approximately 3,600 linear feet of grouted stone on the slope of the GRHOA bank combined with derrick stone at the toe; approximately 1,000 linear feet of metal sheet pile with tie backs along the GRHOA; construction of new side drains and extension of existing side drains; utility relocations; and an access road.

A segment of the Phase 2A project includes bank protection on the left bank of the Santa Ana River along Green River Mobile Home Park (GRMHP) south of the BNSF Railroad Bridge. The low flow channel runs approximately 400 feet to 800 feet from the GRMHP. Approximately 1,100 feet of bank protection was constructed in 2010 northerly from Green River Road under a separate contract, including construction of the access to the maintenance road on top of the bank protection, a sheetpile cutoff wall at the downstream end of the bank protection, extension of the 60-inch side drain, fencing and concrete drainage gutter. The north end was extended another 300 feet in 2011 through a separate contract to the BNSF Railroad right-of-way. The bank protection consists of grouted stone combined with derrick stone at the toe.

The GRMHP segment was designed prior to the implementation of EC 1165-2-214. However, the project was subject to rigorous reviews as part of the former ITR process. The project had undergone IEPR during the construction phase, per the recommendation included in the previously approved RP.

### 2.3.3 BNSF Railroad Bridge

BNSF bridge protection design is in progress. The Burlington Northern & Santa Fe (BNSF) Railroad Bridge bisects the Phase 2A project limits. BNSF bridge protection design is in progress. The GRHOA is north and the GRMHP is south of the railroad. Both residential areas are on the left bank of the river. The BNSF Railroad Bridge consists of 3 separate bridges – one track per bridge. The 1938 bridge piers were designed and built by the District as a relocation

feature for original Prado Dam construction. The railroad had designed and constructed the 1938 bridge superstructure. The two other bridges and piers were designed and constructed by BNSF in 1995 immediately downstream of the 1938 bridge. The 1995 bridge piers were designed for the anticipated SARM project design flows but for lesser scour than the ultimate design scour for the current project.

Conceptual protection alternatives include utilizing reinforced concrete pier nose extension wall in the upstream direction on pile foundation, wall enclosure around the piers, reinforced concrete diaphragm wall and tiebacks at the abutments, and widening of low flow channel. Additional grouted stone revetment would be needed to tie the upstream and downstream bank protections to the BNSF Railroad Bridge left abutment to protect against design high flow and scour erosion at both abutment fill slopes.

#### 2.3.4 Phase 2B

Phase 2B construction was completed in 2014. The Phase 2B bank protection project is on the left bank, it is approximately 5,800 feet in length and is located immediately downstream of Phase 2A. The low flow channel runs parallel and is adjacent to SR-91.

Prior to the Phase 2B project, the left bank of the low flow channel ran along the toe of the SR-91 embankment and the right bank was along the edge of the Green River Golf Course. The low flow was lined with soil cement and concrete on the left and right banks, respectively. The low flow channel was damaged in 2005 by flows estimated at 10,000 cubic feet per second (cfs) released from Prado Dam. The concrete lining was destroyed and the soil cement revetment was determined be inadequate to protect the SR-91 embankment against future design releases from Prado Dam.

The Phase 2B project was awarded in 2009. The bank protection has been constructed in 2014. Restoration activities have been completed and currently being monitored for performance. The major features in the project include approximately 200 linear feet of metal sheet pile wall with tiebacks at the downstream end of the project where the wall ties into existing high ground; approximately 5,550 linear feet of grouted stone over the channel bank combined with derrick stone at the toe; approximately 400 linear feet of riprap combined with derrick stone at the toe at the upstream end where it transitions into the grouted stone protection; construction of a bridge over the low flow channel; construction of new side drains and extension of existing side drains; utility relocations; and construction of a bike path segment.

The project was designed prior to the implementation of EC 1165-2-214. However, the project was subject to rigorous reviews as part of the former ITR process. The project has undergone IEPR during the construction phase, per the recommendation included in the previously approved RP.

### 2.3.5 Phase 3

Phase 3 construction was completed in 2015. The Phase 3 bank protection project is on the left bank, it begins approximately 3.0 miles upstream of Weir Canyon Road and extends approximately 1,500 feet upstream. The low flow channel runs parallel to and is adjacent to SR-91.

Prior to the Phase 3 project, Orange County Flood Control District (OCFCD) performed a scour analysis of Reach 9 for the County's Santa Ana Regional Interceptor (SARI) line relocation design. The results of the analysis indicated that the protection along approximately 1,500 feet of the channel bank is not adequate to protect against impinging flows or deep enough to protect against the design scour condition. The District subsequently confirmed the inadequacy with a separate scour study.

The project's construction contract was awarded in September 2013. The construction was completed in March 2015. The major features of the project include approximately 1,500 linear feet of soil cement on the slope of the bank; extension of existing side drains; and construction of a bike path segment.

The project underwent DQC, ATR, and IEPR during design and construction phase, as recommended in the previously approved RP.

### 2.3.6 Phase 4

Phase 4 design was completed in August 2015. Construction is scheduled in 2016. The Phase 4 bank protection project is located on the south bank. The project is located immediately upstream of Phase 3 and extends approximately 3,150 feet in length. The low flow channel runs parallel to and is adjacent to SR-91.

The existing left bank within the proposed Phase 4 project limits is not armored. Previously, OCFCD constructed a rock groin in the river in vicinity of the proposed Phase 4 project. The purpose of the groin is to protect the existing SARI line. In addition, the groin prevents the low flow channel from meandering and thus keeps the low flow channel from potentially impinging on the channel bank. However, the groin will be removed due to environmental requirements after the SARI line is relocated. After the groin is removed, the path of the low flow channel would be unrestricted and could impinge then erode the channel bank adjacent to SR-91. The District completed the design to strengthen and protect the bank against impingement forces and accommodate the future design flows.

The project is under bidding protest and award is anticipated in late 2015. The major features in the design are anticipated to include: approximately 3,150 linear feet of bank protection; extension of existing side drains; and construction of a bike path segment. The bank protection consists of soil cement revetment.



### 2.3.7 Phase 5A

Phase 5A design was completed in August 2015. The project was awarded for construction in September 2015. Construction is scheduled to begin in 2015. The project is located on the north bank of the Santa Ana River. It begins at a point approximately 1,178 feet east of Via Lomas De Yorba West to immediately upstream of the first segment of the completed Phase 1 bank protection. The project extends approximately 4,083 feet in length. The low flow channel runs parallel to and is adjacent to La Palma Avenue.

Prior to the Phase 5A project, the OCFCD had constructed a riprap revetment over the existing channel north bank called Lomas De Yorba-Sur (LDY-S) Levee. The District determined that the riprap protection was inadequate to resist impingement forces and the future design flows. Additionally, the project area is located where the channel makes a sharp 90-degree bend, and therefore, has a higher potential for bank erosion. The District completed the design to strengthen and protect the bank against impingement forces and accommodate the future design flows.

The major features include: approximately 4,083 linear feet of bank protection consisting of 980 linear feet of grouted stone structure and 3,273 linear feet of steel sheet pile wall; extension of multiple existing side drains; modification of existing side drain culverts; replacement of a bike path and installation of cable fence within the project reach.

### 2.3.8 Phase 5B

Phase 5B design is currently in progress. The Phase 5B project, hereafter the project is located on the right bank of the Santa Ana River facing downstream, immediately upstream of Phase 5A, extending approximately 2.42 miles upstream and ends at a terminus of the existing bank. The project consists of construction of a 24-in. grouted stone revetment, reinforced concrete outlet structures, existing side drain extension, bike path and operation and maintenance roads. (See appendix A for exhibits). The project is scheduled for award in September 2016.

The project limits for the grouted stone extend from Station 1274+43 to Station 1402+10. The horizontal alignment generally follows the existing Lomas De Yorba-Sur (LDY-S) Levee alignment to minimize environmental disturbance and real estate acquisition. The vertical profile varies slightly between top of the existing bank and top of the proposed bank.

The grouted stone structure, which would be placed against the existing bank, would be 24 inches thick overlain a 9-inch bedding layer and has a 2:1 horizontal-to-vertical slope (H:V); The grouted stone structure is approximately 30 feet high with the bottom 15 feet to 20 feet buried below the river thalweg. Existing riprap that is present will be removed and salvaged to the maximum possible. The existing bank slope would require compacted benching, overbuild and cut back to ensure the final slope subgrade conditions meet specifications prior to placement of grouted stone.

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PHASE 5B, NORTH BANK PROTECTION, ORANGE COUNTY, CALIFORNIA**

Construction of a 24-in. grouted stone revetment would require 2H:1V excavation slope. The bottom of the excavation would have a minimum 15 feet wide flat area for equipment to utilize for delivery and placement of rock prior to grouting. The daylight line for the excavation into the channel side will be at 1.5H:1V where conditions allow and flatter as required where unstable sandy soils are encountered.

The existing side drain outlet structures and steel flap gates will be demolished and removed. Existing side drains will be extended to accommodate the new bank protection. See Section 14 for further discussions on side drains.

Locations for the typical bank protection cross sections are shown in Figure 6.1. The cross sections are shown in Figures 6 A through 6 G. See appendix A.

### 3. PROJECT WORK PRODUCTS

#### 3.1 Description of Work Products

The work products related to this RP (Amendment 02) include the DDR, P&S and O&M manual for the Phase 5B project.

##### 3.1.1 Design Documentation Report (DDR)

The 2011 hydraulic analysis revealed bank protection is required to be extended upstream of Phase 5A segments within Reach 9 – this new segment is identified as Phase 5B. The basis of design for Phase 5B would be documented in the DDR. The DDR contains a full record of design decisions, assumptions, and methods made during the initial phases of design. It also serves as a summary of the design used by the project delivery team PDT. The DDR is being prepared by the District.

##### 3.1.2 Plans and Specifications (P&S)

The P&S for Phase 5B will be prepared by the District and are scheduled for completion in June 2016. The major features for the Phase 5B project may include improvements consisting of 24-in grouted stone, derrick stone, or steel sheet pile wall with tiebacks; modification of existing interior drainage culverts; constructing a temporary and permanent bike path; temporary control of water; and other minor features associated with major features of work.

##### 3.1.3 Operation and Maintenance Manuals (O&M)

The Lower Santa Ana River channel O&M manual that includes portion of Phase 2B, Phase 3, Phase 4 and Phase 5A of Reach 9 located within Orange County will be amended to include Phase 5B. The District will prepare an addendum to the Operation and Maintenance manual for Phase 5B.

#### 3.2 Required Level of Review

##### 3.2.1 DQC and ATR

All implementation documents shall undergo a DQC and ATR

##### 3.2.2 IEPR SAR

As described in the original RP and RP (Addendum #1), a type II IEPR (SAR) review is also required. A risk informed decision was made based on factors outlined in EC 1165-2-214, Appendix E section 2(a)-(c). The phase 5B bank protection project is part of a system of flood risk reduction measures in reach 9 Lower Santa Ana River channel where failure of project would pose a significant threat to human life and public safety. The Design Documentation Report, Plan & Specification, and the O&M manual are all implementation documents for the flood risk reduction Reach 9, Phase 5B project. The project design replaces an existing bank

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protection which is determined to be inadequate under USACE criteria to protect adjacent residential, commercial developments and public infrastructure. The project involves protection of an existing bank from estimated scour and impinging flow from natural meandering of the river subjected to outlet releases from improved Prado Dam upstream of the project area. The existing riprap bank protection is deficient in material size and toe down depth which make it susceptible to erosion and potential damage to a major local roadway for residents and businesses, as well as damage to adjacent homes requires redundancy, resiliency, and robustness. In addition, the project requires coordinated construction sequencing to accommodate flood releases from upstream Prado Dam and construction tie-in to a separate construction contract for downstream bank protection at phase 5A. The existing riprap bank will be removed and replaced with a new protection as construction continues through multiple flood seasons. Restrictions on the construction windows due to environmental mitigations must be coordinated through the construction period.

### 3.2.3 Design Documentation Report

The DDR for Phase 5B will undergo DQC and ATR. In addition, the DDR will require Type II IEPR SAR because it is an implementation document and the project purpose is flood risk management where potential hazards would pose a significant threat to human life and public safety.

### 3.2.4 Plans and Specifications

The P&S for Phase 5B will undergo DQC and ATR. In addition, the P&S will require Type II IEPR SAR because they are implementation documents and the projects' purpose is flood risk management where potential hazards would pose a significant threat to human life and public safety. The Type II IEPR SAR will continue through the end of construction.

### 3.2.5 Operation and Maintenance Manual

O&M manual will undergo DQC and ATR. Additionally, Type II IEPR SAR is required for the O&M manual because the projects' purpose is flood risk management and failure to adequately maintain critical features in the projects would potentially pose a significant threat to human life and public safety. The O&M manuals are implementation documents and will therefore undergo a Type II IEPR SAR.

## 3.3 Reference Materials

Electronic versions of all pertinent documents, including, DDRs, P&S, O&M manuals, and all other relevant information available shall be distributed in Adobe Acrobat PDF format to the DQC, ATR and IEPR members at the appropriate time.

## 4. SCOPE OF REVIEW

### 4.1 District Quality Control/Quality Assurance (DQC/QA)



The DQC/QA activities for the DDR, P&S, and O&M manual will consist of Quality Checks and Reviews; supervisory reviews; PDT reviews including input from the local sponsor, if applicable; and biddability, constructability, operability, environmental and sustainability (BCOES) reviews, as required by the District Quality Control Manual.

All computations, drawings or sketches shall undergo a rigorous independent check as part of the standard Quality Control (QC) process. Quality checks may be performed by staff responsible for the work, such as supervisors, work leaders, team leaders, designated individuals from the senior staff, or other qualified personnel. However, they should not be performed by the same people who performed the original work, including managing/reviewing the work in the case of contracted efforts. Quality Checks include a review of the alternatives considered, schedules, budgets, means and methods of construction, and have lessons learned been considered. DQC is assuring the math and assumptions are correct by having a checker initial each sheet of the computations. Checking is accompanied by a red check mark or similar annotation next to the item that has been checked. For drawings the checker shall place a red check mark or similar annotation on each dimension/elevation, note or reference showing concurrence with the correctness of the information show. Additionally, the PDT is responsible to ensure consistency and effective coordination across all project disciplines during project design and construction management.

#### 4.2 Agency Technical Review (ATR)

The ATR team will review the DDR, P&S, and O&M manual. General review guidelines for the ATR team are described below, followed by the points of emphasis for each document.

##### 4.2.1 General Review Guidelines

The objective of ATR is to ensure consistency with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct, went through robust DQC, and comply with published USACE guidance, and that the document explains the analyses and results in a reasonable clear manner for the public and decision makers.

ATR is undertaken to “ensure the quality and credibility of the government’s scientific information” in accordance with ER 1110-1-12. In order to ensure incorporation of USACE national experience for Flood Risk Management Projects (as updated per post-Katrina investigation), and in addition to the DQC, an ATR will also be performed. Moreover, all provisions and checklists for SAR contained in EC 1165-2-214 will be incorporated into the charge to the ATR team.

##### 4.2.1.1 ATR Team Responsibilities.

Reviewers shall review project authorization material, design documents and National Environmental Policy Act (NEPA) documents to confirm that work was done in accordance with established professional principles, practices, codes, and criteria and for compliance with laws

and policy. Comments on the design documents shall be submitted into Document Review and Checking System (DrChecks).

Reviewers shall pay particular attention to one's discipline, but may also comment on other aspects, as appropriate. Reviewers who do not have any significant comments pertaining to their assigned discipline shall provide a comment stating this.

Grammatical and editorial comments shall not be submitted into DrChecks. Comments shall be submitted to the ATR manager via electronic mail using the "Tracked Changes" feature in the Microsoft Word document or as a hard copy mark-up. The ATR manager shall provide these comments to the Study Manager.

The appropriate structure of the review comments is described in the charge.

#### 4.2.1.2 PDT Responsibilities

PDT should obtain ATR agreement on key data such as hydraulics and geotechnical parameters early in design process. The goal is to have early involvement of ATR team, especially when key decisions are made. The ATR Lead should be invited virtually to all PDT meetings, in order to understand the design efforts and to know when to engage other ATR members for concurrence on key decisions. Value added Lessons Learned from the ATR team should be shared early on to have the best chance of being adopted by the PDT. Most of the ATR effort should be accomplished midway through the design effort; after completion of design the ATR effort will check that the effort agreed to at midpoint was accomplished. This is consistent with the requirement that the ATR members shall not be involved in the day-to-day production of the project/product.

The PDT team shall evaluate/address the review comments provided by the ATR team in DrChecks and provide responses to each comment utilizing "Concur," "Non-Concur," or "For Information Only." Concur responses shall state type of action to be taken and incorporate revised text, drawings, sketches in the report as applicable. Non-Concur responses shall state the basis for disagreement or clarification of the concern and suggest actions to negotiate the closure of the comment.

#### 4.2.2 Emphasis of Review for Work Products

##### 4.2.2.1 Design Documentation Report

When reviewing the DDR, the ATR team shall verify that there are sufficiently detailed for each technical specialty. In this way, the criteria that were used, the critical assumptions which were made, and the analytical methods that were used will be evident in the proposed review and for historical documentation. In addition, the team shall verify that the documents contain summaries of important calculation results and selected example calculations for all critical elements of the design.

##### 4.2.2.2 Plans and Specifications

When reviewing the P&S, the ATR team shall verify that the P&S are prepared in accordance with ER 1110-2-1200 and the Architect/Engineering/Construction CADD Standards along with Tri-Service Spatial Data Standards. The team will verify that the P&S contain all necessary information required to bid and construct the plan detailed in the engineering appendix and documented in the DDR. In addition, the team shall review the BCOES aspects of the design.

#### 4.2.2.3 O&M Manual

When reviewing the O&M manual, the ATR team will verify that the requirements included in the O&M for the maintenance of the features within each phase will adequately maintain the conditions assumed during the design and validated during construction. The team will also verify that the proposed project monitoring methods will adequately reveal any deviations from the assumptions made for performance. Finally, the team will verify that adequate guidance is included to acquire the permits required to undertake repair work in accordance with ER 1110-2-401.

#### 4.3 Type II, Independent External Peer Review (Safety Assurance Review or SAR)

The DDR, P&S, and the O&M manual shall undergo a Type II IEPR SAR during the design and construction phases. There would be value added to the overall Reach 9 to have a SAR conducted for Phase 5B in maintaining consistency with the rest of Reach 9 design, verifying H&H analysis that determined there is no need to protect the Gypsum Canyon Road Bridge piers and south abutment, making recommendations regarding the levee section at the upstream end and making recommendations regarding the need for extension of bank protection upstream along the BNSF railroad. Furthermore, in order to omit the SAR, a risk informed decision would be required based on the checklist from EC 214. General review guidelines for the Type II IEPR SAR team are described below followed by the points of emphasis for each phase of work.

##### 4.3.1 Charges

The RMO will develop the charges for the review, per EC 1165-2-214. The charges will contain the instructions regarding the objective of the peer review and the specific advice sought. Reviewers shall be charged with reviewing scientific and technical matters, leaving policy determination for the USACE and the Army. The charge will specify the structure of the review comments to fully communicate the reviewer's intent by including: the comments, why it is important, any potential consequences if issue is not addressed, and suggestions on how to address the comment. It will include specific technical questions while also directing reviewers to offer a broad evaluation of the overall document. The charge will be determined in advance of the selection of the reviewers.

##### 4.3.2 General Review Guidelines

Panel members will address all underlying planning, safety assurance, engineering, economic, and environmental analyses, not just one aspect of the project.

#### 4.3.2.1 Design Phase

During the design phase, panel members shall evaluate and review the design submittals and provide their comments in DrChecks. The design submittals will be at various stages of completion, as defined in the Section 7 of this RP (Addendum No. 02). Panel members will address key features and components to validate the state of the art approach being used to design and construct the system.

#### 4.3.2.2 Construction Phase

During the construction phase, site visits shall be scheduled for the project where the panel shall evaluate and review on-going construction activities. The appropriate peer reviewers will monitor the progress of construction and review critical construction operations during each visit. The visit should coincide with about the mid-point of construction operations. Each visit will terminate with an exit briefing, which will be scheduled by the Project Manager and will be conducted at the Prado Dam Field Office. Each reviewer shall document each site visit with a Field Visit report. The Field Visit reports will include a check list; photographs of features observed; a summary of the observations made for each feature; and other relevant information. The Field Visit Reports shall be included in the Construction Final Report as an appendix.

#### 4.3.3 Emphasis of Review for Work Products

##### 4.3.3.1 Design Phase

During the design phase, the key features and components to be evaluated and reviewed are the soil material characteristics, scour analysis, and the structural design of the RCP culverts, where applicable. When reviewing the the DDR and P&S, the IEPR panel will verify that the assumptions made in the engineering documents are sound.

##### 4.3.3.2 Construction Phase

During the construction phase, the panel shall verify assumptions made during the design are still valid through construction. Depending on type of protection that is selected, the panel shall verify the stone is properly placed and grouted, constructed, cured; the side drains are properly extended, constructed and tested; the panel shall verify that the RCP culverts are properly installed and checked; and utilities are properly protected.

##### 4.3.3.3 Post Construction

When reviewing the O&M manual, the panel will verify that the requirements specified in the O&M manual will maintain the conditions anticipated for the project to function properly.

## 5. PROJECT DELIVERY TEAM AND REVIEW TEAMS



### 5.1 Project Delivery Team

See Appendix B for PDT

### 5.2 Review Teams

#### 5.2.1 District Quality Control/Assurance

See Appendix B for DQC roster

#### 5.2.2 Agency Technical Review

ATR teams were established for the Reach 9 – Phase 2A, Phase 3, BNSF Railroad Bridge, Phase 4, and Phase 5A projects, per ER 1110-1-12 and EC 1165-2-214. The District proposes to have an ATR team for the Phase 5B project. The ATR will be managed by the RMC (Risk Management Center). The ATR will be conducted by individuals and organizations that are separate and independent from those that accomplished the work, in accordance with policy. The RMC will be responsible to select the ATR lead and identifying the other ATR team members. All potential ATR members are in conformance with the requirements for Corps of Engineers Reviewers Certification Access Program (CERCAP) and are regional technical specialists; appointed subject matter experts (SME) from other districts; senior level experts from other districts; Center of Expertise staff; appointed SME or senior level experts from the responsible district; experts from other Corps commands; or a combination of the above. The ATR lead is an USACE employee outside the South Pacific Division. Appendix B will be updated to include the names of the reviewers after the selection process is completed.

#### 5.2.3 Type II IEPR Panel

An RMC contract was utilized to acquire the services of Schnabel Engineering, a qualified outside eligible organization (OEO), to manage the IEPR for the Phase 2A, Phase 2B, Phase 3, Phase 4, Phase 5A, and BNSF Railroad Bridge projects. In order to maximize project continuity, the District proposes to use the same IEPR team for the Phase 5B project. The disciplines required for the Type II IEPR SAR and the expertise required within each disciplines is identified in Appendix B.

## 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://www.spl.usace.army.mil/Missions/CivilWorks/ReviewPlans.aspx>.

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. REVIEW SCHEDULE

### 7.1 General

Based on SPL's commitment to execute the schedule for the completion of the DDRs, P&S and construction for the Phase 5B bank protection project, the milestones for the DQC, ATR, and IEPR, SAR processes have been established and are documented below.

### 7.2 Funding

#### 7.2.1 District Quality Control

It is anticipated that the total cost for all the DQC efforts described in the updated RP (Addendum No. 02) and in the original RP will be approximately \$300,000. DQC efforts will be funded with project labor codes.

#### 7.2.2 Agency Technical Review

It is anticipated that the total cost for all the ATR efforts described in the updated RP (Addendum No. 02) and in the original RP will be approximately \$500,000. The District will provide labor funding by cross charge labor codes. If travel is required, then funding will be provided by way of a government order. The Project Manager will work with the ATR lead to ensure that adequate funding is available and is commensurate with the level of review needed. Any funding shortages will be negotiated on a case by case basis and in advance of a negative charge occurring.

The ATR lead shall provide organization codes for each team member and a responsible financial point of contact (CEFMS responsible employee) for creation of labor codes. Reviewers shall monitor individual labor code balances and alert the ATR lead, in advance, of any possible funding shortages.

#### 7.2.3 Type II IEPR

It is anticipated that the total cost for all the IEPRs efforts described in the updated RP (Addendum No. 02) and in the original RP will be approximately \$570,000. The cost for Type II IEPR, will be shared in accordance with the project purpose(s). RMC will transfer SAR contract capacity to the MSC (Major Subordinate Command) /District for completion of the SAR.

### 7.3 Schedules

Phase 5B DDR Milestones:	
Review Plan Approval by SPD	
Submit Draft DDR for DQC	09 Dec 2015
Submit Final Draft DDR for DQC	02 May 2016

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Submit Final Draft DDR for ATR and SAR	15 Jun 2016
ATR Certification	22 July 2016
SAR Report Approval by SPD	22 July 2016
DDR Approval	22 July 2016

**Phase 5B Plans and Specifications Milestones:**

60% P/S DQC	30 Nov 2015
Submit Final Draft (100%) of P&S for DQC	02 May 2016
Submit Final Draft (100%) of P&S for ATR and SAR	15 Jun 2016
ATR Certification	22 Jul 2016
SAR Report Approval by SPD	22 Jul 2016
BCOES Review Certification	15 Jul 2016
P&S Approval	22 July 2016

**Phase 5B Construction Contract Milestones:**

Pre-Advertise Notice Published (10 days before RTA)	08 Jul 2016
Contract Ready to Advertise	22 Jul 2016
Construction Contract Advertisement	22 Jul 2016
Bid Opening	23 Aug 2016
Construction Contract Award	09 Sep 2016

**8. DOCUMENTATION OF REVIEWS**

**8.1 District Quality Control/Assurance**

The engineering documents will be distributed to the appropriate reviewers, including peer reviewers, supervisors, sponsors and may include other stakeholders. All comments will be documented in DrChecks.

**8.1.2 District Quality Control Certification**

To fully document the DQC process, a statement of technical review will be prepared for each product reviewed. The DQC documentation will include the text of each DQC comment, the PDT response, a brief summary of the pertinent points in the ensuing discussion, including any vertical coordination, and the agreed upon resolution. Certification by the DQC lead and the Technical Project Leader will occur 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 certification statement (See Appendix C for sample of DQC certification).

**8.2 ATR**

**8.2.1 ATR Communication and Documentation**



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The ATR team will use DrChecks to document the review process. The Technical Project Leader will facilitate the creation of a project portfolio in the system to allow access by all PDT and ATR team members. An electronic version of the documents, appendices, and any significant and relevant public comments will be sent to the ATR lead via a secured file transfer program (ftp) site at least one business day prior to the start of the review period. The ATR lead will then distribute the documents to all reviewers via a secure ftp site.

The PDT will help to orient the ATR team by hosting virtual kick-off meeting, if travel is not viable, during the first week of the review period. The PDT will prepare a presentation on the project. The presentation will include photos of the site, identify special features and provide overall information on the project.

The Technical Project Leader shall inform the ATR lead when all responses have been entered into DrChecks and conduct a briefing to summarize comment responses to highlight any areas of disagreement.

A revised electronic version of the documents with the comments incorporated shall be sent to the ATR lead via a secured ftp site. The ATR lead will forward the documents, via a secure ftp site, to the other reviewers for use during the back check period.

PDT members shall contact ATR team members, as appropriate, to seek clarification of a comment's intent or provide clarification of information in the report. Discussions shall occur outside of DrChecks but a summary of discussions shall be provided in the system.

Reviewers will be encouraged to contact PDT members directly via face-to-face meetings, email, or phone to clarify any confusion and expedite resolution of comments. DrChecks shall not be used to post questions needed for clarification.

#### 8.2.2 ATR Resolution

Reviewers shall back check PDT responses then either close the comment or attempt to resolve any disagreements. Conference calls shall be used to resolve any conflicting comments and responses.

Reviewers and PDT members may "agree to disagree" on certain comments. The comment may be closed with a detailed explanation. If reviewer and responder cannot resolve a comment, it shall be brought to the attention of the ATR lead. If the ATR lead is unable to resolve the issue, the ATR lead will implement the guidelines as described below in the paragraph on Dispute Resolution.

The ATR team will identify significant issues that they believe are not satisfactorily resolved and will note these concerns in the Agency Technical Review Certification documentation. The ATR team will prepare a Review Report which includes a summary of each unresolved issue. Review Reports will be considered an integral part of the ATR documentation. Annotated ATR comments will be provided to the RMC then the RMC will notify the District of closure of each phase of ATR or identify issues remaining for resolution.



Significant unresolved ATR concerns that are documented by the RMC will be forwarded through the MSC to the HQ USACE RIT (Regional Integration Team), including basic research of Corps guidance and an expression of the desired outcome, for further resolution in accordance with the policy issue resolution process described in ER 1110-2-12 or Appendix H, ER 1105-2-100, as appropriate. HQ USACE may choose to defer the issue to the policy compliance review process or address it directly. At this point the ATR documentation for the concern may be closed with a notation that the concern has been elevated for resolution by HQ USACE. Subsequent submittals of reports for MSC and/or HQ USACE review and approval shall include documentation of the issue resolution process.

### 8.2.3 ATR Certification

To fully document the ATR process, a statement of technical review will be prepared for each product reviewed. The ATR documentation will include the text of each ATR comment, the PDT response, a brief summary of the pertinent points in the ensuing discussion, including any vertical coordination, and the agreed upon resolution. Certification by the ATR lead and the Technical Project Leader will occur 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 certification statement (Appendix D).

## 8.3 IEPR

### 8.3.1 IEPR Communication and Documentation.

The IEPR will be documented in DrChecks. The Technical Project Leader will facilitate the creation of a project portfolio in the system to allow access to the PDT and OEO.

An electronic version of the engineering documents, appendices, and any significant and relevant public comments will be sent to the OEO via a secured ftp site at least one business day prior to the start of the comment period. The OEO will then distribute the documents to all reviewers via a secure ftp site. The IEPR team will review the appropriate engineering submittals then document any comments. The OEO will compile the comments, upload the comments onto DrChecks, and then notify the District when all of the comments have been uploaded.

The PDT will address the comments or consult outside sources, as necessary, to develop a proposed response to each comment. The PDT may or may not concur with a reviewer's comment. The PDT will upload the proposed responses onto DrChecks, and then the Technical Project Leader will notify the OEO when all responses have been uploaded. A revised electronic version of the documents with comments incorporated shall be sent to the OEO via a secured ftp site.

The OEO will distribute the proposed responses and revised documents to the reviewers for their use during the back check period. The Technical Project Leader and OEO may schedule a briefing to summarize responses and highlight any areas of disagreement. The reviewers will prepare final replies to the proposed responses. The OEO will upload the reviewers' replies onto DrChecks. The reviewers' final replies may or may not concur with the USACE's proposed

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responses. The reviewers' final replies will indicate concurrence or briefly explain what issues are blocking concurrence. There will be no final closeout iteration.

The District will consult the vertical team and outside resources to prepare an agency response to each outstanding comment. The reviewers' initial comments, the District's proposed responses, the reviewers' final replies, and the final agency response will all be tracked and archived in DrChecks for the administrative record. However, only the initial reviewers' comments and the final agency responses will be posted. This process will continue to be refined as experience shows need for changes.

PDT members cannot contact the IEPR panel members directly. All communication shall occur through the OEO. The PDT may seek clarification of a comment's intent or provide clarification of information in the report. Discussions shall occur outside of DrChecks but a summary of discussions may be provided in the system.

The IEPR panel shall produce final Review Reports, including documentation of the peer review of the Project Design and field visit reports on construction activities.

The SAR comments and recommendation letter must be provided to RMC as soon as they become available.

#### 8.3.2 IEPR Resolution

The OEO shall review the products, comments, PDT responses and final back check replies then identify any outstanding disagreements between members of the PDT and the review panel. Resolution meetings must be set when resolution is not readily achievable. The RMC must attend the SAR comment resolution meetings with the panel and the meeting must be set with consideration of the RMC's schedule and with enough advanced notice to facilitate attendance. When resolutions are not readily achievable, the RMC should engage the PCX (Planning Center of Expertise) or MSC SMEs to help facilitate resolution, and they in turn may choose to engage HQ USACE SMEs. HQ USACE may choose to defer the issue to the policy compliance review process or address it directly. If a specific concern still remains unresolved, the USACE is to pursue resolution through the policy issue resolution processes described in Appendix H, ER 1105-2-100, ER 1110-1-12, or other applicable guidance.

#### 8.3.3 IEPR Certification

The panel's comments, the PDT's responses, and the panel's final replies shall be provided to the RMC. RMC must concur with closure of the SAR.

#### 8.4 Policy and Legal Revisions

The Santa Ana River Mainstem flood risk management project (SARM) is a continuing project originally authorized by WRDA 1986, P.L.99-662. The additional phases of flood protection in Reach 9 of the Lower Santa Ana River channel was documented by the Reach 9 Engineering

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Documentation Report to be justified. The determination was made in coordination with District Legal and Policy reviews.

## 9. POINTS OF CONTACT

Questions about this Review Plan may be directed to the Los Angeles District Project Delivery Team, Design Lead Supervisor, Mr. Robert Kwan, P.E. at (213) 452-3639; Project Manager for the Phase 5B project, Mr. Damien Lariviere at (213) 452-4015; or the Chief of Engineering Division is Mr. Richard J. Leifield, P.E. at (213) 452-3629. Inquiries to the MSC will be directed to Paul Bowers at (415) 503-6556. The RMO point-of-contact is Nathan Snorteland at RMC (303) 963-4573.

## 10. REVIEW PLAN APPROVAL

The RMO (Review Management Organization) for ATR and Type II IEPR (SAR) of all work products for the Phase 5B project is the RMC, in close coordination with the SPD MSC and FMR-PCX.

The Los Angeles District will continue to comply with the review requirements as identified on the Review Plan for the Santa Ana River Mainstem, Including Santiago Creek, California, dated 03 June 2011 (approved on 10 June 2011) and Addendum No. 1 (approved on 19 February 2014).

In addition, the Los Angeles District will fully comply with all existing guidance, and conduct DQC, ATR, and Type II IEPR SAR in accordance with EC 1165-2-214 for the Phase 5B project feature.

The approval of the updated RP (Addendum No. 02) for the Santa Ana River Mainstem, Including Santiago Creek, California, as outlined above, will help facilitate the District's completion of the Phase 5B project on schedule. In order to ensure the updated RP (Addendum No. 02) is in compliance with the principles of EC 1165-2-214, the updated RP (Addendum No. 02) must be approved by the applicable MSC, in this case the Commander, South Pacific Division (SPD). Once the updated RP (Addendum No. 02) is approved, the District will post it on the district's public website and notify SPD. If necessary, any changes to the updated RP (Addendum No. 02) will be approved by following the process used for initially approving the plan.

The Los Angeles District requests that the South Pacific Division endorse the above recommendations and approve the updated RP (Addendum No. 02) prepared in accordance with Appendix B of EC 1165-2-214.

## APPENDICES

APPENDIX A - REACH 9 - PROJECT LOCATION MAP AND EXHIBITS

APPENDIX B - PDT, DQC, QA ,ATR AND SAR ROSTERS. ATR AND IEPR REVIEWER QUALIFICATIONS

APPENDIX C - COMPLETION OF DISTRICT QUALITY CONTROL REVIEW CERTIFICATIONS

APPENDIX D – COMPLETION OF AGENCY TECHNICAL REVIEW CERTIFICATIONS



# APPENDIX A

REACH 9 - PROJECT LOCATION MAP AND OTHER EXHIBITS



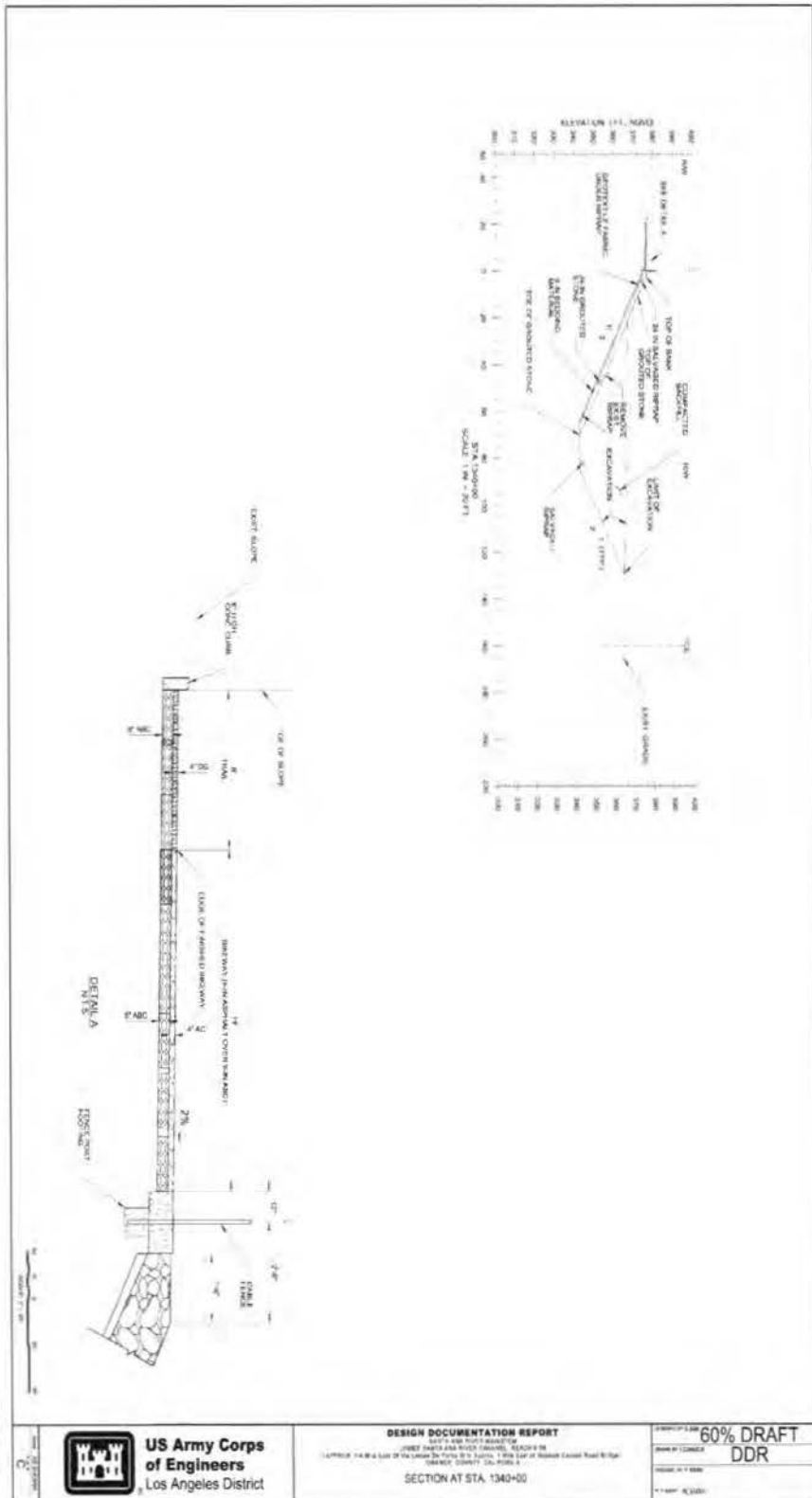
Figure 6.1 Reach 9 Phase 5B Cross Sections Index Map







Figure 6 C Reach 9 Phase 5B Cross Section at Station 1340+00





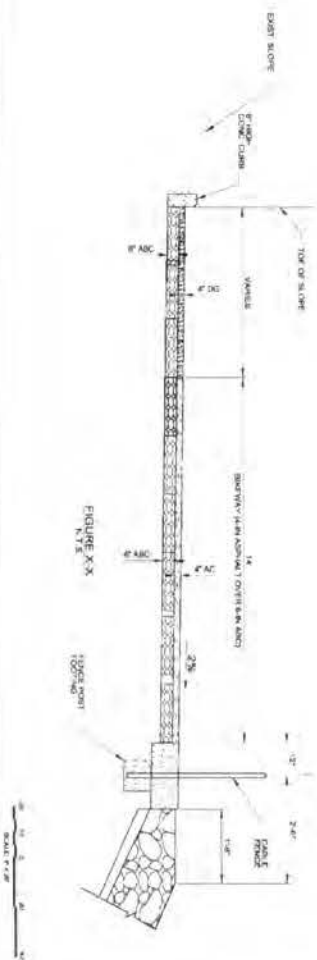
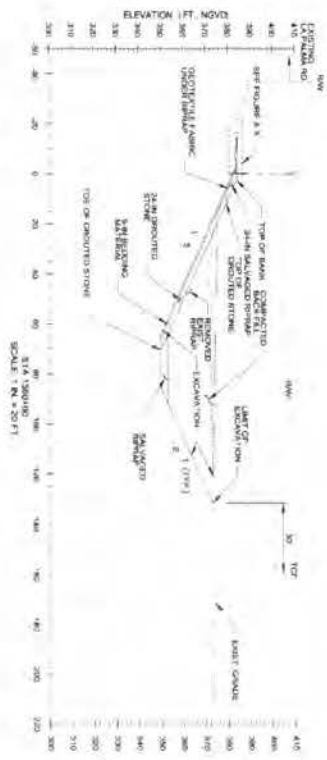


FIGURE X-X  
N.T.S.

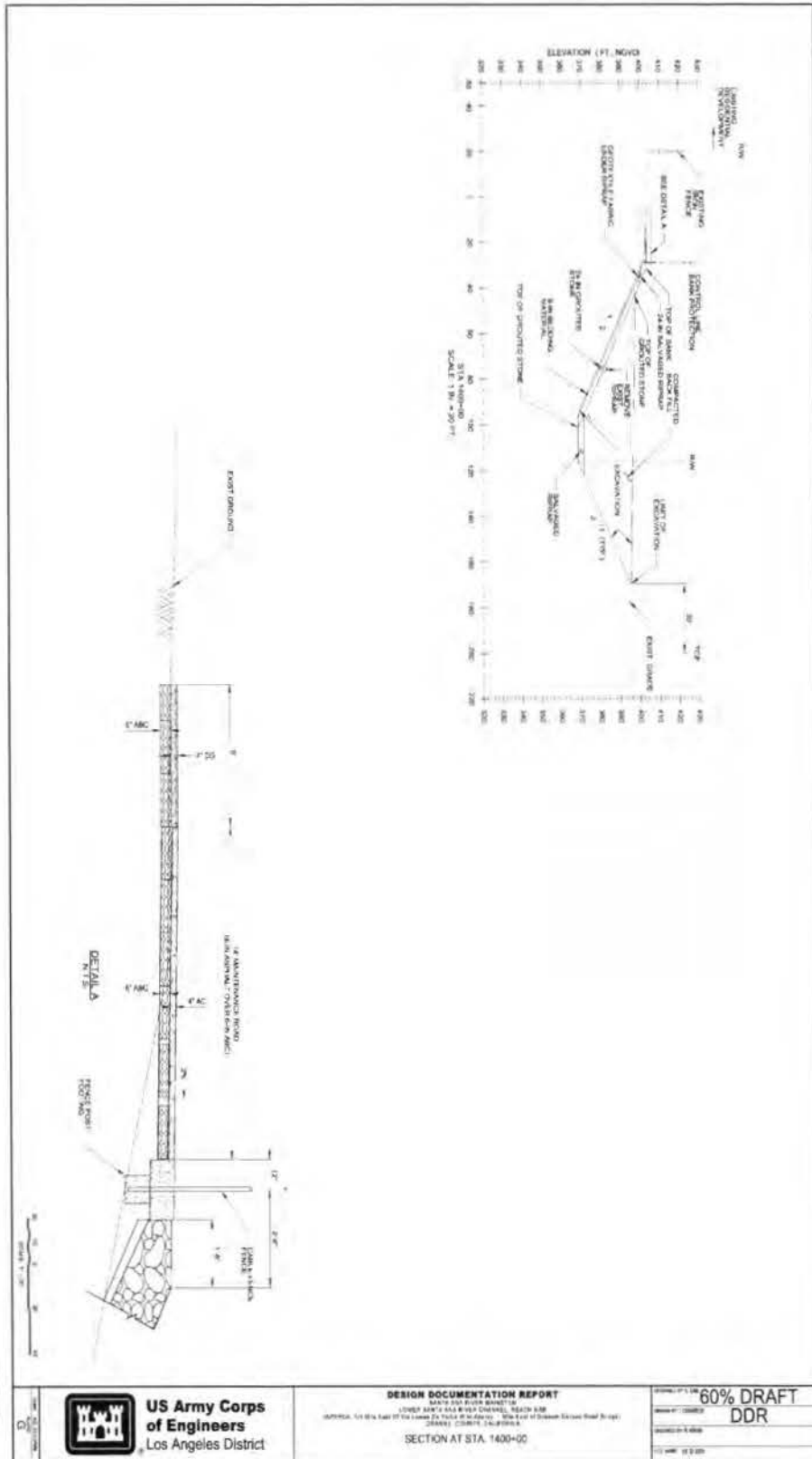
Figure 6 E Reach 9 Phase 5B Cross Section at Station 1360+00

 <b>US Army Corps of Engineers</b> Los Angeles District	<b>DESIGN DOCUMENTATION REPORT</b> SAN JOAQUIN RIVER WASHLETTS LOWER REACH AND RIVER CHANNEL REACH 8-38 <small>DESIGNED BY: [Name]</small> <small>CHECKED BY: [Name]</small> <small>DATE: [Date]</small> SECTION AT STA. 1360+00	<b>60% DRAFT</b> <b>DDR</b> <small>DESIGNED BY: [Name]</small> <small>CHECKED BY: [Name]</small> <small>DATE: [Date]</small>
	<small>APPROVED BY: [Name]</small> <small>DATE: [Date]</small>	





Figure 6-G Reach 9 Phase 5B Cross Section at Station 1400+00



**US Army Corps of Engineers**  
Los Angeles District

**DESIGN DOCUMENTATION REPORT**  
SECTION AT STA. 1400+00

**60% DRAFT**  
**DDR**

# APPENDIX B

PDT, DQC, QA, ATR AND SAR ROSTERS

SPD POINT OF CONTACT AND

QUALIFICATIONS FOR THE IEPR TYPE II/SAR AND ATR TEAMS



ATR ROSTER

The ATR is composed of USACE-Omaha District employees who are located outside the LAD. A list of the members currently on the ATR is provided below

Agency Technical Review (ATR)			
Discipline	Name	Agency/Office	Phone Number
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

IEPR Type II/SAR ROSTER

The IEPR/SAR is composed of experts specializing in civil, geotechnical, geology, hydraulic, hydrology and structural designs who work for the A-E under contract with the LAD. A representative of experts currently on the SAR team is provided below

Outside Eligible Organization (OEO),			
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

SPD- POINTS OF CONTRACT		
Office Name	Name	Phone Number
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]



## QUALIFICATIONS OF ATR AND IEPR –TYPE II (SAR) REVIEW TEAMS

ATR members for must have the minimum expertise listed below for the appropriate discipline:

**ATR Team Leader.** The ATR Team Leader should have 10 or more years of experience with Civil Works Projects and have performed ATR Team Leader duties on complex civil works projects.

**Civil Engineering.** The team member shall have 10 or more years of experience in design of flood control structures including levees, guide dikes and channels utilizing sandy soils (soft soils). Experience utilizing grouted stone, riprap, derrick stone, and concrete in design of levees, guide dikes and channels for large civil works projects is required. Demonstrated knowledge regarding site layout, surveying, 3-dimensional modeling, construction techniques, hydraulic structures, erosion control, and interior drainage is required.

**Hydrology and Hydraulics.** Team member should be a registered professional with 10 or more years of experience in conducting and evaluating hydrologic and hydraulic analyses for flood risk management projects. Experience with all aspects of hydraulic engineering including: knowledge of analyses techniques of sediment and regime flows, forecasting of scour based on channel slope, sediment loads, sediment budget, geology, and basin/historic hydrology; hydraulic analyses and designs for outlet structures, diversion structures; and designing of the appropriate protection/launching apron dimensions and other river engineering structures; water velocities, pressures, directions, trajectories, and erosion potential; and hydraulic modeling is desired. Experience with the Dam or Levee Safety program is also desired. Active participation in related professional societies is encouraged. (Review work products, as necessary.)

**Geotechnical Engineering.** Team member shall have 20 or more years of experience in geotechnical engineering and shall be a recognized expert in the analysis, design and construction of embankment dams and levees on alluvial foundations with extensive experience in subsurface investigations, liquefaction analyses, earthquake induced embankment deformations, seepage and slope stability analysis, design and construction, and preparing plans and specifications for embankment dams and levees. The Geotechnical Engineer shall be a licensed professional engineer. Experience with the Dam or Levee Safety program is also desired. Active participation in related professional societies is encouraged. (Review work products, as necessary)

**Structural Engineering.** The team member shall have 10 or more years of experience in structural engineering. The Structural Engineer shall have extensive experience in design and evaluations of large complex hydraulic structures associated with flood risk management projects such as side drains constructed through levees. Experience with AASHTO and state road and bridge standards as well as practical knowledge of construction methods and techniques as it relates to structural portions of projects is encouraged. (Review work products, as necessary)

Cost Engineering. The team member should have 10 or more years demonstrated in the preparation of cost estimates, cost risk analyses and cost engineering. Experience is needed for complex Civil Works projects to include levee and floodwalls systems. Reviewer should be certified as a Cost Engineer by the Walla Walla DX which requires an 8 hour training and signed certificate. (Review work products, as necessary)

Geology. The team member shall have 10 or more years of experience in flood control projects assuring that the geologic factors affecting the location, design, construction, operation, maintenance of dams and levees, including the necessary investigations and testing are within the Corps current standards and criteria.

Construction Engineering/Operations. The team member should have 10 or more years of experience of construction management in complex large scale public works projects, including coordinating efforts in horizontal construction, specializing in earthwork, concrete work, floodwalls, roads and highways, relocations, paving and drainage.

Environmental. The team member should have 10 or more years of experience in NEPA compliance activities and preparation of Environmental Assessments and Environmental Impact Statements for complex civil/site work projects. Experience is needed for levee system projects. (Review work products, as necessary)

Real Estate. Team member will be experienced in federal civil works real estate laws, policies, and guidance. (Review work products, as necessary)

#### TYPE II, INDEPENDENT EXTERNAL PEER REVIEW

The Type II IEPR panel will include the following disciplines: Civil, Hydrology and Hydraulics, Geotechnical, Structural and Environmental. To ensure that an appropriate level of review expertise is obtained, the following models are anticipated to be used in the design of the project. Civil 3-dimensional modeling will include: InRoads. H&H analyses will include the following models: CHANLPRO, HEC RAS, HEC 6T and HEC FDA. Geotechnical and structural analyses will include the following models: Seep/W, Slope/W, CLiq, CWALSSI, PILE BUCK, CUFRBC, CORTCUL and MATHCAD. In addition, Type II, IEPR panel members must have the minimum expertise listed below for the appropriate discipline:

Civil Engineering Panel Member. The Civil Engineer panel member should be a registered professional from academia, a public agency, or an Architect-Engineer or consulting firm with 10 or more years of experience in design of flood control structures including levees, guide dikes and channels utilizing sandy soils (soft soils). Experience utilizing soil cement, riprap, grouted stone, and derrick stone in design of bank protection and channels for large civil works projects is required. Demonstrated knowledge regarding site layout, surveying, 3-dimensional modeling, construction techniques, grading, hydraulic structures, erosion control, interior drainage, road design and retaining walls is required.

Hydrology and Hydraulics (H&H) Panel Member. The H&H panel member should be a registered professional from academia, a public agency, or an Architect-Engineer or consulting firm with 15 or more years of experience in conducting and evaluating hydrologic and hydraulic analyses for flood risk management projects. The panel member should be experienced in Flood Damage Reduction Projects, including large earth-fill, rock-fill, concrete or combination dams or systems of dams with their many hydraulic appurtenances such as gated and un-gated spillways, stilling basins, outlet works, control gates and valves, power intake structures, tunnels, conduits and approach and diversion channels and appurtenant control structures; and/or Local

Flood Damage Reduction Projects including levees; floodwalls; gravity outlet and gate closure structures; pumping stations; detention basins; storm drainage structures; lined and unlined flood control channels and improvement structures. Active participation in related professional societies is encouraged. (Review work products, as necessary)

Geotechnical Engineering Panel Member. Geotechnical Engineer panel member should be a registered professional geotechnical engineer from academia, a public agency, an Architect-Engineer or consulting firm with 20 years or more experience in geotechnical and earthquake engineering for critical flood risk management infrastructure and levee safety evaluations. It is preferred that panel member possess a PhD degree in geotechnical engineering, although an MS degree is acceptable. Panel member will be a recognized expert in the analysis, design and construction of embankment dams and levees on alluvial foundations with extensive experience in subsurface investigations; liquefaction analyses; earthquake induced embankment deformations; seepage and slope stability analysis; sheet pile analysis; design and construction of grouted stone embankments; and preparing plans and specifications for embankment dams and levees. (Review work products, as necessary.)

Structural Engineering Panel Member. Structural Engineer should be a registered professional from academia, a public agency, or an Architect-Engineer or consulting firm with 10 or more years of experience in design of hydraulic structures for large and complex civil works projects including in design of hydraulic structures such as side drains constructed through levees. Practical knowledge of construction methods and techniques as it relates to structural portions of projects is encouraged. (Review work products, as necessary)

Environmental – This Member should have a minimum of 10 years demonstrated experience in evaluating and conducting NEPA impact assessments, including cumulative effects analyses, for complex multi-objective public works projects with competing trade-offs. The panel member should have a minimum MS degree or higher in an appropriate field of study. Experience should encompass determining the scope and appropriate methodologies for impact assessment and analyses for a variety of projects and programs with high public and interagency

## APPENDIX C

COMPLETION OF DISTRICT QUALITY CONTROL CERTIFICATIONS



Santa Ana River Mainstem  
Lower Santa Ana River Channel, Reach 9-Phase 5B  
(Gypsum Canyon Road to Coal Canyon Road)  
Orange County, CA  
Design Documentation Report and Plans and Specifications

**COMPLETION OF ENGINEERING DIVISION DQC**

The District Quality Control/Quality Assurance (DQC) Process for Engineering has been completed for the Design Documentation Report and Plans and Specifications for the Santa Ana River Mainstem, Lower Santa Ana River Channel, Reach 9-Phase 5B. The DQC was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-214 and QMS Process 08506-SPD "District Quality Control/Quality Assurance (DQC) of Engineering Products". During the DQC, 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 obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. All important comments resulting from the DQC have been resolved and the comments have been closed in DrChecks.. The DrChecks report documenting this is attached.

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Funke Ojuri  
Juan M. Urena  
David Pham  
PDT Leaders, CESPL-ED-DB&DA

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Date

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John Lei.  
DQC Team Leader, CESPL-ED-DB

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Date

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Stephen H. Vaughn, P.E.  
Chief, Civil Design Section B, CESPL-ED-DB

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Date

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Arthur Y. Jung, P.E.  
Chief, Design Branch CESPL-ED-D

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Date

## CERTIFICATION OF DISTRICT QUALITY CONTROL

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

**CONCERN:** Sump inlets are generally avoided where possible due to higher potential for temporary ponding. This project requires that one sump inlet be utilized due to the proposed grading. The location of the proposed sump inlet is near an existing cell tower facility. The sump inlet must be designed to pass the 100 year event without creating a backwater onto the cell tower property. The elevation of the 100 yr water surface cannot exceed 401 feet to meet this requirement. The design calls for a grate opening yard inlet that can clog easily. The inlet opening size has not been verified. The design for passing the flows from this inlet to the channel includes 48" diameter pipe culvert that does not have supporting hydrology calculations.

**RESOLUTION:** Hydrology and Hydraulics section is presently preparing a more detailed analysis and the design will be updated, if necessary, during the advertisement amendment period .

The DQC has been conducted for this Engineering work product and all resulting concerns have been fully resolved with the exception of the above noted concern. This certification is approved with the acknowledgement that the above issue will be addressed in a timely manner during the advertisement period.

This DQC Certification and the attached DrChecks report should be included as an appendix within the final report.

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Richard J. Leifield, P.E.  
Chief, Engineering Division  
CESPL-ED

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Date

## APPENDIX D

COMPLETION OF AGENCY TECHNICAL REVIEW CERTIFICATIONS



DEPARTMENT OF THE ARMY  
LOS ANGELES DISTRICT, U.S. ARMY CORPS OF ENGINEERS  
915 WILSHIRE BOULEVARD, SUITE 930  
LOS ANGELES, CALIFORNIA 90017

## COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the Plans and Specifications for the Lower Santa Ana River Mainstem, Reach 9 – Phase 5B located in Orange County, California. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-214. During the ATR, 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 obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks.

\_\_\_\_\_  
TBD  
ATR Team Leader  
TBD

\_\_\_\_\_  
Date

\_\_\_\_\_  
Damien Lariviere  
Project Manager  
CESPL-PM-C

\_\_\_\_\_  
Date

\_\_\_\_\_  
Nate Snorteland  
Director of Risk Management Center

\_\_\_\_\_  
Date



## CERTIFICATION OF AGENCY TECHNICAL REVIEW

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

As noted above, all concerns resulting from the ATR of these documents were recorded in Dr Checks and have been fully resolved by the Project Delivery Team to the satisfaction of the ATR reviewers.

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Richard J. Leifield, P.E.  
Chief, Engineering Division  
CESPL-ED

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Date



**DEPARTMENT OF THE ARMY**  
U.S. ARMY CORPS OF ENGINEERS  
RISK MANAGEMENT CENTER  
12596 WEST BAYAUD AVE., SUITE 400  
LAKEWOOD, CO 80228

REPLY TO  
ATTENTION OF

CEIWR-RMC

14 March 2016

MEMORANDUM FOR: Commander, Los Angeles District, ATTN: CESPL-ED-DA

SUBJECT: Risk Management Center Endorsement – Santa Ana River Mainstem, Lower Santa Ana River Channel, Reach 9, Phase 5B, North Bank Protection, Orange County, California, Review Plan

1. The Risk Management Center (RMC) has reviewed the Review Plan (RP) for – Santa Ana River Mainstem, Lower Santa Ana River Channel, Reach 9, Phase 5B, North Bank Protection, Orange County, California, dated 04 February 2016, and concurs that this RP complies with the current peer review policy requirements outlined in EC 1165-2-214 "Civil Works Review Policy", dated 15 December, 2012.
2. This review plan was prepared by Los Angeles District, reviewed by SPD, and the RMC, and all review comments have been satisfactorily resolved. For this project a Type II IEPR will be performed.
3. The RMC endorses this document to be approved by the MSC Commander. Upon approval of the RP, please provide a copy of the approved RP, a copy of the MSC Commander's approval memorandum to the RMC Senior Review Manager (rmc.review@usace.army.mil).
4. Thank you for the opportunity to assist in the preparation of this RP. Please coordinate all aspects of the Agency Technical Review and the Independent External Peer Review (as appropriate) efforts defined in the RP. Also, ensure the review plan is updated annually as required in the RP. For further information, please contact me at 601-631-5896

Sincerely,

Dustin C. Herr, P.E.  
Review Manager  
Risk Management Center

CF:  
CEIWR-RMC (Mr. Snorteland)  
CESPD-DQM (Division Quality Manager)