

## MODIFICATION NUMBER 6 TO CONTRACT AE13-062

**Contract Title:** Santa Clara River Levee (SCR-1)

This modification ("MODIFICATION NO. 6") is made and entered into by and between the Watershed Protection District, hereinafter referred to as AGENCY, and Tetra Tech, Inc., hereinafter referred to as CONSULTANT.

WHEREAS, there now exists a binding contract between AGENCY and CONSULTANT originally dated 6/25/2013 for the CONSULTANT to provide engineering analyses for the Santa Clara River Levee (SCR-1) system to either regain "active" status in the USACE PL-84-99 program or conduct studies in support of a future USACE Feasibility Study. Depending on USACE's response to the Agency's SWIF Letter of Intent, either the SWIF Plan or Planning Documents will be completed for the PROJECT. The work is organized into three phases. The first phase includes efforts common to either a SWIF Plan or Planning Documents. Upon completion of Phase 1, the District in consultation with the Consultant and USACE, will decide whether to proceed with Phase 2 – SWIF Plan or Phase 3 – Planning Documents for a total contract amount of \$593,874.00 and a contract completion date of 12/31/2014 ("CONTRACT"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT on 10/29/14 for the CONSULTANT to delete Phase 2 SWIF Plan (Tasks IV and V), proceed with Phase 3 Planning Documents (Tasks VI and VII) from the original contract, and address recommended Measures 4, 5, 6, 7 and 8 as defined in the Interim Risk Reduction Measures (IRRM) plan (Tasks III.j-m), update the IRRM plan as these efforts are completed for an additional contract amount of \$21,544 and to extend the CONTRACT completion date from 12/31/14 to 12/31/15. ("MODIFICATION NO. 1"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT October 21, 2015 for the CONSULTANT to develop Tabletop Exercises for Flood Warning and Emergency Evacuation Plan (FWEEP) for an additional contract amount of \$39,967 and to extend the CONTRACT completion date from December 31, 2015 to March 31, 2016. ("MODIFICATION NO. 2"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT March 31, 2016 for the CONSULTANT to extend the contract time to allow the CONSULTANT to coordinate with the Corps of Engineers and for Board approval of a modification of CONTRACT to include for the final design of PROJECT at no additional cost and to extend the CONTRACT completion date from March 31, 2016 to December 31, 2016. ("MODIFICATION NO. 3"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT January 9, 2017 for the CONSULTANT to extend the contract time to allow the CONSULTANT to coordinate with the Corps of Engineers and to allow for Board of Supervisors approval of a modification of CONTRACT to include the final design of the project at no additional cost and to extend the CONTRACT completion date from December 31, 2016 to December 31, 2017. ("MODIFICATION NO. 4"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT May 12, 2017 for the CONSULTANT to add Phase 4 for the final design of the SCR-1 levee rehabilitation for and additional contract amount of \$1,229,321.00 and to extend the CONTRACT completion date from December 31, 2017 to December 31, 2022. ("MODIFICATION NO. 5"); and

WHEREAS it has become necessary to revise the effort in Task VIII.f., *Water Quality Characterization and Recommendations* from developing a stormwater Sampling and Analysis Program (SAP) to a modeling analysis using the Event Mean Concentrations (EMC); and

WHEREAS, AGENCY and CONSULTANT desire to modify the terms of said existing CONTRACT;

NOW THEREFORE, the parties hereto agree as follows:

1. All provisions of the original contract dated June 25, 2013, including all modifications listed herein, shall remain in full force and effect unless expressly modified by this modification.
2. Exhibit A (Scope of Work and Services) shall be modified as follows:  
Attached, revised Exhibit A, Modification No. 6.
3. Exhibit B (Time Schedule) shall be modified as follows:  
Attached, revised Exhibit B, Modification No. 6.
4. Exhibit C (Fees and Payment) shall be modified as follows:

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Attached, revised Exhibit C, Modification No. 6.

AGENCY shall pay CONSULTANT the additional lump sum of \$16,466 for said work.

5. The total contract amount is hereby increased by \$16,466 for a new contract total amount of \$1,931,172. The contract completion date remains unchanged at December 31, 2022.

**IN WITNESS WHEREOF, THE PARTIES HERETO HAVE EXECUTED THIS MODIFICATION.**

**FOR CONSULTANT**

Name: \_\_\_\_\_

5/24/18

Date

Title: \_\_\_\_\_

VICE-PRESIDENT

**FOR AGENCY:**

Name: \_\_\_\_\_

Deputy Purchasing Agent

5/30/18

Date

BEO 5/24/18

**EXHIBIT A - SCOPE OF WORK AND SERVICES**  
***(Changes in Bold/Italic)***

**1. Description of Work**

The AGENCY intends to:

Rehabilitate the SCR-1 levee system to meet the 44 CFR 65.10 requirements for levee certification.

The SCR-1 is comprised of 4.72 miles of levee, 75 groins, 1 side drain without a flap gate, 6 side drains with flap gates, 1 side drain with a stop-log closure, 1 commercial side drain and 2 bridge crossings. The SCR-1 levee system was designed and constructed by the U.S. Army Corps of Engineers (USACE) in 1961 and is currently owned and maintained by the AGENCY.

The SCR-1 levee system was originally designed in 1958 with the intent of controlling the USACE's calculated Standard Project Flood discharge of 225,000 cubic feet per second (cfs) emanating from the Santa Clara River watershed. The existing levee height varies from approximately 4 feet to 13 feet. The compacted fill embankment has a top width of 18 feet, and the embankment slopes are 2H:1V on both the landward side and riverward side of the levee. The riverward side of the embankment has a 1.5-foot to 2-foot thick rock revetment, and was grouted with concrete in the vicinity of the highway bridges. The rock revetment extends from the top of the embankment to varying depths.

During previous work, conducted as part of the FEMA Levee Certification program, it was determined that the SCR-1 levee system does not meet 44 CFR 65.10 requirements. As part of the FEMA Levee Certification work, a field investigation was performed that identified deficiencies in the SCR-1 levee system which requires rehabilitation.

The scope of work is organized in four phases. Phase 1 includes an Alternatives Analysis and related technical studies. In Phase 2 a SWIF Plan is to be developed. Phase 3 is the preparation of Planning Documents, and Phase 4 is the Final Design, hereinafter called the WORK.

CONSULTANT shall exercise CONSULTANT'S best judgment, guided by consultation with AGENCY, in determining the optimum balance between the needs of AGENCY, aesthetics, methods for completing the WORK, quality, and the funds available for completing the WORK.

CONSULTANT shall assist AGENCY in establishing the exact requirements for the WORK and perform the professional services necessary to satisfactorily complete the WORK.

**2. Basic Services**

The following services shall be performed by CONSULTANT:

**PHASE 1 – TECHNICAL STUDIES AND IRRM PLAN**

**TASK I - PROJECT MANAGEMENT AND COORDINATION**

**a. Project Management**

- CONSULTANT shall maintain appropriate project-level coordination with the AGENCY and with the LA District office of the U.S. Army Corps of Engineers (USACE).
- CONSULTANT shall prepare a quality control plan, identify development team, independent review team and required disciplines for reviews.

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- CONSULTANT shall coordinate and manage milestones, the schedule, project roles and responsibilities, the resource plan, and the document control process of the project team.

### **b. USACE Coordination and Support**

CONSULTANT shall focus on maintaining the coordination that is needed to progress this project along the most desirable and feasible path while ensuring that the end products are usable by all parties. Of particular importance is persistent coordination with the USACE. CONSULTANT shall ensure that each deliverable is based on USACE guidance and practices so that it can directly support further work by the USACE, particularly in order to obtain funding. CONSULTANT shall utilize staff that has relationships in place to contact current USACE staff to get immediate feedback on a particular issue from the Program and Project Management Division, the Planning Division, the Asset Management Division, the Regulatory Division, the Engineering Division, and the Emergency Management Office.

This effort shall also include CONSULTANTs participation in up to four (4) in-person USACE Consultations to be held at either the AGENCY's or the USACE's offices.

### **c. Meetings**

CONSULTANT shall conduct the following meetings during the project.

- Project Kick-off meeting to be held at the AGENCY's office to go over the scope of services, schedule and project objectives.
- Monthly progress meetings via conference calls or live web meetings shall be held for months not covered by specific Progress Meetings shown in this section.
- Technical Studies Progress Meeting #1 to be held via conference call to go over the project status of the data collection, topographic mapping, hydrology, and the hydraulic analysis.
- Technical Studies Progress Meeting #2 to be held via conference call to go over the project status of the sediment transport and scour analysis, and risk and uncertainty.
- Technical Studies Progress Meeting #3 to be held at the AGENCY's office to go over the project status of the alternatives formulation. At this meeting the CONSULTANT and the AGENCY shall agree upon the three (3) conceptual-level alternatives.
- Technical Studies Progress Meeting #4 to be held at the AGENCY's office to go over the 90% Draft conceptual-level alternatives analysis. This meeting shall be to go over the review comments from the AGENCY on the Draft conceptual-level alternatives documents.
- Technical Studies Progress Meeting #5 to be held at the AGENCY's office to go over the 90% Draft feasibility-level alternatives analysis. This meeting shall be to go over the review comments from the AGENCY on the Draft feasibility-level alternatives documents.
- IRRM Progress Meeting to be held at the AGENCY's office to go over the 90% Draft IRRM Plan. This meeting shall be to go over the review comments from the AGENCY on the IRRM Plan documents.

### **Task I Deliverable(s):**

Electronic copies of schedule and minutes for all meetings between CONSULTANT and AGENCY, as well as those between CONSULTANT and others (i.e. USACE LA District, stakeholders).

### **TASK II - TECHNICAL STUDIES**

CONSULTANT shall perform engineering analyses and prepare an alternatives analysis. The technical studies shall consist of Data Collection, Topographic Mapping, Hydrologic Evaluation, Hydraulic Analysis, Scour Analysis, Risk and Uncertainty Analysis, Alternatives Analysis; and the preparation of Feasibility-Level Design Drawings, Cost Estimates and a Project Report. These analyses and documents shall be prepared in accordance with USACE guidance such that they can also be used by the USACE for this project in the future.



**a. Data Collection**

CONSULTANT shall collect all remaining available documentation and data for the levee system. Efforts shall include; researching the files and archives of other federal agencies, including the USACE, as well as researching AGENCY files and archives for planning and design studies, site data, etc.

**b. Topographic Mapping**

CONSULTANT shall utilize AGENCY provided 2005 LiDAR topographic data as well as AGENCY provided 2009 ground survey of the levee. CONSULTANT shall merge these two data sets to create the working topographic mapping for this project. Any additional survey data needs shall be provided by the AGENCY, and incorporated into the working topographic mapping by CONSULTANT.

**c. Hydrologic Review**

The hydrology for the Santa Clara River was developed by the AGENCY in 2006 as part of the local sponsor contribution to the USACE Santa Clara River Watershed Feasibility Study. The 100-year flood discharge (base level flood) of 226,000 cubic feet per second (cfs) from this feasibility study has the concurrence of the AGENCY, FEMA and the USACE. For design purposes a flow 10% greater than the base level flood shall be considered the "design flood". The "design flood" to be utilized is 250,000 cfs. CONSULTANT shall review and utilize this current hydrology and ratio up for the appropriate peak "design flood" and hydrograph from the current hydrology information for use in this project.

**d. Hydraulic Analysis**

CONSULTANT shall utilize the current hydrology and the "design flood" hydrology from Task II.c. CONSULTANT shall utilize the current HEC-RAS hydraulic model that has been developed for the FEMA FIS or USACE Watershed Study. CONSULTANT shall make revisions and updates as appropriate to the hydraulic model with available updated topographic mapping such that it is consistent with the requirements needed to perform a feasibility-level design. CONSULTANT shall prepare documentation of the hydraulic analysis. CONSULTANT shall meet with the AGENCY to present and discuss the results of this task prior to proceeding.

**e. Sediment-Transport and Scour Analyses**

CONSULTANT shall perform sediment-transport and scour analyses to support the freeboard, embankment protection, and embankment stability analyses. A three-level approach shall be conducted to evaluate overall system sediment continuity and river stability as follows:

Level I - Historic aerial photography and topography, as well as historical data such as information shown on as-built drawings and previous study reports, shall be used to perform a qualitative, Level I analysis using principles of fluvial geomorphology to ascertain what the river system once was, what it is today, and what it might become if past and current watershed and river management practices were to remain unchanged.

Level II - Appropriate bed-material sediment-transport relationships shall then be used to conduct a Level II analysis, which entails performing equilibrium slope calculations to identify and quantify current system sediment discontinuities and to project long-term system changes, as the river seeks dynamic equilibrium, should current watershed and river management practices remain unchanged.

Level III - CONSULTANT shall conduct HEC-6T bed-material sediment-transport modeling for Santa Clara River within the project reach. Both a single design flood event and a series of flood events shall be analyzed for this Level III analysis. The Level I and Level II results shall be compared to and, where appropriate, superimposed upon the results of detailed sediment transport modeling. The three-level analysis shall provide insight into long-term system sediment discontinuity and expected future channel degradation, should current watershed and river management practices remain unchanged.

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Upon completion of the three-level analysis described above, appropriate local-scour equations shall be utilized to predict single-event scour associated with specific storm events along the Santa Clara River. Components of single-event scour shall include, where appropriate, General Scour; Bedform Scour, Bend Scour, Local Scour at Hydraulic Structures (bridges, groins, etc) and Thalweg Scour.

CONSULTANT shall meet with the AGENCY to present and discuss the results of this task prior to proceeding.

### **f. Risk and Uncertainty**

CONSULTANT shall perform Levee Risk and Uncertainty (R&U) Analyses using the Corps of Engineers HEC-FDA (Flood Damage Analysis) software. CONSULTANT shall collect and assemble hydrologic and hydraulic data required for the R&U analyses. One of the outputs of analysis is the determination of the Conditional Non-Exceedance Probability (CNP) for the base flood. CONSULTANT shall also analyze for the "design flood." For FEMA certification purposes, in order to assess a levee's ability to safely and adequately pass the base flood event, the CNP must equal or exceed 90% for the 100-year flood (with a minimum of 3 feet of freeboard, or CNP = 95% for less than 3 feet) for the top-of-levee elevation analyzed. Data to be collected for specific reaches (index points) includes:

- Hydrologic period of record (years), discharge-frequency data for a range of frequencies (1-, 2-, 5-, 10-, 25-, 50-, 100-, 250-, and 500-year events) with confidence limits;
- Water-surface-elevation data for the range of frequencies (stage - frequency data), including upper and lower bounds for uncertainty due to hydraulic roughness, bedforms, etc.

### **g. Economic Analysis**

CONSULTANT shall perform a simple Economic Analysis and compile a benefit-cost ratio for the construction of the SCR-1 Levee. The benefits shall be estimated as the expected annual damages (EAD) calculated from analyzing three events (non-damaging event assuming no levee, the preliminary D-FIRM 100-year event, and the preliminary D-FIRM 500-year event). The construction costs of the project shall be annualized for use in the benefit-cost analysis. The Economic Analysis shall be based on the following:

- Economic analysis shall not include any additional floodplain mapping of flood events beyond what has already been mapped for the preliminary D-FIRM. This simplified economic analysis shall be for internal AGENCY purposes or grant applications and is not intended to meet the more rigorous USACE requirements.
- AGENCY will provide geo-referenced parcel data for areas shown in FEMA preliminary D-FIRM floodplain maps. Parcel data to contain square footage of structures.
- Structure valuations shall be determined with web site values and mapping programs.
- Three flood events shall be analyzed, but only two flood events are to be evaluated in damage calculations (100-year and 500-year). The floodplain mapping from the preliminary D-FIRM shall be used to determine flooding extent and depths for the 100-year and 500-year events. These damages shall be assumed to be the same regardless of the proposed Santa Clara River Levee 3 (SCR-3) improvements being in-place or not. This assumption is based on: 1) the SCR-3 Levee not being certified until the SCR-1 Levee is constructed, and 2) flood flows would cross Highway 101 at Ventura Road and extend to the limits shown on the D-FIRM.
- A hydraulic run shall be completed to determine the largest storm event that would be contained within the existing river channel assuming no levees. This shall be the third storm event analyzed in the EAD calculation.
- The benefits determination shall assume that the SCR-3 Levee downstream of Highway 101 has been constructed, and shall tie into the proposed SCR-1 Levee for a complete system that can be certified.

**i) Review Existing Information**

CONSULTANT shall review background information provided by the AGENCY to become familiar with the available data for use in this study. The parcel data shall be verified to contain the correct information required for this analysis.

**ii) Analysis of Flood Damages**

CONSULTANT shall identify and document economic impacts associated with flooding of the area adjacent and downstream of the proposed SCR-1 Levee. The effects shall be estimated by calculating the anticipated damages caused by flooding. The damages shall be calculated for all the structures, as well as the agricultural land, that are inundated.

**Damages to Structures**

- Parcel data shall be used to generate distinct points for each structure within the study area.
- A database of the structures shall be developed with unique identifier codes for each structure.
- Structure database shall contain four structure types: Residential, Commercial, Industrial, and Public.
- Database shall contain depreciated replacement values for structures based upon multiple sources, as necessary. The major sources to be used shall be Zillow and/or Marshall & Swift Valuation for structure categories.
- Average depreciated replacement values for similar sub-sets of neighborhoods shall be used for the residential structure category.
- Each structure type shall also have a content value applied, which shall be based on USACE guidance and studies.
- The Marshall & Swift valuation method requires several pieces of information to be gathered in order to calculate the replacement value of a structure. Things like the construction materials, estimated condition of the structure, quality of construction and the square footage. The qualitative aspects are to be obtained from on-line resources. Google Earth's *Streetview* tool shall be the primary method used for gathering qualitative components for structure valuation.
- Each structure shall have a first floor elevation attributed to it based on existing LiDAR data for the area and Google Earth's *Streetview*.
- Based on the two flood events, each structure shall be determined to be within the floodplain or not.
- Damages to the structures and contents shall be calculated based on depth damage curves from either HAZUS or USACE information.

**Damages to Agriculture**

- Agriculture maps from the U.S. Department of Agriculture (USDA) shall be obtained.
- The USDA maps shall provide the different crop types and acreages for each type.
- This study assumes that if any agricultural land floods, the crop is considered a total loss for the year.
- Outputs per acre shall be obtained for each crop type.
- Crop prices shall be obtained for each crop type.
- Agricultural damages shall be calculated based on the area of cropland inundated, the output per acre for each crop and the market price of each crop.

**iii) Calculate Expected Annual Damages**

CONSULTANT shall calculate Expected Annual Damages (EAD) from the analysis of the two flood events, and compiled with the one event contained entirely within the river channel. In addition, HEC-FDA along with frequency/discharge function and rating curves shall be utilized in this analysis. The data developed in this task shall be presented in "Table 11 – Expected Annual Damage" for preparing grant applications.

**iv) Benefit-Cost Ratio**

CONSULTANT shall annualize the construction costs for each alternative using the assumed project life span and current interest rates. The EAD value will then be compared to the annualized construction costs for each alternative to develop benefit-cost ratios.

**v) Draft Economic Report**

CONSULTANT shall develop a draft economic report that documents the development of the economic analysis and the results of the benefit-cost ratio.

**vi) Final Economic Report**

CONSULTANT shall develop a final economic report to reflect any changes to data, methodology, analysis and results that occur as a result of the AGENCY review.

**h. Alternatives Analysis**

CONSULTANT shall perform the following analyses and prepare feasibility-level documentation to support the rehabilitation of the identified major deficiencies of the levee, which include undersized rock revetment and inadequate toedown protection.

**i) Determination of Levee Extent and Phasing**

CONSULTANT shall determine the extent that a levee system is required based on the hydraulic and R&U analyses. The upstream determination shall require tying into natural high ground to comply with 44 CFR 65.10 and USACE guidance. This effort requires coordination with the USACE to determine if any upstream length to the levee may be de-authorized from the project.

CONSULTANT shall determine multiple scenarios for phasing construction based on physical conditions and approximated funding streams.

**ii) Revetment Protection Analyses**

CONSULTANT shall analyze three (3) alternatives for the major rehabilitation of the levee system. The corrective measures shall include providing scour protection to a sufficient depth below the river invert, which shall be accomplished with:

- Deeper, more robust and durable rock revetment,
- Deeper more robust rock groins,
- Steel sheet piling,
- Soil cement,
- Or some combination of these measures.

**iii) Structural Analyses**

CONSULTANT shall determine at a feasibility level, the type and extent of structural improvements needed to the existing drainage penetrations, headwalls and closure devices based on the revetment protection analysis.

**iv) Geotechnical Evaluation**

CONSULTANT shall qualitatively evaluate the alternatives based on available existing information. Specific tasks for this phase of work may include preliminary evaluation of the following: Allowable slope angles for construction excavation and embankment slopes; Impact of groundwater on

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design and construction; Feasibility of sheet piles and anchor systems; Suitability of on-site material for use as soil cement; Potential impacts of seismic shaking.

CONSULTANT shall also provide recommendations on future geotechnical investigations and analyses that shall be required as design progresses.

### **i. Alternatives Documents**

CONSULTANT shall prepare a basis of design report and conceptual-level design plans and cost estimates for three (3) alternatives. CONSULTANT shall append the basis of design report to include the more detail on the selected alternative and prepare feasibility-level design plans and cost estimate for one (1) selected alternative. These documents shall be prepared in accordance with USACE Document Guidance and *CONSULTANTS Guide for Ventura County Procedures*, dated April 2001. CONSULTANT shall meet with the AGENCY to present and discuss results of this task.

#### **i) Conceptual-Level Design Documents**

CONSULTANT shall provide engineering services for the preparation of conceptual-level design drawings. The conceptual-level design plans for three (3) alternatives shall be limited to a single plan view as well as 3 typical cross sections for each alternative.

##### **(1) 90% Conceptual-Level Alternatives Documents**

CONSULTANT shall develop 90% Conceptual-Level Design Documents that describe the basis and development of the 90% conceptual-level design plans.

##### **(2) 100% Conceptual-Level Alternatives Documents**

Incorporating comments from the Agency, CONSULTANT shall develop 100% Conceptual-Level Design Documents that describe the basis and development of the 100% conceptual-level design plans.

#### **ii) Feasibility-Level Design Documents**

CONSULTANT shall provide engineering services for the preparation of feasibility-level design drawings for one (1) selected alternative. Construction drawings shall be prepared on standard AGENCY layout sheets (1"= 100' Horizontal, 1"= 10' Vertical) scale utilizing the boundary and topographic mapping from Task II.b. The AGENCY will provide all utility information to be shown on the design drawings. The existing hydraulic and erosion analyses shall be utilized to refine the hydraulic design of the selected alternative.

CONSULTANT shall prepare the plan & profile and typical sections for the selected alternative sufficient for budgetary cost estimating purposes. The feasibility-level design drawings shall include:

- Title Sheet
- Plans and Profiles (1"=100' Horizontal and 1"=10' Vertical)
- Typical Sections
- Cross Sections (@ 500' On-Center, 1"=20' Horizontal and Vertical)

##### **(1) 90% Feasibility-Level Design Documents**

CONSULTANT shall develop 90% Feasibility-Level Design Documents that describe the basis and development of the 90% feasibility-level design plans.

##### **(2) 100% Feasibility-Level Alternatives Documents**

Incorporating comments from the Agency, CONSULTANT shall develop 100% Feasibility-Level Design Documents that describe the basis and development of the 100% feasibility-level design plans for submission to the USACE.

##### **(3) Final Feasibility-Level Alternatives Documents**



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Incorporating final comments from the Agency and the USACE, CONSULTANT shall develop 100% Feasibility-Level Design Documents that describe the basis and development of the 100% feasibility-level design plans.

### iii) Cost Estimates

CONSULTANT shall provide engineering services for the preparation of preliminary quantities and cost estimates. The quantities shall be developed for three (3) alternatives based on the conceptual-level design drawings for the proposed project. The quantities shall be refined for the selected alternative based on the feasibility-level design drawings. Unit costs shall be based upon the most current cost information for recent similar projects in the area. Costs shall be presented in a tabular form.

### Task II Deliverable(s):

- ❖ Electronic copy of the Conceptual-Level 90% Draft Alternatives Documents to include the following:
  - Hydrology, Hydraulics, Scour, Risk and Uncertainty, Economics, Alternatives Analysis, Conceptual-Level Plans and Cost Estimates, including the native electronic files of the HEC-RAS, AutoCAD, and ArcGIS.
- ❖ Electronic copy of the Conceptual-Level 100% Draft Alternatives Documents to include the following:
  - Hydrology, Hydraulics, Scour, Risk and Uncertainty, Economics, Alternatives Analysis, Conceptual-Level Plans and Cost Estimates, including the native electronic files of the HEC-RAS, AutoCAD, and ArcGIS.
- ❖ Electronic copy of the Feasibility-Level 90% Draft Alternatives Documents to include the following:
  - Hydrology, Hydraulics, Scour, Risk and Uncertainty, Economics, Alternatives Analysis, Feasibility-Level Plans and Cost Estimates, including the native electronic files of the HEC-RAS, AutoCAD, and ArcGIS.
- ❖ Electronic copy of the Feasibility-Level 100% Draft Alternatives Documents to include the following:
  - Hydrology, Hydraulics, Scour, Risk and Uncertainty, Economics, Alternatives Analysis, Feasibility-Level Plans and Cost Estimates, including the native electronic files of the HEC-RAS, AutoCAD, and ArcGIS.
- ❖ Four (4) hard copies and an Electronic copy of the Final Alternatives Documents to include the following:
  - Hydrology, Hydraulics, Scour, Risk and Uncertainty, Economics, Alternatives Analysis, Feasibility-Level Plans and Cost Estimates, including the native electronic files of the HEC-RAS, AutoCAD, and ArcGIS.

### TASK III - IRRM PLAN

CONSULTANT shall develop an Interim Risk Reduction Measures (IRRM) Plan, which is a plan that includes interim actions to reduce flood risks from a levee system while long-term solutions are developed and implemented. The developed IRRM shall follow the guidance in *Engineering and Construction Bulletin No, 2012-1* to become a critical part of flood risk management and prevention of loss of life for the SCR-1 Levee System. Nonstructural and structural measures shall be considered as part of the IRRM Plan. The selected measures shall be discussed in the IRRM Plan with regard to potential consequences and impacts, environmental considerations, economics, and the risk informed justification. Schedule and costs for implementation shall be identified.

#### a. IRRM Plan Layout, Description, and Purpose

CONSULTANT shall consult with the USACE on the appropriate IRRM Plan Layout and develop a report template to develop the IRRM Plan. CONSULTANT shall identify the extents of the SCR-1

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Levee System, including the system name and identification number within the National Levee Database, that are to be covered in the IRRM Plan and describe the purpose of developing an IRRM Plan for the SCR-1 Levee.

**b. Identify Potential Failure Modes**

CONSULTANT shall identify potential failure modes of the SCR-1 Levee System. These identified failure modes shall address the four scenarios listed in Figure 1. of Engineering and Construction Bulletin No, 2012-1.

**c. Consequences of Failure Modes**

CONSULTANT shall define the consequences associated with each identified potential failure. This shall include mapping potential inundation areas of the identified failures along the levee.

**d. Structural IRRM Alternatives**

Structural IRRM shall be developed and incorporated into the IRRM. It is anticipated that these structural measures may include isolating the problem (i.e. potentially flooded) areas, increasing resilience to overtopping, and increasing erosion protection at groins. These structural measures shall be developed to a conceptual level but due to overlap with the long-term solution may not be implemented, depending on long-term rehabilitation schedule. If it is determined that an interim structural measure is feasible then additional design outside of this scope of work will be required to further develop the measures for implementation.

**e. Non-Structural IRRM Alternatives**

Non-structural measures include measures that address preparedness, warning and response. As part of the non-structural measures a SCR-1 Flood Warning and Emergency Evacuation Plan (FWEEP) shall be developed which includes the warning and response actions that address the specific conditions associated with SCR-1. Also included as part of the FWEEP is the inundation mapping associated with potential failure modes of SCR-1.

In addition to the FWEEP, non-structural measures that shall be identified are those related to preparedness. These include development of an Emergency Exercise Plan, Plan to Pre-Position Emergency Supplies, and an Inspection and Monitoring Plan. Each of these plans shall focus specifically on SCR-1 and the actions to be taken to address the risks along that system.

Non-structural measures shall also include outreach and communication. Specific opportunities to collaborate with other agencies to align the IRRM with Hazard Mitigation Planning and the NFIP shall be identified and incorporated into the IRRM. In addition opportunities to work with the communities to inform people impacted by the SCR-1 flood risk of the options available for them to be prepared for potential flooding shall be developed and implemented.

**i) 90% Draft FWEEP**

CONSULTANT shall develop a 90% Draft FWEEP that describe the basis and development of the 90% draft FWEEP.

**ii) 100% Draft FWEEP**

Incorporating comments from the Agency, CONSULTANT shall develop a 100% Draft FWEEP that describe the basis and development of the 100% draft FWEEP.

**f. Impacts, Environment Considerations, and Economics**

CONSULTANT shall research, analyze and discuss the potential consequences and impacts on the project purpose, environmental considerations, and economics associated with the IRRM, both positive and negative. This task shall utilize existing information and data prepared within Tasks II and III of this scope of work and shall not require environmental analyses or studies or a separate economics analysis.

**g. Recommended IRRM and Risk Informed Justification**

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CONSULTANT shall coordinate with the AGENCY and the USACE to formulate the recommended IRRM based on realistic potential failure modes and the consequences. CONSULTANT shall qualitatively develop risk associated with Impacts and provide discussion on the justification for the recommended IRRM.

### **h. Schedule and Cost to Implement**

CONSULTANT shall develop a plan identifying the schedule and cost to implement the recommended IRRM.

### **i. IRRM Plan**

CONSULTANT shall develop an IRRM Plan that incorporates all of the actions and plans developed as part of the previous tasks.

#### **i) 90% Draft IRRM Plan**

CONSULTANT shall develop a 90% Draft IRRM Plan that describe the basis and development of the 90% draft IRRM.

#### **ii) 100% Draft IRRM Plan**

Incorporating comments from the Agency, CONSULTANT shall develop a 100% Draft IRRM Plan that describe the basis and development of the 100% draft IRRM for submission to the USACE.

#### **iii) Final IRRM Plan**

Incorporating final comments from the Agency and the USACE, CONSULTANT shall develop a Final IRRM Plan including the Final FWEEP that describe the basis and development of the Final IRRP and FWEEP.

### **j. Develop IRRMs**

#### **i) Local National Levee Database (Measures 4 and 5)**

- CONSULTANT shall provide support to the AGENCY to develop Measures 4 and 5. As stated in the IRRM plan, Measure 4 (Develop a Local National Levee Database, NLD) shall involve the development of a geographic information system (GIS) database to graphically display data specific to the SCR-1 system and make it available in a NLD format. Measure 5 (Develop a GIS Performance Database) will complement Measure 4 and provide a sustainable method for evaluating and retaining information related to the SCR-1 system performance over time.
- CONSULTANT shall review existing data in the NLD to become familiar with its content and layout structure.
- CONSULTANT shall participate in a brain-storming session/ meeting with the AGENCY's levee database staff and AGENCY's Operations and Maintenance staff to review existing data for the levee system and discuss recommendations to address implementation of Measures 4 and 5.

Task i) Deliverable(s):

- ❖ Electronic copy of Memorandum of proposed recommendations on how the AGENCY should implement Measures 4 and 5
- ii) Operations and Maintenance Manual (Measure 6 )
  - CONSULTANT shall review and evaluate the existing Operations and Maintenance (O&M) Manual (USACE 1963) that was provided to the AGENCY by the Corps at completion of SCR-1 construction.

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- CONSULTANT shall prepare a supplement to the existing O&M manual to include performance history and IRRM specific to the SCR-1 system and to ensure it meets FEMA requirements related to the levee certification process.

### Task ii) Deliverable(s):

- ❖ Electronic copy of Supplement to the existing O&M Manual

### iii) Visual Markers (Measure 7)

- CONSULTANT shall develop plans for permitting and installation of visual markers. The design plans shall include the following: proposed layout and configuration of visual markers, quantity and dimensions of visual markers, and installation details.
- CONSULTANT shall coordinate with the AGENCY's Environmental Planner and O&M staff to finalize visual markers' locations in order to minimize disturbance to existing species and habitat.

### Task iii) Deliverable(s):

- ❖ Electronic copy of design plans, in 8 ½" x 11" sheet format
- ❖ Electronic copy of design calculations

### iv) Stockpile Materials (Measure 8)

- CONSULTANT shall prepare list of flood fighting materials items and quantities recommended to be stored in the stockpile site.

### Task iv) Deliverable(s):

- ❖ Electronic copy of design plans, in 8 ½" x 11" sheet format
- ❖ Electronic copy of cost estimates

## k. FWEPP Exercise

### i) Project Kickoff and Formation Of Exercise Design Team

As developed by the U.S. Department of Homeland Security (DHS) and promoted by the USACE, CONSULTANT will utilize the processes outlined in the Homeland Security Exercise and Evaluation Program (HSEEP) which provides a standardized methodology for designing, developing, conducting, and evaluating exercises. With this in mind, the development of a Tabletop Exercise (TTX) for the SCR-1 FWEPP will involve planning meetings prior to conduct requiring stakeholder involvement.

Exercises will be designed to provide participants an opportunity to assess current capabilities and validate the critical tasks required to meet expectations. To assess these capabilities, CONSULTANT will use the Core Capabilities, Target Capabilities List (TCL), and associated Universal Tasks, outlined by DHS as the basis for developing our client's exercises. DHS intended the Core Capabilities and TCL to be used as a planning tool in assessing preparedness, developing strategies, establishing priorities for effective resource use, and to evaluating performance. The preparedness and performance measures provide uniform criteria that CONSULTANT will use to develop exercise assessment and analysis tools. Throughout exercise development, CONSULTANT will tie exercise objectives to the evaluation of preparedness, prevention, response, and recovery activities.

CONSULTANT shall coordinate with AGENCY to confirm the timeline and objectives for the project and identify stakeholder representatives appropriate for inclusion on the Exercise Design Team. After confirmation of the Exercise Design Team, stakeholder representatives shall be sent calendar invites for each of the Exercise Development Meetings.

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Task k.i Deliverable(s):

- ❖ Project Kickoff Notes
- ❖ List of Stakeholders for the Exercise Design Team

### ii) Exercise Development Meetings

As a follow-on to the previously conducted Concepts and Objectives Meeting, CONSULTANT shall use the following HSEEP planning meetings:

- Initial Planning Meeting (IPM);
- Mid-Term Planning Meeting (MPM) (If requested)
- Final Planning Meeting (FPM);
- Controller and Evaluator (C&E) Training Webinar, and
- After Action Meeting.

CONSULTANT shall develop required HSEEP materials facilitate each meeting.

#### Initial Planning Meeting

CONSULTANT shall facilitate an IPM for the exercise and work with planning committee participants for guidance as we design exercise activities. The first meeting shall be used to accomplish the following:

- Provide an overview of HSEEP describing the exercise and evaluation process;
- Establish exercise goals and objectives to be tested;
- Confirm targeted capabilities;
- Determine stakeholder participation;
- Propose scenario and injects; and
- Determine scope of play.

CONSULTANT shall work with participating agency representatives to determine expected responses to the scenario. Anticipated outcomes will eventually be evaluated against actual outcomes to validate response capabilities.

#### Mid-term Planning Meeting

If requested by the AGENCY, CONSULTANT shall facilitate an MPM to finalize exercise objectives and begin the development of the facilitator guide and steering questions. The meeting will resolve details regarding logistics, exercise facilitation (number of evaluators, controllers, and observers anticipated), and provide a forum for exercise planning team document review.

Immediately following the MPM, a draft Situational Manual (SitMan) shall be provided including all major exercise modules and subsequent steering questions that will be facilitated to drive exercise discussion.

#### Final Planning Meeting

CONSULTANT shall reference project checklists to ensure all remaining exercise details have been addressed. The final SitMan shall be provided to each member of the planning team. The SitMan shall contain major and detailed events and subsequent steering questions that will be inserted to drive participant actions and decisions during the exercise. Based on final recommendations from the planning committee, CONSULTANT shall finalize all exercise documents for dissemination at the exercises.

Task ii Deliverable(s):

- IPM Notes
- MPM Notes (if requested)



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- FPM Notes

### iii) HSEEP Exercise Materials

CONSULTANT shall generate HSEEP documentation for the TTXs including the SitMan, PowerPoint Presentations, Exercise Evaluation Guides (EEG), Facilitator Guides, and exercise support materials (sign-in sheets, table tents, participant feedback forms, etc.). CONSULTANT shall provide AGENCY with Adobe Acrobat PDF copies of the documents to be distributed electronically to exercise planning committee members for review and to provide feedback.

#### Situation Manual

CONSULTANT shall facilitate the development of the Situation Manual (SitMan), official exercise document used during the TTXs. The document shall identify the scope and concept of play for all participants; provide key exercise assumptions and artificialities; document scenario narratives leading to the start of the exercise; provide exercise objectives and associated observation elements; explain procedural aspects of play; describe roles and locations of facilitators, evaluators, and observers; establish communications, logistics, and administration mechanisms; and establish administrative and support requirements and procedures applicable to the exercise. The SitMan shall include various modules and a chronological schedule of scripted events that will be facilitated to generate discussion or prompt actions in support of the established exercise objectives. The majority of development will take place during and immediately following the IPM with minor revisions finalized at the FPM.

#### Scenario

CONSULTANT shall work with Stakeholders to develop a scenario that closely resembles potential real-world conditions. This shall include discussions of the time required to identify and confirm the problem; anticipated consequences; and incident management at the various government levels. In addition, CONSULTANT shall consider DHS's Target Capabilities as part of the evaluation process.

#### Controller/Evaluator Handbook

The C/E Handbook will be the official planning document used by CONSULTANT staff and local jurisdiction representatives controlling and evaluating the exercise. The C/E Handbook will: determine the roles and locations of controllers, simulators, evaluators, and observers; establish and define communications, logistics, and administration mechanisms; and assist with logistic activities.

#### Exercise Evaluation Guides

CONSULTANT shall work with the planning committee in the development of EEGs consistent with both the TCLs and UTLs. CONSULTANT shall also work with the planning committee to determine who, what, where, when, and why actions would occur during the simulated response. The EEGs shall serve as a tool to assist evaluators in capturing the data required to develop the AAR.

#### Task iii Deliverable(s):

- Situation Manual and C/E Handbook w/ Scenario
- Exercise Evaluation Guides

### iv) Exercise Facilitation

During exercise play, CONSULTANT shall provide 3 staff members to facilitate and provide the necessary direction and control needed to effectively manage exercise flow. CONSULTANT shall coordinate participant registration including players, observers, evaluators, and

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facilitators. The day of the exercises, CONSULTANT staff shall facilitate the TTXs according to the SitMan and control the pace of play and make adjustments accordingly.

Task iv. Deliverable(s):

- Exercise Sign-in Sheets
- Completed Exercise Evaluation Guides

### v) Exercise Evaluation

All exercises shall be evaluated based on the objectives and expected actions identified by the exercise design team. CONSULTANT shall facilitate a hot wash following exercise completion to solicit participant feedback to validate strengths and identify improvement opportunities for all participating organizations.

#### Participant Hot Wash

Exercise controllers and evaluators will conduct a participant hot wash at the conclusion of exercise play to obtain the initial perceptions of participants and collect participant evaluation forms. The debriefing provides an opportunity for participants to share lessons learned; identify key success and areas for improvement; and clarify observations and any unresolved issues or concerns resulting from the exercise. The hot wash will solicit initial input from all participants to be incorporated into the AAR and IP. A formal Facilitator/Evaluator debriefing will occur immediately following the hot wash. This allows the facilitators and evaluators to summarize and clarify their written EEGs. Feedback from this debriefing will be included in the AAR.

#### After Action Report / Improvement Plan

The After Action Report / Improvement Plan (AAR/IP) will be the final product of the TTX. This document will be comprised of two components: an AAR, which will capture observations and recommendations based on the exercise objectives and associated with the capabilities and tasks; and an IP, which identifies specific correction actions, assigns them to responsible parties, and establishes targets for their completion. CONSULTANT will develop a draft AAR and distribute to AGENCY prior to the After Action Meeting (AAM). The exercise planning committee will review observations identified in the draft AAR, and determine which areas for improvement require further action.

#### After Action Meeting

The After Action Meeting (AAM) will serve as a forum to review the revised AAR and the draft IP. During this meeting, CONSULTANT will facilitate a discussion to help participants reach a final consensus related to strengths and areas for improvement, as well as revise and gain consensus on draft corrective actions. The exercise planning team will be responsible for developing implementation processes and timelines for corrective actions.

Once all the corrective actions have been consolidated in the final IP, the finalized AAR/IP will be distributed to MDO-OEM in both hard and electronic formats. A final AAR/IP will be provided prior to the January 31, 2016 deadline.

Task v. Deliverable(s):

- Draft After Action Report
- Final After Action Report
- Improvement Plan

### **TASK III Deliverables:**

- ❖ Electronic copy of the 90% Draft FWEEP.
- ❖ Electronic copy of the 100% Draft FWEEP.

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- ❖ Electronic copy of the 90% Draft IRRM Plan.
- ❖ Electronic copy of the 100% Draft IRRM Plan.
- ❖ Four (4) hard copies and an electronic copy of the Final IRRM Plan.
- ❖ Four (4) hard copies and an electronic copy of the Final FWEEP Plan.
- ❖ Electronic copy of the Situation Manual and C/E Handbook.
- ❖ Electronic Copy of the After Action Report and Improvement Plan.

### **PHASE 2 DELETED PER MODIFICATION NO. 1**

### **PHASE 3 – PLANNING DOCUMENTS**

Phase 3 shall not commence unless written authorization is provided to the CONSULTANT by the AGENCY.

CONSULTANT shall prepare the initial USACE Documents required for the SCR-1 Levee to progress in a Section 216 Feasibility Study. These documents shall consist of a Draft Initial Appraisal Report, a Draft Reconnaissance Report 905(b), and a Draft Project Management Plan. These documents shall be prepared in accordance with USACE guidance such that they can be used by the USACE for this project in the future. The Planning Documents preparation shall include the following:

#### **TASK VI - PROJECT MANAGEMENT AND COORDINATION**

##### **a. Project Management**

- CONSULTANT shall maintain appropriate project-level coordination with the AGENCY and with the LA District office of the U.S. Army Corps of Engineers (USACE).
- CONSULTANT shall coordinate and manage milestones, the schedule, project roles and responsibilities, the resource plan, and the document control process of the project team.

##### **b. Meetings**

CONSULTANT shall conduct the following meetings during the project.

- Monthly progress meetings via conference calls or live web meetings shall be held for months not covered by specific Progress Meetings shown in this section.
- Initial Appraisal Report Progress Meeting to be held via conference call to go over the Draft Initial Appraisal Report. This meeting shall be to go over the review comments from the AGENCY on the Initial Appraisal Report.
- 905(b) Reconnaissance Report Kick-off Meeting to be held at the AGENCY's office to go over the scope of services, schedule and project objectives.
- 905(b) Reconnaissance Report Progress Meeting to be held via conference call to go over the Draft Reconnaissance Report. This meeting shall be to go over the review comments from the AGENCY on the Reconnaissance Report.

#### **TASK VI Deliverable(s):**

- ❖ Electronic copies of schedule and minutes for all meetings between CONSULTANT and AGENCY, as well as those between CONSULTANT and others (i.e. USACE LA District, stakeholders).

**TASK VII - PLANNING DOCUMENTS****a. Initial Appraisal Report**

CONSULTANT shall prepare a Draft Initial Appraisal Report documenting the justification for a study of the SCR-1 levee system for submittal to the USACE as part of the 216 process. CONSULTANT shall utilize existing information that has been collected during the FEMA Levee Certification process, the results from the Phase I Evaluation Report, the USACE PIR, and the Technical Studies prepared under Task II.

**i) Draft Initial Appraisal Report**

CONSULTANT shall develop a 90% Draft Initial Appraisal Report that describe the basis and development of the 90% Draft Initial Appraisal.

**ii) Draft-Final Initial Appraisal Report**

Incorporating comments from the Agency, CONSULTANT shall develop a 100% Draft Initial Appraisal Report that describe the basis and development of the 100% draft Draft Initial Appraisal for submission to the USACE for their completion.

**b. Reconnaissance Report 905(b)**

CONSULTANT shall perform a reconnaissance study and prepare a Draft Section 905(b) Report for problems on Santa Clara River related to the SCR-1 levee system in accordance with the six-step planning process specified in ER 1105-2-100 Planning Guidance Notebook. CONSULTANT shall work in close coordination with the AGENCY and USACE to accomplish the required tasks. Existing, readily available data shall be used to investigate concerns, establish a Federal interest, and develop an array of measures to a conceptual degree that could resolve the concerns of the SCR-1 levee system. Coordination and interviews with the sponsor, other agencies, and state and local governments shall be conducted in order to gather available data. No new topographic survey, mapping, hydrology, or other models will be required for this effort. CONSULTANT shall performed the work as described more specifically below.

**i) Data Collection and Information Gathering**

CONSULTANT shall gather pertinent existing data including mapping, previous reports, interviews, and other sources to assess existing conditions for the study area. Up to two (2) site visits may be needed based on the needs of the study. All visits to the site shall be coordinated through the AGENCY's Project Manager.

**ii) Reconnaissance Study**

The CONSULTANT shall gather and interpret data in sufficient detail to produce a Report of findings per *ER 1105-2-100* (pgs 4-1, 4-5 and *Appendix G*) that addresses the requirements of Section 905(b) of WRDA 1986, as amended. The conclusions shall be largely qualitative, and are anticipated to result in a flood risk management study. The basic requirements of the reconnaissance effort shall include evaluation of public concerns in the context of problems and opportunities that can be addressed through levee rehabilitation, and a reasonable assessment of the Federal interest in pursuing a flood-risk management study. Investigations shall identify existing problems and opportunities to qualitatively assess a limited number of potential solutions in sufficient detail to indicate that a solution to the water-resources problem will likely warrant USACE participation in a Section 216 Feasibility study. The assessment shall describe the existing conditions and potential for and types of benefits from proposed solutions. Environmental evaluations shall describe in general terms the existing conditions, typical effects of potential measures, and the potential requirement for mitigation. Fish and wildlife resources considerations, which are readily available, shall be of sufficient scope and detail to identify the presence, condition and general location of known fish and wildlife resources within the area and no additional surveys are proposed at this time. The study shall determine whether planning to develop a project or levee study should proceed to the more detailed feasibility phase. The study and report shall:

- (1) Determine if the levee problem(s) warrant Federal participation in feasibility studies. Defer comprehensive review of other problems and opportunities to feasibility studies;
- (2) Define the Federal interest in pursuing a Section 216 Feasibility study based on a preliminary appraisal consistent with USACE's policies, and upon environmental impacts of identified potential alternative measures;
- (3) Document the analysis and conclusion in a brief report (See Task iii below);
- (4) Assess the level of interest and support of non-Federal entities in the identified potential solutions and cost-sharing of feasibility phase and construction.

**iii) Draft Reconnaissance Report**

**(1) Draft Reconnaissance Report 905(b)**

CONSULTANT shall prepare the Draft Section 905(b) Report summarizing the findings of the reconnaissance study and recommendations for future efforts. The report shall be consistent with *ER 1105-2-100*, particularly *Appendix G* and shall include all items listed in Table G2. CONSULTANT shall also provide all supporting data collected and field notes gathered during the work effort in appropriate technical appendices. The format for the report sections shall be structured in accordance with the *Model Reconnaissance Report 905(b)* guidance from the Corps of Engineers. The CONSULTANT shall submit the Draft report to the AGENCY in accordance with the submittal schedule. All electronic files shall be compatible with Microsoft Word software for text, Microsoft Excel for tables or spreadsheets, and Microsoft Access for database information, as well as a searchable PDF file of the entire report. GIS, graphics, and mapping shall use the latest version of either AutoCAD, or ArcMap, software. Other file formats may be used if found appropriate by the AGENCY. All electronic files shall be left justified, with linked table of contents and lists of Table and Figures.

**(2) Draft-Final Reconnaissance Report 905(b)**

AGENCY Review and Back-Check. The AGENCY will review the Draft report to assure that planning criteria and engineering regulation guidelines were followed and will also provide review comments. CONSULTANT shall provide detailed responses to the AGENCY, which will be reviewed by the AGENCY technical team. At that time, a review conference shall be held at the AGENCY Office for the specific purpose of resolving any outstanding review comments. Once the AGENCY concurs with the proposed responses, the CONSULTANT shall revise the document in accordance with the accepted comments. CONSULTANT shall then submit an electronic copy of the revised Draft document in MS Word to the AGENCY so that the AGENCY can ensure that the accepted document comments were addressed in an adequate fashion (back-check). The AGENCY will transmit the revised Draft document to the USACE for their review. CONSULTANT shall respond and resolve USACE comments in the same fashion as discussed above. CONSULTANT shall then submit the Draft-Final document to the AGENCY to submit to the USACE for their completion.

**c. Project Management Plan**

CONSULTANT shall Prepare a Draft Project Management Plan (including development of introductory chapters, Plan Formulation, Economics, Environmental portions, the Quality Control Plan, and incorporation of provided Hydrologic, Hydraulic, Geotechnical and Civil Engineering and Real Estate input) for the efforts required in the preparation of the SCR-1 Levee Section 216 Review of Completed Projects Report. The Section 216 documentation shall be prepared utilizing CONSULTANT services to the maximum extent practical. The scoping of studies and deliverables required in the preparation of these decision documents shall be developed by the CONSULTANT under direction of the AGENCY. Specific tasks necessary to accomplish the work described include the following:

- Assessment of Existing Information/Recommendation for Updated and/or Generated Information: CONSULTANT shall collect, review and assess for adequacy all pertinent existing information. Existing information must be sufficient for the USACE to later generate baseline



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condition information and to measure potential adverse effects to alternative plans developed as part of the Section 216 effort. Any existing information that is not sufficient should be identified as such and a recommendation and methodology for updating and/or generating the information shall be specified.

- Draft Project Management Plan (PMP): The PMP shall document the efforts required to prepare the Section 216 Feasibility Report, the economic analysis and environmental compliance documentation and the Engineering Appendix. The PMP will ensure that the work required for the Section 216 has been carefully developed and considered. The PMP shall form the basis for estimating the total Section 216 cost. The PMP shall state the objectives of the Section 216, necessary level of detail, and scheduling and draft cost estimate of activities for the Section 216. The PMP Input is to be prepared in accordance with *ER 1105-2-100, Planning Guidance Notebook*, and references noted therein.
- Quality Control Plan (QCP): Development of a QCP is a requirement of the PMP. The QCP shall identify the major technical activities to be conducted during the Section 216 study, products that shall be reviewed by the USACE Agency Technical Review (ATR) team, (ATR team members may be comprised of expert, senior-level USACE technical personnel from a LA District or multiple districts outside of Los Angeles) Independent Technical Review Team (ITRT) members and the general and specific experience of each individual. The QCP shall be prepared in accordance with: *CESPD 1110-1-8 Quality Management Plan*, 30 December 2002; and *ER 1110-1-12 Quality Management*, 30 September 2006.

### i) Draft Project Management Plan

CONSULTANT shall develop a Draft Project Management Plan that includes all of the specific tasks outlined above.

### ii) Draft-Final Project Management Plan

Incorporating comments from the Agency, CONSULTANT shall develop a Draft-Final Project Management Plan that includes all of the specific tasks outlined above, for submission to the USACE for their completion.

## TASK VII Deliverable(s):

- ❖ Initial Appraisal Report:
  - Electronic copy of the Draft Initial Appraisal Report.
  - Four (4) hard copies and an electronic copy of the Draft-Final Initial Appraisal Report.
- ❖ Reconnaissance Report 905(b):
  - Electronic copy of the Draft Reconnaissance Report 905(b).
  - Four (4) hard copies and an electronic copy of the Draft-Final Reconnaissance Report 905(b).
- ❖ Project Management Plan:
  - Electronic copy of the Draft Project Management Plan.
  - Four (4) hard copies and an electronic copy of the Draft-Final Project Management Plan.

## PHASE 4 – FINAL DESIGN

### TASK VI - PROJECT MANAGEMENT AND COORDINATION

- a. Project Management
  - CONSULTANT shall maintain appropriate project-level coordination with AGENCY, Environmental Consultant, and with the LA District office of the U.S. Army Corps of Engineers (USACE).

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- CONSULTANT shall prepare a quality control plan, identify development team, independent review team and required disciplines for reviews.
  - CONSULTANT shall coordinate and manage milestones, the schedule, project roles and responsibilities, the resource plan, and the document control process of the project team.
- b. USACE Coordination and Support
- CONSULTANT shall maintain the coordination that is needed to progress this project along the most desirable and feasible path while ensuring that the end products are usable by all parties. Of particular importance is persistent coordination with USACE. CONSULTANT shall coordinate the preparation of the project decision document to authorize the project for submittal to USACE Headquarters and shall ensure that each deliverable is based on USACE guidance and practices so that it can directly support further work by USACE, particularly in order to process the section 408 permit. This effort will also include attending meetings with USACE.
- CONSULTANT shall utilize staff that has relationships in place to contact current USACE staff to get immediate feedback on a particular issue from the Program and Project Management Division, the Planning Division, the Asset Management Division, the Regulatory Division, the Engineering Division, and the Emergency Management Office.
- This effort will also include the team's participation in up to four (4) in-person USACE Consultations to be held at either AGENCY's or USACE's offices.
- c. Project Kick-Off Meeting
- CONSULTANT shall conduct a Project Kick-off meeting to be held at AGENCY's office to go over the scope of services, schedule and project objectives.
- d. Progress Meetings
- CONSULTANT shall conduct the following meetings during the project.
- Monthly progress meetings via conference calls or live web meetings will be held for months not covered by specific Progress Meetings shown in this section.
  - Technical Studies Progress Meeting #1 to be held via conference call to go over the project status of the environmental documents and technical studies.
  - Technical Studies Progress Meeting #2 to be held via conference call to go over the project status of CEQA/NEPA documents.
  - Technical Studies Progress Meeting #3 to be held at AGENCY's office to go over the project status of the CEQA/NEPA documents.
  - Technical Studies Progress Meeting #4 to be held at AGENCY's office to go over the 60% design plans, specifications and estimate.
  - Technical Studies Progress Meeting #5 to be held at AGENCY's office to go over the project status of the CEQA/NEPA documents.
  - Technical Studies Progress Meeting #6 to be held at AGENCY's office to go over the 90% design plans, specifications and estimate.
  - Technical Studies Progress Meeting #7 to be held at AGENCY's office to go over the project status of the CEQA/NEPA documents.
  - Technical Studies Progress Meeting #8 to be held at AGENCY's office to go over the 100% design plans, specifications and estimate.
  - Technical Studies Progress Meeting #9 to be held at AGENCY's office to go over the project status of the CEQA/NEPA documents.

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### e. Public Meetings

In coordination with the Agency, CONSULTANT shall participate in the following meetings during the project.

- Pre-scoping meeting (to be led by Environmental Consultant)
- Scoping meeting (to be led by Environmental Consultant)
- Draft Environmental Impact Report (DEIR) meeting (to be led by Environmental Consultant)
- Board of Supervisors meeting to be held at AGENCY office.
- Riverpark Neighborhood Council meeting to be held at AGENCY office, or other AGENCY location
- Montalvo Neighborhood Council and East Ventura Neighborhood Council joint meeting to be held at AGENCY office, or other AGENCY location
- Four (4) meetings scheduled quarterly with the stake holders to be held at AGENCY office, or other AGENCY location.

### TASK VI - Deliverables:

- ❖ Electronic copies of schedule and minutes for all meetings between CONSULTANT and AGENCY, as well as those between CONSULTANT and others (i.e. USACE LA District, stakeholders).

### TASK VII - CEQA/NEPA SUPPORT AND PERMITS

As part of the permit application process, the CONSULTANT team shall closely coordinate with the AGENCY and Environmental Consultant team members to determine project impacts and locations where impacts can be limited and/or avoided. Since mitigation costs can be expensive, close coordination and discussion of proposed design shall be performed throughout the design of the project.

#### a. CEQA/NEPA and Environmental Permitting Support

CONSULTANT shall provide services for the preparation of a summary alternatives analysis to support the CEQA document. This task will include the preparation of graphic exhibits and visualization exhibits for support of the CEQA/NEPA document, including public meetings, and regulatory permit applications (e.g., Clean Water Act, Endangered Species Act, and California Fish and Game Code permits). CONSULTANT shall prepare presentation quality graphics which depict the recommended project improvements and alternatives for AGENCY use. CONSULTANT shall coordinate with the AGENCY's Environmental Consultant working under separate agreement for environmental processing/permits.

#### b. Caltrans Permit Coordination/Processing

Caltrans coordination will be required where improvements to the levee are under Hwy 101. This task includes coordinating with Caltrans, preparing a Traffic Management Plan, and preparing an encroachment permit if the project will affect Caltrans rights-of-way. Additional coordination with local traffic control agencies may also be required. This specific task will require complete traffic control and permitting.

#### c. USACE 408 Permit Preparation/Processing

Modifications to federal levees or navigation channels will require a Section 408 permit through USACE. Project team shall attend meetings with USACE and respond to consolidated sets of 408 permit comments to resolution through the Dr. Checks process. Assumes 1 round of comments for the 60% Design Submittal, and 2 rounds of comments for the 90% Design Submittal.

### TASK VII - Deliverables:

- ❖ Electronic copies of correspondence, meeting agenda, and meeting minutes

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- ❖ Electronic copies of graphic exhibits, visualization exhibits, and technical support
- ❖ Two (2) hard copies and an electronic copy of the 408 Permit application

### TASK VIII - TECHNICAL STUDIES

CONSULTANT shall perform final engineering analyses on the selected alternative. The technical studies shall consist of Data Collection, Topographic Mapping, River Hydraulic, Sediment Transport, and Scour Analysis, Risk and Uncertainty Analysis, Interior Drainage Analysis, and Geotechnical Analysis. These analyses and documents shall be prepared in accordance with USACE guidance in order to meet the 408 permit requirements.

**a. Data Collection**

CONSULTANT shall obtain and review all available reports and plans including the conceptual designs, previous hydrologic and hydraulic studies, environmental documents, and pertinent AGENCY, Federal, and City design guidelines. A field visit will be conducted to familiarize the project team with the site and constraints including the existing levees, bank protection, street improvements, Caltrans' Hwy 101 Bridge, street bridges and storm drain penetrations. Photo documentation of the field visit shall be performed.

**b. Topographic Mapping**

The CONSULTANT shall utilize the AGENCY provided 2005 LiDAR topographic mapping of the river bed for the hydraulic analyses. The CONSULTANT shall merge the 2005 LiDAR with the new topographic mapping provided by AGENCY to create the working topographic mapping for this project.

**c. River Hydraulic, Sediment Transport, and Scour Analysis**

CONSULTANT shall perform a final river hydraulic, sediment transport, and scour study in accordance with the FEMA requirements of 44 CFR 65.10 and appropriate guidance from USACE. The scope of work includes an updated hydraulic analysis utilizing the HEC-RAS program, a detailed sediment transport analysis, which will evaluate the long-term scour or aggradation potential of the Santa Clara River adjacent to the proposed SCR-1 levee improvements, an analysis of the local scour potential, and analysis of the existing levee armoring and toe protection.

The CONSULTANT shall import the previously developed baseline hydraulic model of the Santa Clara River to the latest version of HEC-RAS 5.0. This model has the SCR-1 cross sections surveyed in 2009 (spaced at 100-foot intervals) and incorporates all the bridge crossings along the SCR-1 Levee reach. The updated hydraulic model based on the new topographic mapping provided by AGENCY shall be used for freeboard evaluation and to provide maximum shear velocities for the analysis of local scour potential and design of toe protection.

CONSULTANT shall utilize the current HEC-6T sediment-transport model that was previously developed for the Santa Clara River within the project reach. This model will be reasonably calibrated to match the hydraulics of the new HEC-RAS 5.0. Both a single-design flood event and a series of flood events shall be analyzed for this task to provide insight into the long-term bed adjustment and expected future channel degradation, should current watershed and river management practices remain unchanged

Appropriate scour methodology will be used to predict maximum total scour along the levee for toe-down depths. Major components of total scour will include, where appropriate, long-term bed degradation (from the sediment transport model), single-event general scour (for 100-year flood hydrograph), bedform scour, bend scour, local scour (e.g. bridge pier, drop structure, etc.), and thalweg scour.

**d. Risk and Uncertainty**

CONSULTANT shall review the project performance for the SCR-1 Levee using the Corps' risk-based Monte Carlo simulation program HEC-FDA (Flood Damage Analysis). The HEC-FDA program integrates hydrology, hydraulics, and economic relationships to determine damages,

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floodings risk, and project performance. Uncertainty is incorporated for each relationship and the model samples from a distribution for each observation to estimate damage and flood risk. The model includes the following relationships for each economic impact area:

- Discharge-Probability (with uncertainty determined by period of record)
- Stage-Discharge (stage in the channel with estimated error in feet)
- Stage-Damage (damage associated with channel/overbank stage with uncertainty in stage estimates and structure conditions)

The selected design for the SCR-1 Levee shall be reviewed in accordance with the Federal Emergency Management Agency (FEMA) certifiable standards as defined in USACE EC 1110-2-6067. The EC lays out the criteria for determining acceptable top of levee/channel elevations in terms of risk-based project performance.

The criteria presented in the USACE EC 1110-2-6067, Certification of Levee Systems for the National Flood Insurance Program, dated August 31, 2010 for certification of a riverine levee system are as follows:

- The conditional non-exceedance probability (CNP) must be greater than 90 percent from overtopping of the 1 percent chance exceedance flood event for all reaches of the levee system.
- If the top of levee elevation is less than 3 feet above the FEMA base flood elevation, the levee can only be certified if the CNP is greater than 95 percent.
- The top of levee elevation shall not be less than 2 feet above the FEMA base flood elevation in any event, regardless if the CNP is 95 percent or greater.
- For incised channels, the top of channel elevation should be checked for containment of the 90 percent assurance flood level; containment of the 1 percent annual chance exceedance flood; and in accordance with the "freeboard" guidance provided in EM 1110-2-1601, Hydraulic Design of Flood Control Channels.

**e. Interior Drainage/Joint Probability Analysis**

A detailed interior drainage and joint probability analysis in accordance with FEMA requirements is necessary to determine the extent of the flooded area. FEMA requires that this analysis be based on the joint probability of interior and exterior flooding and the capacity of facilities (such as drainage lines and pumps) for evacuating interior floodwaters.

CONSULTANT shall perform an interior drainage analysis, identifying the sources and magnitude of interior flooding. This interior drainage analysis must be based on the joint probability of interior and exterior flooding and must include delineation of areas landward of the levee where interior runoff may pond. CONSULTANT shall utilize the guidance and criteria contained in the USACE publication EM 1110-2-1413, Engineering and Design – Hydrologic Analysis of Interior Drainage Areas.

CONSULTANT shall obtain from AGENCY or the City of Oxnard copies of master plan of drainage and all storm drain as-builts that are available for use in this analysis for each storm drain penetration.

Based on the field investigation and review of the as-built plans, there are 8 storm drain penetrations through the levee. All storm drains have flap gates with the exception of two locations at Side Drain 1A and a 12-in metal pipe private drain (possibly abandoned).

**f. Water Quality Characterization and Recommendations**

The AGENCY is interested in the possibility of diverting runoff from the Central Avenue Drain to an adjacent spreading ground managed by the United Water Conservation District as part of



the SCR-1 multi-use objectives. The primary goals of diverting this runoff is the enhancement of the underlying groundwater supply and stormwater quality enhancement. Given this goal and understanding the need for the protection of groundwater quality, the AGENCY is interested in characterizing the water quality of runoff discharged from the Central Avenue Drain in order to determine; 1) potential impacts to the existing spreading grounds, and 2) possible management measures (i.e., diversion timing, pretreatment, etc.) for reducing impacts to the spreading grounds, while ensuring maximum runoff diversion. To aid the AGENCY with characterizing runoff water quality, CONSULTANT shall; ***prepare a technical memo for the a preliminary layout of an Infiltration Basin within Ferro Basin to capture flows diverted from the Central Avenue Drain based on a 10-year storm event; perform water quality characterization of the Central Avenue Drain using the EPA SWMM model and locally developed stormwater event mean concentration data; perform analysis to simulate and predict the pollutant concentrations and loads entering Ferro Basin via the proposed diversion structure; design a water quality enhancement/ground water recharge project and evaluate its feasibility and cost effectiveness; perform a cost-benefit analysis that will compare diversion and basin design with associated stormwater capture benefits. Sampling and Analysis Plan (SAP) to be implemented by the AGENCY. Upon complete implementation of the SAP, CONSULTANT shall prepare a memorandum summarizing the water quality of runoff to be discharged from the Central Avenue Drain, including recommendations for runoff diversion management.***

- ~~CONSULTANT shall prepare a SAP that is designed to provide clear guidance on characterizing the water quality of runoff discharged by the Central Avenue Drain. Prior to preparing the SAP, CONSULTANT shall visit the spreading grounds and meet with the AGENCY and UWCD in order to further refine monitoring objectives and questions. Information from this meeting be used to inform the design of the SAP, including both the extent and timing of sample collection. The SAP will include; flow monitoring, field measurements, and grab and composite sample collection over a range of storms, so that the aforementioned questions can be adequately addressed.~~
- ~~Once the AGENCY and its laboratories have completed the sampling and analysis described in the SAP and submitted the results, CONSULTANT shall consolidate the monitoring data and prepare a brief memorandum summarizing the results and recommendations. The memorandum will describe:~~
  - ~~General water quality of runoff discharged by the Central Avenue Drain;~~
  - ~~Description of any pollutants detected at concentrations that pose a threat to groundwater resources (e.g., nitrates, pesticides, etc.);~~
  - ~~Description of pollutants detected at concentrations that pose a threat to operation/ maintenance of the spreading grounds (i.e., suspended solids); and~~
- **CONSULTANT shall provide a draft memo and preliminary layout of a conceptual infiltration Basin within Ferro Basin to capture flows diverted from Central Avenue Drain for discussion purposes with stakeholders. Infiltration Basin components shall be sized based on the yield volumes in the Hydrology Report Central Avenue Drain Watershed Design Hydrology Update Draft Report (Ventura County Watershed Protection District 2017) for a 10 year event and in accordance with Appendix E.2. of The Ventura County Technical guidance Manual for Stormwater Quality Control Measures [TGM] (VCWPD, 2017).**

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- **CONSULTANT shall develop an EPA SWMM model for the drainage area tributary to the Central Avenue Drain. The model shall be configured using information available in the Hydrology and the Santa Clara River (SCR) Watershed- Specific Dataset of Average Event Mean Concentration (EMC) Values and Revised Piru Stormwater Capture for Groundwater Recharge Project Pollutant Loads (Geosyntec Consultants 2018). Output shall be generated for a range of design storms, to include a storm that represents the 1.4 inch rain event that corresponds to the bacteria TMDL, as well as 2-yr, 5-yr, 10-yr, 25-yr, 50-yr, and 100-yr average recurrence interval storms and also for a long-term, continuous simulation using historical rainfall data to develop a comprehensive characterization of stormwater quality. The outputs shall include the concentrations and mass loading of critical pollutants in the Central Avenue Drain, in runoff diverted to Ferro Basin, and in flow intercepted by a pretreatment device before infiltration at the basin. The list of critical pollutants presented in Table 1 below is based on data availability and Santa Clara River watershed-specific surface water quality priorities.**

**CONSULTANT shall assess the potential performance of two pretreatment device styles to represent the range of possible load reductions possible: (1) a traditional forebay that meets the design criteria specified in the Ventura County Technical Guidance Manual for Stormwater Quality Control Measures 2015, and (2) a manufactured pretreatment device that is selected to reduce the constituents of greatest concern to preserve groundwater integrity at the site. The simulation of a forebay and a manufactured device serve to 'book-end' the pretreatment assessment so that the range of constituent loads expected to be infiltrated at Ferro Basin can be evaluated. This exercise is necessary to indicate the appropriate pretreatment style necessary to address the constituents of concern originating from the upstream drainage area. This analysis shall rely on existing databases like the International BMP database, State agencies, and others as applicable to simulate the appropriate effectiveness of the pretreatment devices.**

**Outputs from the SWMM model shall be validated using information or models available from development of the Stormwater Resources Plan. CONSULTANT shall use a series of calibrated watershed models developed in-house using Loading Simulation Program in Fortran (LSPC) for the Upper Santa Clara Watershed Management Program (expected to have runoff characteristics similar to the lower river), which shall be used as additional benchmarks to validate the results.**

**Table 1 Constituents analyzed in stormwater quality characterization**

Constituents		Units
TSS		mg/L
Nutrients	Total P	mg/L
	Diss P	mg/L
	NH3	mg/L
	NO3+ NO2	mg/L
	TKN	mg/L
Metals	Total Cu	µg/L
	Diss Cu	µg/L

		Total Lead	µg/L
		Diss Lead	µg/L
		Total Zinc	µg/L
		Diss Zinc	µg/L
<b>Fecal Bacteria</b>	<b>Indicator</b>	Total Coliform	MPN/ 100 mL
		<i>E. coli</i>	MPN/ 100 mL
		Enterococcus	MPN/ 100 mL
		Fecal Coliform	MPN/ 100 mL
<b>Pesticides</b>		Glyphosate	µg/L
		Penta chlorophenol	µg/L

- **CONSULTANT shall evaluate the long-term performance through a range of design configurations (e.g., facility footprint, ponding depth, inflow diversion rate) to efficiently predict the long-term costs and benefits. The outcome from this analysis is a cost-effectiveness curve to ensure that a facility is sized to meet a specific design target and that the facility is not inadvertently oversized by identifying the point of diminishing returns where additional cost does not yield substantially higher performance. Cost-effectiveness curves shall be developed for both volume and pollutant capture (i.e., pollutant load reduction) to determine the optimum basin configuration to achieve multiple benefits and reduce spending on both initial construction and long-term maintenance.**

**CONSULTANT shall use the watershed model and stormwater quality characterization developed above to generate cost-effectiveness curves describing a range of feasible basin sizes, diversion rates, and pretreatment configurations. The outputs will be generated to identify the optimum configuration to achieve long-term (average annual) stormwater volume and pollutant capture. The two pretreatment configurations evaluated above shall be explicitly modeled during this analysis, and the results shall be used to determine the specific pretreatment configuration for the site.**

**g. Geotechnical Analysis**

**Subsurface Soil Exploration:**

Prior to the start of this task, CONSULTANT shall prepare a work plan for geotechnical exploration that includes a sketch of bore hole and test pit locations, anticipated exploration depth, soil sampling intervals, and the soil testing methods that follow the standard geotechnical procedures (i.e. ASTM). CONSULTANT shall meet with AGENCY to go over the work plan prior to the start of this task. The work plan shall be developed in coordination with the Environmental Consultant.

Exploratory methods are to include hollow stem auger borings utilizing a high torque truck mounted drill rig and test pits. The test pit explorations for the SCR-1 levee system will utilize a backhoe to verify subsurface conditions on the riverside of the existing levee. This area will be the primary source of borrow material for the proposed soil cement. Bulk samples of the subsurface materials will be taken to evaluate the material for suitability as soil cement. If revetment or embankment material is encountered, controlled backfill utilizing a compaction wheel and water supply will be used.



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CONSULTANT shall perform approximately 20 subsurface borings and 10 test pits along the levee system to support the geotechnical assessment required for certification. CONSULTANT shall assume the following:

- For geotechnical field investigations, CONSULTANT shall provide all information, photos, and maps necessary to fill out the application for encroachment, access and traffic control permits, as well as applicable permits from Fish and Wildlife, USACE, and Regional Water Quality Control Board, and shall ensure that field work is conducted in compliance with all regulatory permit conditions,
- CONSULTANT shall obtain well/boring installation and closure permits,
- CONSULTANT shall provide the requirements for adequate topographic mapping for marking field locations,
- CONSULTANT shall notify Underground Service Alert prior to excavating exploratory borings and test pits. Where necessary, CONSULTANT shall provide a specialty utility locator,
- CONSULTANT shall determine staging area for equipment storage,
- CONSULTANT may scatter the castings between the riverward side of the levee and lower access road, if approved by regulatory agencies; otherwise, the castings may be neatly scattered on the land side of the levee,
- CONSULTANT shall coordinate with AGENCY's Environmental Consultant to ensure that geotechnical field investigations are monitored by a qualified biologist, and that field personnel receive Environmental Education prior to commencing activities on site,
- Disposal of non-hazardous drilling material shall be performed by CONSULTANT.
- Cold patching will be performed for any borings drilled through asphalt.

### **Laboratory Testing:**

CONSULTANT shall perform laboratory testing of the samples collected during the subsurface exploration. Laboratory testing will include in-situ moisture and density, grain size distribution, shear strength and hydraulic conductivity. The laboratory testing will be used to determine: excavation parameters; suitable material for soil cement and backfill; mix design for soil cement; stability of levee under conditions of flooding, seismic activity, and scour; foundation parameters for reinforced floodwall under Hwy 101; and construction considerations for temporary stability and dewatering requirements.

### **Geotechnical Assessment:**

Once subsurface conditions are evaluated and laboratory testing is completed, CONSULTANT shall perform a geotechnical analysis. Analyses will include seepage analysis, slope stability analysis, and a brief discussion of seismic considerations. Where sustained water flow levels indicate that embankment or foundation seepage could be problematic, seepage analysis will be performed using SEEPW, a finite-element software program that can perform transient seepage modeling.

Slope stability of levee embankments will be performed utilizing SLOPEW, a computer program that can perform a variety of limit equilibrium stability analysis methods (Spencer, Janbu, Morgenstern-Price, etc.) under both static and pseudo-static loading conditions. Slope stability will be evaluated in accordance with the methodology outlined in USACE Manual EM 1110-2-1913.

CONSULTANT shall perform all geotechnical analyses required by Section 65.10 of the NFIP regulations (and identified in FEMA MT-2 forms).

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CONSULTANT shall prepare a geotechnical report which documents all subsurface exploration, laboratory testing results and provide design parameters for the levee system improvements. The geotechnical analyses and assessments shall be consistent with levee certification requirements and USACE guidelines.

### TASK VIII - Deliverables:

- ❖ Electronic copy of the 60% Documents to include the following:  
Hydrology, Hydraulics, Scour, Risk and Uncertainty, Interior Drainage, Geotechnical Analysis, including the native electronic files of the HEC-RAS, and ArcGIS.
- ❖ Electronic copy of the 90% Documents to include the following:  
Hydrology, Hydraulics, Scour, Risk and Uncertainty, Interior Drainage, Geotechnical Analysis, including the native electronic files of the HEC-RAS, and ArcGIS.
- ❖ Electronic copy of the 100% Documents to include the following:  
Hydrology, Hydraulics, Scour, Risk and Uncertainty, Interior Drainage, Geotechnical Analysis, including the native electronic files of the HEC-RAS, and ArcGIS.
- ❖ Four (4) hard copies and an Electronic copy of the Final Documents to include the following:  
Hydrology, Hydraulics, Scour, Risk and Uncertainty, Interior Drainage, Geotechnical Analysis, including the native electronic files of the HEC-RAS, and ArcGIS.
- ~~❖ An electronic draft of the SAP will be submitted to the AGENCY for review and comment. Upon addressing the comments, CONSULTANT will submit electronically a final version of the SAP.~~
- ~~❖ An electronic draft of the water quality memorandum shall be submitted to the AGENCY for review and comment. Upon addressing the comments, CONSULTANT shall submit electronically a final version of the memorandum.~~
- ❖ **Technical memo and preliminary layout for an infiltration basin within Ferro Basin.**
- ❖ **Brief memo characterizing Central Avenue Drain stormwater quality and modeling assumptions**
- ❖ **Technical memo reporting optimization results and sizing recommendations**

### TASK IX - FINAL DESIGN

CONSULTANT shall prepare a basis of design report and final design documents including plans, specifications and estimates. These documents shall be prepared in accordance with USACE Document Guidance and Consultant's Guide for Ventura County Procedures. CONSULTANT shall meet with AGENCY to present and discuss results of this task.

CONSULTANT shall provide engineering services for the preparation of final design documents at 60%, 90%, and 100%.

Design Plans will be prepared on standard District layout sheets (1"= 40' Horizontal, 1"= 4' Vertical) scale utilizing the boundary and topographic mapping. The existing hydraulic and erosion analyses will be utilized to refine the hydraulic design. Major elements of the project include:

- Levee Embankment Improvements
- Erosion Protection
- Access Ramps and Turnouts
- Paved Recreational Trail
- Educational Signs and other Amenities

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- Storm Water Outlet Improvements
- Low flow Diversion in Central Ave Drain

CONSULTANT shall prepare the plan & profile and typical sections for the selected alternative sufficient for construction purposes. The final design drawings will include:

1. Title Sheet
2. General Notes, Abbreviations, Symbols
3. Plans and Profiles (1"=40' Horizontal and 1"=4' Vertical)
4. Typical Sections
5. Details
6. Cross Sections (@ 100' On-Center, 1"=10' Horizontal and Vertical)

Specifications will be prepared in a format suitable for the approving agencies.

CONSULTANT shall provide engineering services for the preparation of quantities and cost estimates. Unit costs will be based upon the most current cost information for recent similar projects in the area. Costs will be presented in a tabular form.

- a. 60% Design Plans, Specifications and Estimate  
CONSULTANT shall prepare 60% design plans, specifications and estimate for project team and stakeholder review and for use in the CLOMR and permits.
- b. 90% Design Plans, Specifications and Estimate  
CONSULTANT shall prepare 90% design plans, specifications and estimate including incorporating comments provided from the project team and stakeholder reviews.
- c. 100% Design Plans, Specifications and Estimate  
CONSULTANT shall prepare 100% design plans, specifications and estimate including incorporating comments provided from the project team and stakeholder reviews. This submittal will also be forwarded to USACE.
- d. USACE Safety Assurance Review  
Project team shall attend meetings with USACE and respond to one consolidated set of Safety Assurance Review (SAR) comments through the Dr. Checks process.
- e. Final Design Plans, Specifications and Estimate  
CONSULTANT shall prepare Final design plans, specifications and estimate including incorporating comments provided from the project team, stakeholders and USACE reviews.
- f. Conditional Letter of Map Revision (CLOMR)  
Upon completion of the 60% design plans for SCR-1, CONSULTANT shall prepare the CLOMR submittal to FEMA. The technical studies and investigations required to develop the 60% design plans will be utilized as a base and the design report. The FEMA Levee (MT-2) forms and appurtenant documentation will be filled out and submitted to obtain a CLOMR. Due to the complexity of the design, it is important to confirm that the proposed flood protection improvements and analysis can be certified upon completion of construction. A CLOMR will provide FEMA's conditional approval and limit post construction processing issues through FEMA. As the approval of the CLOMR is obtained, any requested design revisions from FEMA can be incorporated into the Final design plans.

### TASK IX - Deliverables:

- ❖ Electronic copy of the 60% Documents to include the following:  
Basis of Design Report, Plans, Specifications, and Cost Estimates, including the native electronic files of the latest version of AutoCAD, Specifications, MT2-Forms, and ArcGIS.



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- ❖ Electronic copy of the 90% Documents to include the following:  
Basis of Design Report, Plans, Specifications, and Cost Estimates, including the native electronic files of the latest version of AutoCAD, Specifications, MT2-Forms, and ArcGIS.
- ❖ Electronic copy of the 100% Documents to include the following:  
Basis of Design Report, Plans, Specifications, and Cost Estimates, including the native electronic files of the latest version of AutoCAD, Specifications, MT2-Forms, and ArcGIS.
- ❖ Four (4) hard copies and an Electronic copy of the Final Documents to include the following:  
Basis of Design Report, Plans, Specifications, and Cost Estimates, including the native electronic files of the latest version of AutoCAD, Specifications, MT2-Forms, and ArcGIS.

### **3. Extra Services**

Extra Services are not included but are within the scope of the WORK and are related to the Basic Services described above. Extra Services shall be performed by CONSULTANT when ordered in writing by the Project Manager for AGENCY. The AGENCY'S written order shall include a statement of the work required and time schedule for completion. Payment for extra services performed by CONSULTANT shall be paid by AGENCY as provided in Exhibit C. Only Extra Services that are considered within the scope and intent of this contract as described herein shall be authorized.

### **4. County Services**

The following shall be provided by AGENCY:

1. Provide full information as to the requirements of the WORK.
2. Review documents submitted by CONSULTANT and provide comments, direction, or approval as needed in a timely manner.
3. Any additional survey data needs shall be provided by the AGENCY, and incorporated into the working topographic mapping by CONSULTANT.
4. Geo-referenced parcel data for areas shown in FEMA preliminary D-FIRM floodplain maps. Parcel data to contain square footage of structures.
5. All utility information to be shown on the design drawings.
6. All available information on the past performance of the SCR-1 levee including maintenance history, emergency flood fighting history, capital improvements, etc.
7. Site work improvements (such as grading and marker fabrication) and installation of the visual markers.
8. Prepare the design and perform site work improvements to the stockpile site.
9. A new topographic mapping of the levee improvements footprint at 1" = 40' scale with one foot contour intervals in the latest AutoCAD format. The new topographic mapping will include field survey of any structures that have been modified or were not included in the original 2009 field survey, focused mostly on the Hwy 101 bridge section (bridge deck, soffit) and structures (retaining walls, Central Ave. Drain, etc.) and the re-aligned levee section. Adequate topographic mapping for marking field locations based on requirements provided by CONSULTANT.
10. Contract administration, overall project management and technical review for the entirety of the project. This will include maintaining coordination and attending meetings with CONSULTANT, cities, agencies, and stakeholders.
11. Right-of-way Acquisition and Utility Relocation Rights of way for the implementation of the levee improvements. The preparation of plans and legal descriptions for these easements. Any additional right-of-way mapping required to complete the WORK.

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12. The 100-year flow hydrograph.
13. Survey documentation of the existing storm drains' outlets, inlets, inverts and manholes elevations upstream of each penetration until the ground elevation at the inlets/manholes is 2-ft above the top of levee/floodwall or the u/s limit of the storm drain system if no storm drain as-builts are available.
14. Based on information provided by CONSULTANT, AGENCY will prepare and provide encroachment, access and traffic control permits, as well as applicable permits from Fish and Wildlife, USACE, and Regional Water Quality Control Board for the geotechnical field investigations, and will provide a qualified biologist to conduct worker environmental education and to monitor field activities.
15. Full vehicular access to both ends and top of levee along the entire length of the levee for the subsurface soil exploration.
16. For the geotechnical field investigations, AGENCY will be responsible for identifying location of buried utilities that are owned or operated by AGENCY
17. A potable water supply source that can be accessed during the field exploration phase of work

End of Exhibit A

# MODIFICATION NUMBER 6 TO CONTRACT AE 13-062

## EXHIBIT B - TIME SCHEDULE (Changes in Bold/Italic)

### 1. Schedule

All Work on this contract shall be completed by 12/31/2022.

CONSULTANT shall complete intermediate tasks as follows:

#### Task Table

Task	Description	Due Date
<b>PHASE 1</b>	<b>TECHNICAL STUDIES AND IRRM PLAN</b>	
<b>I</b>	<b>PROJECT MANAGEMENT AND COORDINATION</b>	
I.a	Project Management	3/16/17
I.b	USACE Coordination and Support	Duration
I.c.	Project Kick-Off Meeting	7/22/13
I.c	Progress Meetings	Duration
<b>II</b>	<b>TECHNICAL STUDIES</b>	
II.a	Data Collection	7/23/14
II.b	Topographic Mapping	8/15/13
II.c	Hydrologic Review	8/12/13
II.d	Hydraulic Analysis	1/10/14
II.e	Sediment Transport and Scour Analyses	6/27/14
II.f	Risk and Uncertainty	7/25/14
II.g	Economic Analysis	10/14/13
II.g.v)	Draft Economic Report	12/23/13
II.g.vi)	Final Economic Report	11/14/14
II.h	Alternatives Analysis	10/17/13
II.i	Alternatives Documents	
II.i.i)(1)	90% Draft Conceptual-Level Alternatives Documents	1/6/14
II.i.i)(2)	100% Conceptual-Level Alternatives Documents	2/3/14
II.i.ii)(1)	90% Draft Feasibility-Level Alternatives Documents	1/30/15
II.i.ii)(2)	100% Draft Feasibility-Level Alternatives Documents	2/27/15
II.i.ii)(3)	Final Feasibility-Level Alternatives Documents	3/16/17
<b>III</b>	<b>IRRM Plan</b>	
III.e.i)	90% Draft FWEEP	10/16/13
III.e.ii)	100% Draft FWEEP	7/18/14
III.i.i)	90% Draft IRRM Plan	12/5/13
III.i.ii)	100% Draft IRRM Plan	1/15/15
III.i.iii)	Final IRRM Plan	3/16/17
III.j	Develop IRRMs	
III.j.i)	Support AGENCY with Measures 4 and 5	12/1/14
III.j.ii)	O&M Manual (Measure 6)	12/30/14
III.j.iii)	Visual Markers (Measure 7)	12/30/14
III.j.iv)	Stockpile Materials (Measure 8)	11/15/14

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III.k.i)	Project Kickoff and Formation of Exercise Design Team	10/28/15
III.k.ii)	Exercise Development Meetings	11/20/15
III.k.ii)	HSEEP Exercise Materials	12/3/15
III.k.iv)	Exercise Facilitation	12/3/15
III.k.v)	Exercise Evaluation	1/7/16
PHASE 2	DELETED FROM CONTRACT IN MODIFICATION NO. 1	
PHASE 3	PLANNING DOCUMENTS	
VI	PROJECT MANAGEMENT AND COORDINATION	
VI.a	Project Management	Duration
VI.b	Progress Meetings	Duration
VII	PLANNING DOCUMENTS	
VII.a.i)	Draft Initial Appraisal Report	5/19/14
VII.a.ii)	Draft-Final Initial Appraisal Report	6/30/14
VII.b.iii)(1)	Draft Reconnaissance Report 905(b)	7/14/14
VII.b.iii)(2)	Draft-Final Reconnaissance Report 905(b)	12/15/14
VII.c.i)	Draft Project Management Plan	12/15/14
VII.c.ii)	Draft-Final Project Management Plan	3/16/17
PHASE 4	FINAL DESIGN	
VI	PROJECT MANAGEMENT & COORDINATION	
VI.a	Project Management	Duration
VI.b	USACE Coordination and Support	Duration
VI.c	Project Kick-Off Meeting	6/14/17
VI.d	Progress Meetings	Duration
VI.e	Public Meetings	Duration
VII	CEQA/NEPA SUPPORT AND PERMITS	
VII.a	CEQA/NEPA and Environmental Permitting Support	1/31/19
VII.b	Caltrans Permit Coordination/Processing	11/25/21
VII.c	USACE 408 Permit Preparation/Processing	3/24/22
VIII	TECHNICAL STUDIES	
VIII.a	Data Collection	7/6/17
VIII.b	Topographic Mapping	11/9/17
VIII.c	River Hydraulic, Sediment Transport, and Scour Analysis	7/6/17
VIII.d	Risk and Uncertainty	8/17/17
VIII.e	Interior Drainage/Joint Probability Analysis	3/29/18
VIII.f	Water Quality Characterization and Recommendations	<b>10/31/18</b>
VIII.g	Geotechnical Analysis	3/29/18
IX	FINAL DESIGN	
IX.a	60% Design Plans, Specifications and Estimate	1/30/19
IX.b	90% Design Plans, Specifications and Estimate	3/18/20
IX.c	100% Design Plans, Specifications and Estimate	1/20/21
IX.d	USACE Safety Assurance Review	6/17/21
IX.e	Final Design Plans, Specifications and Estimate	3/24/22
IX.f	Conditional Letter of Map Revision (CLOMR)	6/9/21

**2. Delays**

If Work cannot be completed by the dates specified in Exhibit B through no fault of CONSULTANT, the fee for the Work not then completed may be adjusted to reflect increases in cost which occur, due to delay, from the date that the Work was required to be complete as specified in Exhibit B until the time the Work can actually be completed. Any payment of an additional fee as described in this paragraph must be authorized by AGENCY with a modification to this contract.

End of Exhibit B

## MODIFICATION NUMBER 6 TO CONTRACT AE 13-062

### EXHIBIT C – Fees and Payments (Changes in Bold/Italic)

#### 1. Fees

##### Basic Services

AGENCY shall compensate CONSULTANT as specified in this Exhibit at the lump sum amount of **\$1,801,172** to complete all WORK, specified in Exhibit A, using the payment schedule herein.

##### Extra Services (when authorized in Exhibit A)

CONSULTANT agrees to provide extra services at the rates specified in this Exhibit unless other agreements have been made in this Exhibit.

Fees for extra services shall be paid only when the work is authorized in writing by AGENCY'S Project Manager prior to the work being performed. The total amount for all Extra Services under this contract shall not exceed **\$130,000**.

##### Fee Schedule

Item	Description	Unit	Regular <sup>1</sup>	Prevailing <sup>2</sup>	Travel <sup>3</sup>
	Professional				
1	Senior Program Director	Hr	\$292.00	n/a	No
2	Program Director	Hr	\$243.00	n/a	No
3	Senior Geotechnical Manager	Hr	\$212.00	n/a	No
4	Project Manager/Sr. Project Coord	Hr	\$200.00	n/a	No
5	Senior Engineer	Hr	\$200.00	n/a	No
6	Senior Planner	Hr	\$180.00	n/a	No
7	Landscape Architect	Hr	\$170.00	n/a	No
8	Project Engineer/Project Coordinator	Hr	\$165.00	n/a	No
9	Project Planner	Hr	\$165.00	n/a	No
10	Senior GIS Specialist	Hr	\$160.00	n/a	No
11	Engineer IV	Hr	\$148.50	n/a	No
12	Environmental Specialist	Hr	\$148.50	n/a	No
13	Engineer III	Hr	\$136.00	n/a	No
14	Biologist	Hr	\$133.00	n/a	No
15	GIS Specialist	Hr	\$128.00	n/a	No
16	Engineer II	Hr	\$121.50	n/a	No
17	Engineer I	Hr	\$111.50	n/a	No
18	Water Quality Specialist	Hr	\$111.50	n/a	No
19	Designer/CAD	Hr	\$96.00	n/a	No
20	Engineering Intern/Technician	Hr	\$79.50	n/a	No



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	Administrative				
21	Graphic Designer	Hr	\$116.50	n/a	No
22	Word Processor/Admin. Support	Hr	\$79.50	n/a	No
23	Administrative Clerk	Hr	\$59.00	n/a	No

- Notes: 1) The Regular rates shown include all routine general and administrative expenses including but not limited to: phone calls, travel within Ventura County (see note 3), incidental photocopying, and office equipment unless otherwise expressly listed in the fee schedule above.
- 2) The Prevailing rates shown include all routine general and administrative expenses including but not limited to: phone calls, travel within Ventura County (see note 3), incidental photocopying, and office equipment unless otherwise expressly listed in the fee schedule above.
- 3) The word "Yes" in the Travel column above indicates that reimbursement for travel within Ventura County is authorized for the position described by that item.

### Delays

If all work under this contract cannot be completed by the dates specified in Exhibit B through no fault of CONSULTANT, the fee for the work not then completed may be adjusted to reflect increases in cost which occur, due to delay, from the date that the work was required to be complete as specified in Exhibit B until the time the work can actually be completed. Any payments of additional fee as described in this paragraph must be authorized by AGENCY with a modification to this contract.

### 3. Payments

AGENCY shall make payments to CONSULTANT as follows:

#### Basic Services

Payments shall be made monthly by AGENCY upon presentation of a properly completed AGENCY claim form by CONSULTANT. AGENCY may make progress payments for each specific task as described in the table below but not to exceed 95% of the lump sum amount provided for herein for the specific task until the completion of that task has been accepted by AGENCY.

Task	Description	Lump Sum
<b>PHASE 1</b>	<b>TECHNICAL STUDIES AND IRRM PLAN</b>	
<b>I</b>	<b>PROJECT MANAGEMENT AND COORDINATION</b>	<b>\$44,166</b>
I.a.	Project Management	\$17,656
I.b.	USACE Coordination and Support	\$14,900
I.c.	Meetings	\$11,610
<b>II</b>	<b>TECHNICAL STUDIES</b>	<b>\$299,582</b>
II.a	Data Collection	\$3,931
II.b	Topographic Mapping	\$5,080
II.c	Hydrologic Review	\$2,550
II.d	Hydraulic Analysis	\$12,258
II.e	Sediment Transport and Scour Analyses	\$79,579
II.f	Risk and Uncertainty	\$23,918
II.g	Economic Analysis	\$38,336
II.h	Alternatives Analysis	\$31,454
II.i	Alternatives Documents	
II.i.i)	Conceptual-Level Design Documents	\$39,452
II.i.ii)	Feasibility-Level Design Documents	\$47,863

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II.i.iii)	Cost Estimates	\$15,161
<b>III</b>	<b>IRRM PLAN</b>	<b>\$ 221,492</b>
III.a	IRRM Plan Layout, Description and Purpose	\$664
III.b	Identify Potential Failure Modes	\$2,362
III.c	Consequences of Failure Modes	\$10,938
III.d	Structural IRRM Alternatives	\$14,692
III.e	Non-Structural IRRM Alternatives	\$90,785
III.f	Impacts, Environment Considerations and Economics	\$10,964
III.g	Recommended IRRM Risk Informed Justification	\$7,114
III.h	Schedule and Cost to Implement	\$7,114
III.i.i)	90% Draft IRRM Plan	\$9,724
III.i.ii)	100% Draft IRRM Plan	\$2,812
III.i.iii)	Final IRRM Plan	\$2,812
III.j.i)	Support AGENCY with Measures 4 and 5	\$3,888
III.j.ii)	O&M Manual (Measure 6)	\$10,028
III.j.iii)	Visual Markers (Measure 7)	\$5,708
III.j.iv)	Stockpile Materials (Measure 8)	\$1,920
III.k.i)	Project Kickoff and Formation of Exercise Design Team	\$3,479
III.k.ii)	Exercise Development Meetings	\$10,259
III.k.ii)	HSEEP Exercise Materials	\$13,322
III.k.iv)	Exercise Facilitation	\$7,345
III.k.v)	Exercise Evaluation	\$5,562
	Subtotal Maximum Phase 1	\$565,240

### PHASE 2 SWIF PLAN – DELETED PER MODIFICATION NO. 1

<b>PHASE 3</b>	<b>PLANNING DOCUMENTS</b>	
<b>VI</b>	<b>PROJECT MANAGEMENT AND COORDINATION</b>	<b>\$8,292</b>
VI.a	Project Management	\$4,210
VI.b	Meetings	\$4,082
<b>VII</b>	<b>PLANNING DOCUMENTS</b>	<b>\$81,853</b>
VII.a	Appraisal Report	
VII.a.i)	Draft Initial Appraisal Report	\$12,336
VII.a.ii)	Draft-Final Initial Appraisal Report	\$5,347
VII.b	Reconnaissance Report 905(b)	
VII.b.iii)(1)	Draft Reconnaissance Report 905(b)	\$22,756
VII.b.iii)(2)	Draft-Final Reconnaissance Report 905(b)	\$12,327
VII.c	Project Management Plan	
VII.c.i)	Draft Project Management Plan	\$20,236
VII.c.ii)	Draft-Final Project Management Plan	\$8,851
	Subtotal Maximum Phase 3	\$90,145

<b>PHASE 4</b>	<b>FINAL DESIGN</b>	
VI	PROJECT MANAGEMENT & COORDINATION	\$163,090

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VI.a	Project Management	\$55,188
VI.b	USACE Coordination and Support	\$32,438
VI.c	Project Kick-Off Meeting	\$4,900
VI.d	Progress Meetings	\$46,509
VI.e	Public Meetings	\$24,055
VII	CEQA/NEPA SUPPORT AND PERMITS	\$104,213
VII.a	CEQA/NEPA and Environmental Permitting Support	\$19,960
VII.b	Caltrans Permit Coordination/Processing	\$17,800
VII.c	USACE 408 Permit Preparation/Processing	\$66,453
VIII	TECHNICAL STUDIES	\$405,353
VIII.a	Data Collection	\$8,969
VIII.b	Topographic Mapping	\$8,924
VIII.c	River Hydraulic, Sediment Transport, and Scour Analysis	\$36,502
VIII.d	Risk and Uncertainty	\$19,328
VIII.e	Interior Drainage/Joint Probability Analysis	\$39,076
VIII.f	Water Quality Characterization and Recommendations	<b>\$39,846</b>
VIII.g	Geotechnical Analysis	\$269,174
IX	FINAL DESIGN	\$456,665
IX.a	60% Design Plans, Specifications and Estimate	\$151,894
IX.b	90% Design Plans, Specifications and Estimate	\$121,800
IX.c	100% Design Plans, Specifications and Estimate	\$55,616
IX.d	USACE Safety Assurance Review	\$52,565
IX.e	Final Design Plans, Specifications and Estimate	\$48,696
IX.f	Conditional Letter of Map Revision (CLOMR)	\$26,094
	Subtotal Maximum Phase 4	<b>\$1,145,787</b>
	Total – Phases 1 through 4	<b>\$1,801,172</b>

### Extra Services (when authorized in Exhibit A)

When invoicing for extra services, CONSULTANT shall clearly mark on the CONSULTANT'S invoice which payments are for Extra Services and keep them separate from the costs for Basic Services. CONSULTANT shall also include a copy of the AGENCY letter authorizing the Extra Services with the claim request.

### Invoicing

CONSULTANT shall submit all requests for payments to:

Public Works Agency  
County of Ventura L#1670  
800 South Victoria Avenue  
Ventura, CA 93009-1670  
Attn: Contracts Technician

Timely invoicing by CONSULTANT is very important to AGENCY. Delays in invoicing for services performed increases the management effort required by AGENCY to ensure accurate payments to CONSULTANT and manage project budgets. Accordingly, CONSULTANT shall request payment for

## **MODIFICATION NUMBER 6 TO CONTRACT AE 13-062**

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services no later than 60 calendar days after the date that the services were performed. Requests for payment on items received by Agency more than 60 calendars days after the services were performed shall be reduced by 5% to compensate AGENCY for the additional management costs. Additionally, since increases in administrative and budgetary problems caused by late invoicing correlate to the length of delay in invoicing, there shall be an additional 5% reduction in compensation for each 30 day period beyond 60 days from when the services were performed.

CONSULTANT shall submit a final invoice within 60 days of the earliest of the following events: 1) contract completion date, 2) completion and acceptance by AGENCY of all work required by this contract, or 3) termination of the contract.

End of Exhibit C