



BLID-1857

**BOARD MINUTES
BOARD OF SUPERVISORS, COUNTY OF VENTURA, STATE OF CALIFORNIA**

**SUPERVISORS MATT LAVERE, LINDA PARKS,
KELLY LONG, ROBERT O. HUBER AND JOHN C. ZARAGOZA
December 15, 2020 at 8:30 a.m.**

CONSENT – PUBLIC WORKS AGENCY - Watershed Protection District – Confirm Modifications Nos. 1 through 5 to Professional Services Contract No. AE18-034 for Engineering Services for the Matilija Dam Removal 65% Design Planning Project with AECOM Technical Services, Inc., as Previously Approved by a Deputy Purchasing Agent; Approval of, and Authorization for the Ventura County Public Works Agency Director to Execute, Modification No. 6 to the Contract for the Additional Contract Amount of \$683,901, for a Total Not-to-Exceed Contract Amount of \$1,688,733; Contract No. AE18-034; Project No. P6081905; Watershed Protection District Zone 1; Supervisorial Districts No. 1.

- (X) All Board members are present.
- (X) Upon motion of Supervisor Zaragoza, seconded by Supervisor LaVere, and duly carried, the Board hereby approves the recommendations as stated in the respective Board letters for Consent Items 12 - 46.

By:



Lori Key
Deputy Clerk of the Board

EXHIBIT 7

Item #39
12/15/20

Central Services
Joan Araujo, Director

Engineering Services
Christopher Cooper, Director

Roads & Transportation
David Fleisch, Director

Water & Sanitation
Joseph Pope, Director

Watershed Protection
Glenn Shephard, Director

December 15, 2020

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Board of Supervisors
Ventura County Watershed Protection District
800 South Victoria Avenue
Ventura, California 93009

Subject: Confirm Modifications Nos. 1 through 5 to Professional Services Contract No. AE18-034 with AECOM Technical Services, Inc. for Engineering Services for the Matilija Dam Removal 65% Design Planning Project Previously Approved by a Deputy Purchasing Agent; Approval of and Authorization for the Ventura County Public Works Agency Director or His Designee to Execute Modification No. 6 to the Contract for the Additional Contract Amount of \$683,901, for a Total Contract Not to Exceed Amount of \$1,688,733; Contract No. AE18-034; Project No. P6081905; Supervisorial Districts 1; Watershed Protection District Zone 1

Recommendations:

It is recommended that your Board:

1. Confirm Modification Nos. 1 through 5 to Professional Services Contract No. AE18-034 with AECOM Technical Services, Inc. (attached hereto as Exhibits 3 through 7) for the Matilija Dam Removal 65% Design Planning Project for Engineering Services for the additional amount of \$182,530, as previously approved by a Deputy Purchasing Agent in the Public Works Agency.
2. Approve Modification No. 6 (Exhibit 8) to Professional Services Contract No. AE18-034 with AECOM Technical Services, Inc. for the Matilija Dam Removal 65% Design Planning Project to add additional tasks to address concerns regarding downstream impacts from sediment deposition after dam removal for the additional amount of \$683,901.
3. Authorize the Ventura County Public Works Agency Director or his designee to execute Modification No. 6 (Exhibit 8) to Professional Services Contract No. AE18-034.



Fiscal/Mandates Impact:

Mandatory: No
 Source of Funding: California Department of Fish and Wildlife
 Funding Match Required: No
 Impact on Other Departments: None

Summary of Revenues and Costs:	<u>FY 2020-21</u>	<u>FY 2021-22</u>
Revenue:	\$ 341,950	\$ 341,951
Costs:		
Direct	\$ 341,950	\$ 341,951
Indirect-Agency Dept.	\$ 0	\$ 0
Indirect-County CAP	\$ 0	\$ 0
 Total Costs	 \$ 341,950	 \$ 341,951
Net District Costs	\$ 0	\$ 0
Recovered Indirect Costs	\$ 0	\$ 0

Current FY Budget Projection:

Current FY 2020-21 Budget Projection for Watershed Protection District Zone 1 - Unit 4211				
	Adopted Budget	Adjusted Budget	Projected Budget	Estimated Savings (Deficit)
Appropriations	\$ 3,791,400	\$ 5,448,749	\$ 5,448,749	\$ 0
Revenue	\$ 4,877,500	\$ 4,877,500	\$ 4,877,500	\$ 0
Net Cost	\$(1,086,100)	\$ 571,249	\$ 571,249	\$ 0

Sufficient appropriations and revenue are included in the FY 2020-21 Zone 1 Adjusted Budget.

Discussion:

On May 23, 2017, your Board accepted a \$3,300,504 California Department of Fish and Wildlife Restoration Grant (Grant) for the Matilija Dam Removal 65% Design Planning Project located in the Unincorporated County of Ventura (attached hereto as Exhibit 1 Vicinity Map and Exhibit 2 Location Map). The Grant focuses on advancing the Matilija Dam Ecosystem Restoration Project from conceptual design, through a feasibility study to 65% design (per the CDFW Proposal Solicitation Notice definition). The main Grant tasks are: Project Management and Administration, Field Investigations, Dam Removal Feasibility Study, Independent Technical Review, Review and Update Real Estate Plan, Overall Project Permitting Plan, Update CEQA/NEPA, 65% Design Documents, and Prepare Final Report.



Transmitted herewith is a consulting services contract modification that has been negotiated with AECOM Technical Services, Inc. of Oakland, California in accordance with the policy adopted by your Board on February 6, 1996. On February 6, 2018, your Board approved a contract with AECOM Technical Services, Inc. for the Project for \$822,302 to complete field investigations, technical studies, and a feasibility study (equivalent to 10% design). As indicated in the February 6, 2018 Board Letter, tasks included in the Grant, but not in the initial contract scope of work, would be completed by other contracts or future modifications to this contract.

Modification No. 1 (Exhibit 3), executed in July 2018, added biological clearance surveys and compliance monitoring in support of field investigations to comply with California Department of Fish and Wildlife (CDFW) requirements for a cost of \$16,898. Modification No. 2 (Exhibit 4), executed in July 2019, extended the contract schedule to conduct field investigation due to a delay initiated from the acquisition of regulatory permits required for the filed investigations. Modification No. 3 (Exhibit 5), executed in December 2019, added additional tasks to review and update the 2004 Real Estate Plan prepared by the USACE for a cost of \$53,375 and extended the project schedule. Modification No. 4 (Exhibit 6), executed in February 2020, added tasks to assess possible short-term impacts caused by the flushing of fine sediment from the dam removal on downstream water supply infrastructure and identify and evaluate the potential water supply mitigation alternatives for a cost of \$32,769. Modification No. 5 (Exhibit 7), executed in July 2020, added tasks to address concerns regarding the potential long-term impacts to the operation of Casitas Municipal Water District's Robles Diversion Facility caused by increased sediment delivery following the removal of Matilija Dam for a cost of \$79,488 and extended the project schedule.

Modification No. 6 (Exhibit 8) provides for additional tasks to address concerns regarding downstream impacts from sediment deposition after dam removal by completing additional detailed hydraulic modeling and analysis using 2-dimensional (2D) methods and completing a screening level assessment of bank erosion, and advancing the design of the removal of Matilija Dam from 10 percent to 30 percent, and 30 percent to 65 percent. Tasks include, Detailed 1D and 2D Hydraulic Analysis; Screening Level Assessment of Bank Erosion Due to Dam Removal; 30 Percent Design, including 30 Percent Design Plans, a Monitoring and Adaptive Management Plan, and a 30 Percent Design Report; 65 Percent Design, including, 65 Percent Plans, Project Cost Estimate and Specifications Inventory, and a 65 Percent Design Report; and the grant Final Report.

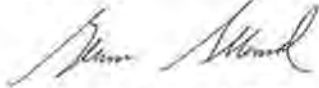
This contract modification results in a net increase of \$683,901 for a revised total fee of \$1,688,733. The current contract completion date of December 31, 2020 is extended to March 31, 2022.

This letter has been reviewed by the County Executive Office, the Auditor-Controller's Office, and County Counsel. The Modification is on a standard form previously reviewed by County Counsel.



If there are any questions regarding this item, please contact the undersigned at (805) 654-2040.

Sincerely,

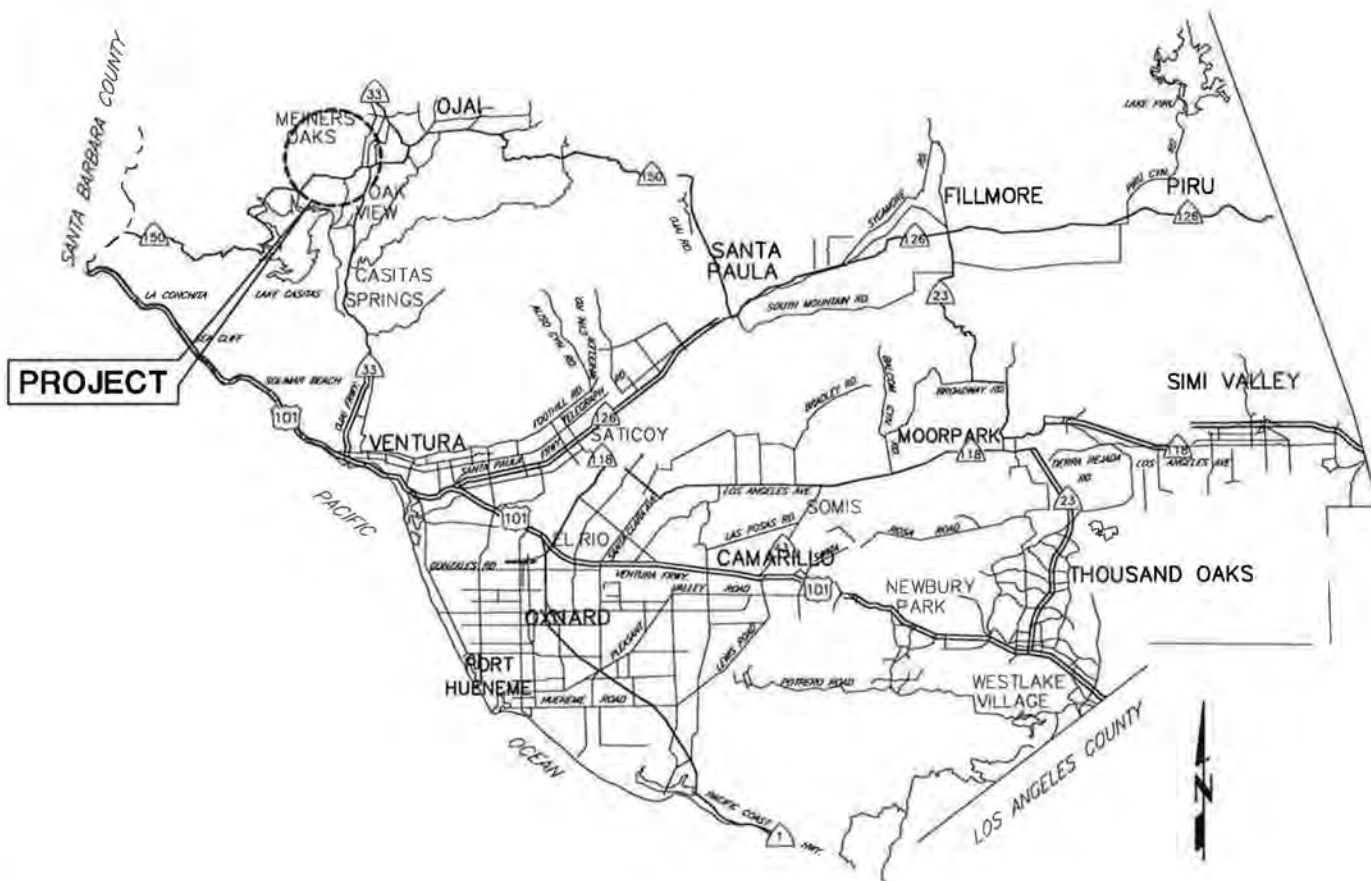


Glenn Shephard, P.E.
Director, Watershed Protection

Attachments

- Exhibit 1 – Vicinity Map
- Exhibit 2 – Location Map
- Exhibit 3 – Modification No. 1
- Exhibit 4 – Modification No. 2
- Exhibit 5 – Modification No. 3
- Exhibit 6 – Modification No. 4
- Exhibit 7 – Modification No. 5
- Exhibit 8 – Modification No. 6





VENTURA COUNTY PUBLIC WORK AGENCY - WATERSHED PROTECTION

**MATILJA DAM REMOVAL 65%
DESIGN PLANNING PROJECT**

**PUBLIC
WORKS**

VICINITY MAP

EXHIBIT 1



VENTURA COUNTY PUBLIC WORKS AGENCY - WATERSHED PROTECTION

PUBLIC
VENTURA COUNTY
WORKS

MATILIA DAM REMOVAL 65%
DESIGN PLANNING PROJECT
LOCATION MAP

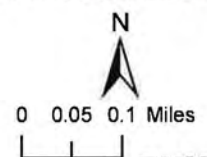


EXHIBIT 2

**COUNTY OF VENTURA
PUBLIC WORKS AGENCY
MEMORANDUM**

Date:	11/19/2020	
To:	Chris Cooper, Director – Engineering Services Department	Approved: <i>CEC 11/30</i>
From:	Peter Sheydayi, Project Manager <i>RAS</i>	
Via:	(1) Peter Sheydayi, Deputy Director, Design and Construction - Watershed Protection District <i>RAS</i> (2) Karen Goodman, ESD Consultant Contracts Specialist <i>KG</i> (3) Glenn Shephard, Director - Watershed Protection District <i>R</i>	

Subj: CONSULTANT CONTRACT MODIFICATION APPROVAL (Form 4.6-2)

1. General Information

- a. Project Title: Matilija Dam Removal 65% Design Planning Project
- b. AE Contract Number: AE18-034 Date Contract Awarded: 2/26/2018 Current Class: Class III
- c. Consultant Name: AECOM City: Camarillo, State: CA, Zip: 93012
- d. E-mail: brian.person@aecom.com

2. Justification for Modification:

It has become necessary to add additional tasks to the Contract to 1) address concerns regarding downstream impacts from sediment deposition after the dam is removed by completing additional detailed hydraulic modeling and analysis using 2-dimensional (2D) methods and completing a screening level assessment of bank erosion, and 2) advancing the design of the removal of Matilija Dam from 10 percent to 30 percent, and 30 percent to 65 percent.

3. Justification of Fees

Item	Amount	Comments
Consultant's Proposal	\$683,901.00	
PM's Original Estimate	\$734,510.00	
PM's Revised Estimate	\$663,834.24	
Negotiated Amount	\$683,901.00	

4. Modification Approval Authority

Complete the table below to determine the appropriate approval level for this modification. Make sure to use the correct contract classification tab.

Class III Contracts (All contracts with a Current Contract Amount (line c) above \$100k)		
Item	Amount	% Orig
a. Original Contract Amount (Class IA, IB or III)	\$ 822,302.00	
b. Current Board Approved Amount	\$ 822,302.00	
c. Current Contract Amount	\$ 1,004,832.00	
d. Number of Previous Modifications Issued	5	
e. Amount of this Proposed Modification	\$ 683,901.00	
f. Total of current Board Approved Modifications (b-a)	\$ -	0%
g. Total of current non-Board Approved Mods (c-b)	\$ 182,530.00	22%
h. Total of all current Modifications (f+g)	\$ 182,530.00	22%
i. Total of all non-Board approved mods (e+g)	\$ 866,431.00	105%
j. Proposed New Contract Amount (c+e)	\$ 1,688,733.00	
Test 1	Use Higher Amount	
k. 10% of Current Contract Amount (0.10 x c)	\$100,483.20	or \$25,000.00
Proposed mod (e) greater than higher amount?		YES
Test 2	Use Higher Amount	
l. 25% of Current Contract Amount (0.25 x c)	\$251,208.00	or \$100,000.00
Sum of all non-Board approved mods (l) greater than higher amount?		YES
BOARD APPROVES MODIFICATION		

Subj: CONSULTANT CONTRACT MODIFICATION APPROVAL (Form 4.8-2)


5. Summary of Negotiations

The Project Manager (PM) and Consultant negotiated the scope of work over numerous iterations in order to refine the scope needed for the \$3.3M CDFW Matilija Dam 65% Design Planning grant. This modification represents the remaining work needed from AECOM to complete this grant.

PM's estimate for 30 Percent Design, 65 Percent Design, and Final Report tasks are based on the estimate used for the CDFW grant application. Due to the 3 years since the grant was approved, PM increased labor rates from grant agreement estimate by 3% per year for a total of 9.27 percent. This matches closely to the difference between Consultant's proposal and PM's estimate for these 3 tasks implying that the Consultant has not raised labor rates from those in the estimate for the grant application. The PM's estimate for Detailed 1D and 2D Hydraulic Model was based on costs for earlier sediment and hydraulic analysis, and Bank Erosion Screening Level Assessment was based on PM's understanding of effort anticipated. Overall, PM's original estimate is 7.4% above the Consultant's proposal.

The revised estimate was calculated based on 2017 labor rates and is 2.9% lower than the Consultant's proposal. The spread between the PM's original estimate and revised estimate indicates that there is good agreement between the Consultant's proposal and PM's estimates, and no further negotiations took place.

6. Accounting Information and Funds Availability Certification by Central Services

Program	Dept	Fund	Unit	Task	Object	Amount	CSD Approval
P6081905	PWA	S710	4211	P128	2183	\$683,901.00	

\$0.00

7. Attachments:

- a. ☒ Contract Modification
- b. ☒ Consultant's Proposal
- c. ☒ Project Manager's Estimate
- d. ☒ Draft Board Letter (if Board approval is required)

MODIFICATION NUMBER 1 TO CONTRACT AE18-034

Contract Title: Matilija Dam Removal 65% Design Planning Project - Biological Clearance Surveys and Compliance Monitoring

This modification ("MODIFICATION NO. 1") is made and entered into by and between the Watershed Protection District, hereinafter referred to as AGENCY, and AECOM, hereinafter referred to as CONSULTANT.

WHEREAS, there now exists a binding contract between AGENCY and CONSULTANT originally dated 2/26/2018 for the CONSULTANT to provide engineering services to develop 65% designs to remove Matilija Dam in a manner that would reduce the impact of impounded sediment while minimizing costs and time associated with dam removal for a total contract amount of \$822,302.00 and a contract completion date of 7/11/2019 ("CONTRACT"); and

WHEREAS it has become necessary to perform biological clearance surveys and compliance monitoring for the investigations as part of the California Department of Fish and Wildlife (CDFW) 1602 Streambed Alteration Agreement; 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 2/26/18, 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:
Add Subtask 1.4 - Biological Support for Field Investigations. See revised Exhibit A attached.
3. Exhibit B (Time Schedule) shall be modified as follows:
Add Subtask 1.4 - Biological Support for Field Investigations. See revised Exhibit B attached.
4. Exhibit C (Fees and Payment) shall be modified as follows:
Agency shall pay consultant the additional lump sum of \$16,898 for said work. See revised Exhibit C attached.
5. The total contract amount is hereby *increased* by \$16,898 for a new contract total amount of \$839,200. The contract completion date *remains unchanged* at 7/11/2019.

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

FOR CONSULTANT

Name:

Theodor Feldsher 7/20/2018
Date

Title:

Associate Vice President

FOR AGENCY:

Name:

[Signature] 7/25/18
Date
Director of Public Works Agency

OEC 7/24

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

1. Overview of Project and Services

AGENCY has engaged CONSULTANT to provide the following services, which are more specifically described in the Basic Services section below, to assist AGENCY with the following project:

The Matilija Dam Removal 65% Planning Design Project, follows work completed by CONSULTANT in 2016 for the Agency. The CONSULTANT shall provide engineering services to develop 65% designs to remove Matilija Dam in a manner that would reduce the impact of impounded sediment while minimizing costs and time associated with dam removal.

2. Basic Services

The following Basic Services shall be performed by CONSULTANT:

Task 1 – Field Investigations

CONSULTANT shall perform field investigations to collect data needed for the following: 1) further analysis of the fine sediment deposits upstream of the dam, and 2) further characterization of the structural concrete comprising the dam to inform studies and structural analysis for dam removal. Field investigations shall be accomplished under the three subtasks described below.

Subtasks in Field Investigations shall include Project Management and oversight services. The CONSULTANT shall facilitate ongoing coordination and communication among staff and sub-consultants. The CONSULTANT shall coordinate general AGENCY update meetings/calls at monthly intervals, and shall address questions and concerns in a timely manner. The CONSULTANT shall also coordinate, or assist with coordinating, interaction with the California Division of Safety of Dams as necessary.

CONSULTANT services shall include implementation of quality assurance/quality control procedures following standard CONSULTANT processes. Prior to submission to the AGENCY, all deliverables shall undergo detail checks and technical reviews to verify the quality and integrity of the project tasks and written work products, and to verify that the deliverables are in accordance with the scope of work. Each technical review shall be documented using appropriate forms and this documentation shall be maintained in the CONSULTANT's project files. Invoices and project budget tracking reports shall be provided at monthly intervals.

Subtask 1.1 - Geotechnical Field Investigations to Characterize Fine Sediment and Organics

CONSULTANT shall plan the investigation, obtain a County drilling permit, obtain a DSOD permit (if one is needed), obtain and log sediment samples at six locations to an estimated depth of 60-90 feet, and perform laboratory testing. Sampling and testing shall be performed to screen for the presence of contaminants such as heavy metals and pesticides, and the results shall be compared to earlier test findings by the US Army Corps

of Engineers. Specific tests to identify the presence of metals include Title 22 (CAM17) and others depending on the target metal types. Specific tests for organics such as pesticides and hydrocarbons will include TPH, OCP, PCB, SVOC, and PAH. The tests shall be conducted in accordance with appropriate EPA sampling protocols and test methods. The borings shall be advanced through the water from a barge.

Previous investigations by the United States Army Corps of Engineers (USACE) identified that the characteristics of the organic materials in the fine sediment upstream of the dam could affect water quality during and following dam removal. Several borings were abandoned after methane gas was detected and as a result, the full depth of the sediment was not penetrated at those locations. The six borings included in the this scope of work, as indicted above, will be used to characterize the limits of the organic materials as well as collect other geotechnical information (SPT blowcount, grain size distribution and relative quantities, plasticity, shear strength, etc.) related to the sediment to confirm the transport of fine sediment from the reservoir during initial and subsequent flushing events.

Since sediment within the reservoir basin is known to be partially comprised of decomposed organic material, it is expected that methane gas emissions will occur during the drilling process. The drilling section of the Project Safety Plan shall describe specific measures addressing methane gas emissions, with alternate drilling methods that may be employed to eliminate or reduce emissions from low-pressure methane lenses. In some cases, the volume and pressure of methane escaping a penetrated lens may prohibit further advancing that boring and the drilling equipment will be removed when safe to do so. Based on the boring depth completed to that point and other factors, a decision shall be made, in consultation with the AGENCY, whether to characterize the sediment utilizing the data obtained to that depth or to drill in an alternative, representative location. Seven days of onsite drilling effort has been budgeted for this subtask.

Subtask 1.2 - Field Investigations to Characterize Dam Concrete

CONSULTANT shall perform concrete coring and testing to determine the appropriate material properties for use in the structural analyses under Subtask 2.1 and 2.7.

CONSULTANT shall develop a work plan, obtain DSOD approval, and obtain concrete cores from the downstream dam face near the two proposed orifice locations and at 4 to 6 other locations along the upstream face of the dam. The downstream cores shall be obtained from a barge platform in the plunge pool or other means of access. The upstream cores shall be obtained from the same barge platform used for the geotechnical investigations under Task 1.1. The core samples shall be 6 inches in diameter, and continuous samples shall be obtained for the full depth of each boring. The upstream borings shall be approximately 4 feet deep. Two downstream borings near the proposed orifice locations shall be approximately 4 feet deep and the remaining two shall be approximately 20 feet deep. Core samples selected for compressive strength testing will typically be at least 12 inches long. An investigation work plan and application for the concrete coring shall be prepared and submitted to DSOD for review and approval prior to the commencement of field work. The concrete core samples shall be logged and

photographed during drilling and then transported to the laboratory for further examination and testing. Selected samples shall be tested for bulk specific gravity, unconfined compressive strength, splitting tensile strength, and elastic modulus properties. Petrographic analysis and gel fluorescence testing shall also be conducted to assess the presence of Alkali Silica Reaction (ASR) in the concrete.

Subtask 1.3: Field Investigations Memorandum

CONSULTANT shall document the results from the field investigations described under Subtasks 1.1 and 1.2 in a technical memorandum (TM). The TM shall present the results of the investigations, including fine sediment boring logs, concrete core logs, and laboratory test results for both the sediment samples and the concrete core samples. All boring logs shall be photo documented for inclusion as appendices to the TM.

Subtask 1.4: Biological Support for Field Investigations

CONSULTANT shall conduct pre-construction surveys. To comply with permitting requirements, at least three pre-construction biological surveys, at least three days apart with the last survey within three days of mobilization, shall be conducted by two qualified biologists. CONSULTANT shall mobilize two biologists to conduct biological pre-construction surveys of the perimeter of Matilija Reservoir and the plunge pool at the base of the dam. Surveys shall be conducted in the habitat communities surrounding the water bodies out to 300 feet and does not include protocol-level biological surveys for sensitive species. The biologist shall coordinate with the AGENCY for access and appropriate routes to conduct the surveys. This work assumes three, 8-hour days to allow for travel, coordination, and access to the areas for surveys.

CONSULTANT shall perform geotechnical work monitoring. A qualified biological monitor shall be present periodically during work activities. Geotechnical work is anticipated to begin on July 31, 2018, and continue on weekdays through approximately August 9, 2018, for a total of 8 days of biological monitoring. The monitor shall be responsible for daily clearance surveys prior to work commencing, ensuring compliance with the species protection measures, and documenting BMP practices.

CONSULTANT shall coordinate with the AGENCY to discuss any special-status species findings during the course of the surveys and monitoring. If any sensitive biological resources are identified, the AGENCY shall be notified and applicable species protection measures shall be discussed and implemented. CONSULTANT'S biologist shall participate in conference calls to present interim finding of biological pre-construction surveys and monitoring.

Any non-compliance observations and/or sensitive resource observations shall be immediately reported to the project manager and communicated to the AGENCY. If active bird nests are found within the area potentially affected by the work, which

was defined as 300 feet, work shall be redirected or postponed until the nest is no longer active or other protection measures are implemented in coordination with the AGENCY

This work assumes 6-hour days to allow for travel, access and a clearance survey prior to the start of each day's work and assumes the geotechnical investigation crews work an 8-hour day.

CONSULTANT shall provide reporting. A biological survey and monitoring report shall be completed (Project Completion Report) as required by the AGENCY, which shall include the following:

- **Site conditions / vegetation in or adjacent to project area;**
- **Distance to adjacent or downstream sensitive biological resources and description of resource;**
- **Summary/general descriptions of vegetation types within the survey and monitoring area;**
- **Summary of preconstruction surveys via email documenting any nesting bird or other sensitive resources;**
- **Cumulative lists of common and special-status wildlife species found at the project site during all surveys (detailed species descriptions are not necessary);**
- **If special-status species that should be reported to the California Natural Diversity Database are observed, a statement shall be included of when such reports were submitted. Additionally, the completed California Native Species Field Survey Form(s) shall be appended to the project completion report;**
- **Documentation of BMPs implemented to avoid biological resource impacts; and**
- **Any problems/examples of non-compliance and how they were resolved.**

Task 1 Deliverables:

- Conference calls shall be held at monthly intervals to facilitate coordination, input and provide progress summaries to the AGENCY/Contract Management Team. CONSULTANT shall prepare agendas and meeting minutes for each meeting.
- CONSULTANT shall coordinate quarterly (4) meetings between CONSULTANT/AGENCY/Contract Management Team/Technical Advisory Committee (TAC) in Ventura over the performance period involving CONSULTANT and two other team members.
- CONSULTANT shall coordinate one meeting between CONSULTANT/AGENCY/DSOD in Sacramento over the performance period involving the CONSULTANT and two other team members.
- Project Safety Plan
- Work plan and application for submission to DSOD
- Coordination with DSOD during permit processing as required
- Draft Field Investigations TM characterizing the fine sediment and assessing the concrete condition
- Revised Draft (if necessary) Field Investigations TM, incorporating comments received on Draft TM.

- Final Field Investigations TM, incorporating comments received on Revised Draft TM.
- Invoices, progress reports, meeting minutes, and other documentation as necessary.
- ***The biological monitor shall complete pre-construction field reports and daily monitoring field reports for inclusion in the Project Completion Report.***
- ***The CONSULTANT'S qualified biologist shall prepare the Project Completion Report within 15 days of project completion and shall address AGENCY comments and return the final version within 7 days of receipt of AGENCY comments.***

Task 2: Dam Removal Feasibility Study

CONSULTANT shall prepare a feasibility study to advance the conceptual design for installing two large diameter orifices in Matilija Dam, implementing fine sediment evacuation by opening the orifices during a flushing storm event, and demolition of the dam following sediment flushing. The feasibility study shall be accomplished under the subtasks described below. Subtasks in the Dam Removal Feasibility Study shall include Project Management and oversight services. CONSULTANT shall facilitate ongoing coordination and communication among staff and sub-consultants. CONSULTANT shall coordinate general AGENCY update meetings/calls at monthly intervals, and shall address questions and concerns in a timely manner. CONSULTANT shall also coordinate, or assist with coordinating, interaction with the California Division of Safety of Dams as necessary.

Project Management services shall include implementation of quality assurance/quality control procedures following standard CONSULTANT processes. Prior to submission to the AGENCY, all deliverables shall undergo detail checks and technical reviews to verify the quality and integrity of the project tasks and written work products, and to verify that the deliverables are in accordance with the scope of work. Each technical review shall be documented using appropriate forms and this documentation shall be maintained in the CONSULTANT'S project files. Invoices and project budget tracking reports shall be provided at monthly intervals.

Subtask 2.1: Structural Evaluation of Dam With and Without Orifices

CONSULTANT shall perform analyses to verify that installation of the proposed large diameter orifices into the dam shall not adversely impact the seismic stability or safety of the structure. Using the data obtained from the concrete cores under Subtask 1.2, the current strength of the concrete in the dam shall be estimated and compared with the strength assumed in the previous structural analyses (URS, AE11-06). The three-dimensional linear elastic finite element (ANSYS) model prepared by URS under the previous contract with the AGENCY (AE11-06), shall be modified to include the orifices and the suite of analyses re-run. The results of the runs on the modified model shall be compared to the results from the URS study, with specific focus on the stresses in the vicinity of the proposed orifices to verify that the presence of the orifices is not expected to significantly impact the stability of the dam during static or dynamic loading.

Subtask 2.2: Detailed Sediment Transport Modeling From Dam to Ocean

CONSULTANT shall review earlier modeling efforts for fine and coarse sediment transport prepared for the Matilija Dam Removal (by Reclamation and CONSULTANT), incorporate information collected in Subtask 1.1, and develop detailed modeling of transport from the dam to the Pacific Ocean using the DREAM-2 model.

The DREAM-2 model is one of the two Dam Removal Express Assessment Models developed at Stillwater Sciences (Cui et al. 2006), which simulate the transport of both coarse and fine sediment following dam removal. The model, its predecessors, and sister models have been applied in more than a dozen large and small scale sedimentation analysis projects, including river sedimentation of a mining project that has released close to 2 billion tons of sediment (to date) into a river corridor (Pickup and Cui 2009), and the removal of Marmot Dam in the Sandy River, Oregon (Cui and Wilcox 2008). Comparisons of simulated and surveyed post-dam removal channel degradation/aggradation in the Sandy River, which has similar geomorphic conditions with Matilija Creek and Ventura River, indicated that the model likely outperformed any previous model simulations of similar magnitude (Cui et al. 2014). The model has also been extensively examined with flume experimental data (Cui et al. 2008) and against a natural landslide (Sutherland et al. 2002) and proven to perform satisfactorily. It is also worth noting that a preliminary DREAM-2 model was developed for the Matilija Dam removal project during the last contract phase completed in 2016 (AE14-033).

The future with project condition shall be modeled with rate of sediment input established in earlier studies and with downstream project components determined in collaboration with the AGENCY and the CONSULTANT. Modeling shall include peak flow and daily average hydrologic analyses under existing conditions, along with select representative years (such as the year that represents the occurrence of 100-yr flood). Two sets of model runs simulating sediment transport following dam removal, each comprised of 5 to 7 runs, are proposed under the most-likely scenario: dam removal during a 4-yr flood event (the minimum flood event required to remove the dam under the previous CONSULTANT study) and dam removal during a 10-yr flood event. In both scenarios a 100-yr flood event shall be inserted into the discharge series, representing it to occur at different years after dam removal. The purpose of the 100-yr flood modeling is to examine the maximum sediment deposition (i.e., worst-case-scenario) that would occur in different downstream river reaches during the 100-yr flood event so as to inform hydraulic modeling in Task 2.3. In addition to runs simulating sediment transport following dam removal described above, a separate model run shall be conducted simulating the terminal effect of dam removal. This run shall be conducted by using the projected post-removal sediment supply as model input, and extended to the future years when a new quasi-equilibrium bed profile is established. The simulated profile shall also be provided to Task 2.3 for evaluation of the long-term effect of dam removal on the 100-yr flood event.

In addition to the modeling runs, a mass conservation analysis similar to that presented in Cui et al (2011) for the Slab Creek Reservoir sedimentation process shall be conducted to better approximate the time at which sand and gravel will begin to pass the dam if the

structure remains in place. The analysis shall apply basic geomorphic principles and shall utilize reasonable assumptions with regard to the profiles of sand and gravel deposits within the reservoir as the gravel continuously advances downstream and aggrades upward, replacing some of the more mobile sand deposits within the reservoir with coarser sediment. The results of this analysis shall provide a reference condition for the no-project alternative.

Subtask 2.2 Sediment Transport Modeling Summary

Condition	Event Recurrence Interval or Flow Rate	Presumed Number of Model Runs
Baseline (current)	Available Discharge Record	1
Dam Removal	4 year and 10 year event during the year of dam removal, 100-yr peak flow in different years after dam removal	10-14
Long- Term Following Dam Removal	Available discharge record, running repeatedly to achieve a new quasi-equilibrium	1

Subtask 2.3 - Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses

CONSULTANT shall conduct hydraulic modeling along the reaches of Matilija Creek and the Ventura River from the dam to the Pacific Ocean. The purpose of this task is to determine changes in flood elevations along Matilija Creek and the Ventura River resulting from dam removal. The first step of this task is to review the existing conditions in the Reclamation HEC-RAS model to ensure that it is generally accurate and the model is functioning properly. Steady state flood modeling shall then be conducted using 100-year peak flow, as well as 10-year, 25-year, and 50-year flows, applied to the modeled river profiles provided in Task 2.2. The modeling first establishes the existing conditions and future conditions (with dam). Next, post-removal channel geometries shall be imported into the HEC-RAS model based on: 1) detailed sediment transport analyses (i.e., changes in channel bed elevations/geometry based on coarse sediment transport results from Task 2.2) and 2) proposed upgrades of the Robles Diversion Dam and other downstream project components, to be determined in collaboration between CONSULTANT and AGENCY. Post-removal modeling shall be conducted using the same peak flow events as used for existing-conditions modeling. Several post-removal channel profiles shall be selected to conduct hydraulic modeling. The profiles shall be selected based on sediment transport modeling results to represent the highest levels of aggradation in different reaches of the channel as the sediment wave gradually progresses downstream, resulting in the maximum sediment deposit occurring in different reaches in different years following dam removal. Then, the existing and proposed conditions model results shall be compared in profile plots and water surface elevation comparison tables. Additionally, overbank inundation depth comparisons shall be generated for existing and proposed conditions model results based on HEC-RAS water surface elevations and 2005 LiDAR topography. Inundation results shall be presented in a map format. Up to five different post-removal channel geometry conditions shall be evaluated to account for dynamic channel conditions as different reaches experience

peak bedload sediment deposition at different times or under different hydrologic scenarios (i.e., peak discharge occurs in different years).

Subtask 2.4: Re-evaluation of Downstream Project Components (Santa Ana and Camino Cielo Bridges, Live Oak Acres and Meiners Oaks Levees, and Robles High Flow Bypass).

CONSULTANT shall re-evaluate the downstream project component designs in light of the results of 100-yr flood routing performed under Subtask 2.3.

The various downstream project components are currently at varying levels of design, approximately as follows: Santa Ana Bridge – 100%; Camino Cielo Bridge – 5%; Live Oak Acres Levee – 90%; Meiners Oaks Levee – 90%; Casitas Springs Levee – 5%; Robles High Flow Bypass – 90%; and, Foster Park Wells – 100%.

The design of each of the downstream project components is based on 100-yr flood levels that were developed for USACE's Alternative 4b dam removal project. CONSULTANT shall compare the 100-yr flood level used for downstream project component designs to levels required for FEMA certification based on 100-yr water surface elevation determined in Subtask 2.3. CONSULTANT shall develop and recommend alternative design revisions based on the results of the comparison of changes in hydraulics as well as input from the Contract Management Team, and review and update construction costs estimates, as appropriate.

Subtask 2.5: Predictability Assessment of Flushing Storm Event

CONSULTANT shall collect and review weather forecast data from the National Weather Service from the standpoint of how predictable flushing storm events are, and a model shall be developed to estimate risk associated with under-predicting a minimum flushing storm event.

Predicting that an incoming storm is of sufficient intensity to produce the required minimum flushing storm event is a key component of the feasibility study for the Project. Stream gage data for Matilija Creek and for the Ventura River indicate that storm events with adequate flushing flows have a recurrence interval of approximately three years. Historic storm events to be analysed, include flushing event storms and a range of storm events that result in flows significantly less than the minimum flushing storm event, shall be used to repeat the fine sediment analyses conducted during the previous study contract (URS, AE14-033) to determine the risks of under-predicting the storm event during dam removal. The results of the fine sediment and organics characterization from Subtask 1.1 shall provide updated information with regard to sediment gradation, erodibility, etc. that shall either affirm the previous fine sediment analysis (URS, AE14-033) or allow for updated analysis with the same methodology. The sediment profile, in particular a determination of its composition and erosive tendencies, will help predict the efficacy of each storm event type (peak flow rate, duration, and recurrence interval) in mobilizing the sediment.

Subtask 2.6 - Update Dam Removal Concept To 10 Percent Design

CONSULTANT shall advance the design for the large diameter orifices, excavation of the orifice openings, dam demolition, and restoration of the reservoir area from the current conceptual level to a 10 percent design. Document the updated design on engineering plans.

A list of conceptual drawings anticipated to be included at the 10 percent design level include:

1. Project location and general arrangement plan
2. Dam site area plan
3. Dam and plunge pool plan view
4. Upstream elevation view
5. Downstream elevation view
6. Dam section views
7. Large diameter orifice sections and details
8. Orifice excavation sequencing plan and details
9. Dam demolition sequencing – profile and details
10. Post-flush channel plan, profile, and sections
11. Sediment disposal areas - plan and sections
12. Post-project restoration plan -- reservoir area

Subtask 2.7 – Updated Dam Structural Analysis

CONSULTANT shall review and update as appropriate the 2013 (AE11-06) structural analysis for Matilija Dam to address comments or concerns with the analysis based on the findings of Subtask 2.1. The model geometry shall be updated to reflect the proposed orifices through the structure with the 10 Percent Design from Subtask 2.6. Using updated data on the concrete strength obtained in Subtask 1.2 and refined in Subtask 2.1, the three-dimensional linear elastic finite element (ANSYS) model, modified from the model used in the URS 2013 study, shall be used to evaluate usual (normal), unusual (flood), and extreme (seismic) loading conditions on the dam with and without the orifices and with and without sediment behind the dam to assess the safety of the dam.

Subtask 2.8: Dam Removal Feasibility Study Report

CONSULTANT shall document the results of Subtasks 2.1 through 2.7 in a comprehensive report for comment by the various stakeholders including DSOD. The Feasibility Study Report (Report) shall summarize the results of the data obtained and analysis performed in each subtask, and shall incorporate as appendices or by reference the technical memorandum provided in Subtask 1.3. It is anticipated that the content and format of the Report may evolve as work on the other subtasks progresses and the Report will be structured in response. Further, the Report shall focus in part on addressing specific areas of interest or concern expressed by DSOD or other regulatory entities.

Incorporate stakeholder comments, where possible, into the final report and include an appendix of stakeholder comments and responses in the final report.

Draft Feasibility Study Table of Contents:

Executive Summary

- 1.0 Introduction
- 2.0 Summary of Field Investigations
- 3.0 Reservoir Fine Sediment
- 4.0 Dam Concrete
- 5.0 Structural Evaluation of Orifice Alternative
- 6.0 Sediment Transport Modeling
- 7.0 Hydraulic Studies Based on Sediment Modeling
- 8.0 Re-evaluation of Downstream Project Components
- 9.0 Assessment of Flushing Storm Events
- 10.0 Dam Removal Concept – 10% Level Design
- 11.0 Updated Structural Analysis of Dam
- Appendix 1 – Stakeholder Comments

Task 2 Deliverables:

- CONSULTANT/AGENCY/Contract Management Team conference calls shall be held at monthly intervals to facilitate coordination, input and provide progress summaries to the AGENCY/Management Team. CONSULTANT shall prepare agendas and meeting minutes for each meeting.
- CONSULTANT shall coordinate quarterly (4) meetings between CONSULTANT/AGENCY/Contract Management Team/Technical Advisory Team (TAC) in Ventura over the performance period involving CONSULTANT and two other team members.
- CONSULTANT shall coordinate two meetings between CONSULTANT/AGENCY/DSOD in Sacramento over the performance period involving CONSULTANT and two other team members.
- Draft Concrete Structural Strength Comparative Analysis and Stability Evaluation Report for AGENCY/Contract Management Team/TAC review
- Revised Draft Concrete Structural Strength Comparative Analysis and Stability Evaluation Report incorporating AGENCY/Contract Management Team/TAC comments
- Final Concrete Structural Strength Comparative Analysis and Stability Evaluation Report
- Draft Sediment Transport and Hydraulics Modelling Memo for AGENCY/Management Team/TAC Review
- Revised Sediment Transport and Hydraulics Modelling Memo incorporating AGENCY/Management Team/TAC comments
- Final Sediment Transport and Hydraulics Modelling Memo
- All native files for HEC-RAS and any other hydraulic computer modeling programs employed.
- Draft Re-evaluation of Downstream Project Components Designs Summary for AGENCY/Management Team/TAC Review
- Revised Draft Re-evaluation of Downstream Project Components Designs Summary incorporating AGENCY/Management Team/TAC comments
- Final Re-evaluation of Downstream Project Components Designs Summary

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- Summary of Recommended Alternative Design Revisions for Downstream Project Components (depending on the outcome of the deliverables described above)
- Draft Summary of Risk Estimate in Under-Predicting a Flushing Storm Event for AGENCY/Management Team/TAC Review
- Revised Draft Summary of Risk Estimate in Under-Predicting a Flushing Storm Event incorporating AGENCY/Management Team/TAC comments
- Final Summary of Risk Estimate in Under-Predicting a Flushing Storm Event
- Draft 10 Percent Level Design package (to include conceptual drawings, preliminary descriptions of boring and demolition requirements and sequencing, a description of the key design elements, a description of restoration requirements and objectives, etc.) for Orifice Boring, Dam Demolition, and Reservoir Area Restoration for Management Team/TAC Review
- Revised Draft 10 Percent Level Design package for Orifice Boring, Dam Demolition, and Reservoir Area Restoration incorporating Management Team/TAC comments
- Final 10 Percent Level Design package for Orifice Boring, Dam Demolition, and Reservoir Area Restoration
- Draft Summary of Matilija Dam Structural Analysis for AGENCY/Contract Management Team/TAC review
- Revised Draft Summary of Matilija Dam Structural Analysis Incorporating AGENCY/Contract Management Team/TAC comments
- Final Summary of Matilija Dam Structural Analysis
- Draft Dam Removal Feasibility Report for AGENCY/Contract Management Team/TAC review
- Revised Draft Dam Removal Feasibility Report incorporating AGENCY/Contract Management Team/TAC comments
- Final Dam Removal Feasibility Report incorporating Contract Management Team comments
- Invoices, progress reports, meeting minutes, and other documentation as necessary.

3. Extra Services

Extra Services are separate from but related to the Basic Services described above. Extra Services shall be performed by CONSULTANT only after being authorized in writing by the Project Manager for AGENCY. AGENCY's written authorization will include a statement of the Extra Services required and time schedule for completion. CONSULTANT's billing and AGENCY's payment for Extra Services shall occur pursuant to Exhibit C.

4. County Services

AGENCY will provide or accomplish the following:

1. Full information as to the requirements of the services to be provided by CONSULTANT under the contract.
2. Review documents submitted by CONSULTANT and provide comments, direction, or approval as needed in a timely manner.
3. Provide environmental permitting for all field investigations.

End of Exhibit A

EXHIBIT B - TIME SCHEDULE**1. Schedule**

All Work on this contract shall be completed by 07/11/2019.

CONSULTANT shall complete intermediate tasks as follows:

Task Table

Task	Description	Due Date
1	Field Investigations	
1.1	Geotechnical Field Investigations to Characterize Fine Sediment and Organics	07/07/2018
1.2	Field Investigations to Characterize Dam Concrete	07/07/2018
1.3	Field Investigations Memorandum	08/30/2018
1.4	<i>Biological Support for Field Investigations</i>	<i>09/15/2018</i>
2	Dam Removal Feasibility Study	
2.1	Structural Evaluation of Dam With and Without Orifices	10/24/2018
2.2	Detailed Sediment Transport Modeling From Dam to Ocean	10/24/2018
2.3	Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses	11/22/2018
2.4	Re-evaluation of Downstream Project Components	03/11/2019
2.5	Predictability Assessment of Flushing Storm Event	09/27/2018
2.6	Update Dam Removal Concept To 10 Percent Design	11/22/2018
2.7	Updated Dam Structural Analysis	12/19/2018
2.8	Dam Removal Feasibility Study Report	04/11/2019

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

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EXHIBIT C – Fees and Payments

1. Compensation Summary

The following summarizes the maximum amount of compensation available to CONSULTANT under this contract. The actual amount of compensation shall be established and paid in accordance with the applicable provisions of the contract including this Exhibit C.

Maximum Fees for Basic Services:	<u>\$ 839,200.00</u>
Maximum Fees for Extra Services:	<u>\$ 0.00</u>
Maximum Reimbursement for Expenses:	<u>\$ 0.00</u>
Total Amount Not to Exceed:	<u>\$ 839,200.00</u>

2. Fees For Basic Services

AGENCY agrees to pay CONSULTANT the following fees for Basic Services

☒ a **fixed fee** compensation, in the lump sum amount of \$ 839,200.00, for completion of all Basic Services.

Task Table

Task	Description	Lump Sum
1	Field Investigations	
1.1	Geotechnical Field Investigations to Characterize Fine Sediment and Organics	\$137,538.00
1.2	Field Investigations to Characterize Dam Concrete	\$61,612.00
1.3	Field Investigations Memorandum	\$32,034.00
1.4	Biological Support for Field Investigations	16,898.00
2	Dam Removal Feasibility Study	
2.1	Structural Evaluation of Dam With and Without Orifices	\$32,992.00
2.2	Detailed Sediment Transport Modeling From Dam to Ocean	\$135,594.00
2.3	Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses	\$43,886.00
2.4	Re-evaluation of Downstream Project Components	\$61,172.00
2.5	Predictability Assessment of Flushing Storm Event	\$42,070.00
2.6	Update Dam Removal Concept To 10 Percent Design	\$102,520.00
2.7	Updated Dam Structural Analysis	\$147,248.00
2.8	Dam Removal Feasibility Study Report	\$25,636.00
Total		\$839,200.00

3. Fees For Extra Services

For Extra Services authorized in writing in advance by AGENCY in accordance with Exhibit A, AGENCY agrees to pay CONSULTANT an **hourly rate** compensation for actual hours of Extra Services performed that is based upon the hourly rates set forth in the Rate Table for Basic Services above or, if none, then

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based upon the hourly rates set forth in the following Rate Table for Extra Services, which rates shall remain fixed for the duration of the contract, not to exceed the **maximum fee amount of \$ 0.00**.

4. Delays

If Work cannot be completed by the dates specified in Exhibit B through no fault of CONSULTANT, the fees 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 written modification to this contract.

5. Reimbursable Expenses

CONSULTANT shall be reimbursed a sum for the following reasonable out-of-pocket expenses that are incurred and paid for by CONSULTANT in furtherance of performance of its obligations under this contract, but only to the extent that such expenses are directly related to CONSULTANT's services hereunder and do not exceed the **maximum reimbursable amount of \$ \$0.00** :

(i) Outside printing directly related to deliverables but not for internal uses of CONSULTANT or its Subconsultants;

(ii) Reproduction or reprographic costs directly related to deliverables but not for internal uses of CONSULTANT or its Subconsultants. If CONSULTANT provides allowable reprographic services using its own equipment rather than using an outside service, the unit billing rates for such charges must be approved in advance by AGENCY;

(iii) Shipping, overnight mail, postage, messenger, courier and/or delivery services (but not for CONSULTANT's internal communications);

(iv) Only if authorized in writing in advance by AGENCY, reimbursement for business travel for the specific position descriptions so identified in the Rate Tables for Basic Services or Extra Services set forth above. AGENCY shall reimburse CONSULTANT for transportation, lodging, and meal expenses consistent with the policies and amounts approved for County employees as defined by policy number Chapter VII(C)-1, *Reimbursement of Employees County Business Expenses*, in the County's Administrative Policy Manual (latest edition);

(v) Only if authorized in writing in advance by AGENCY, fees and costs for Subconsultant services that are not included in the Rate Tables for Basic Services or Extra Services set forth above.

Exclusive List. The list of reimbursable expenses set forth above is the sole and exclusive list of reimbursable expenses that CONSULTANT is entitled to receive.

Approval Limits. Any reimbursable expense wherein a single item exceeds \$500 in value, whether purchased or leased, must be approved in writing in advance by AGENCY.

No Administrative Charge or Mark-Ups. The reimbursement provided for herein shall not include an administrative charge, multiplier or other mark-up by CONSULTANT unless authorized in writing, in advance, by AGENCY.

No Reimbursement for Specified Basic Services Paid for by a Fixed Fee. Notwithstanding the above, expenses related to Basic Services specified in Exhibit B are not reimbursable if CONSULTANT is compensated for Basic Services by a fixed fee.

6. Payment

AGENCY shall make payments to CONSULTANT under the contract as follows:

MODIFICATION NUMBER 01 TO CONTRACT AE18-034

Requests for Payment

To request payment, CONSULTANT shall complete and submit to AGENCY a Consultant Services Invoice Form that shall include, at a minimum, (i) personnel time records for Basic Services and Extra Services actually performed at the rates specified in this Exhibit C if applicable and (ii) receipts for all authorized reimbursable expense, along with the written AGENCY authorization for any specific reimbursable expenses requested for payment, if required above.

When invoicing for Extra Services, CONSULTANT shall clearly mark on the Invoice Form which services are Extra Services and keep those services separate from or Basic Services, and shall include a copy of the written AGENCY authorization for the Extra Services for which payment is requested.

CONSULTANT shall submit all invoices to:

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

Payment Schedule

Payments shall be made monthly by AGENCY upon presentation of a properly completed AGENCY Invoice Form as described above. Upon approval of the invoice, AGENCY shall pay CONSULTANT 95% of the maximum fee for the specific task/milestone. Upon completion and acceptance by AGENCY of the task/milestone, AGENCY shall pay CONSULTANT the balance of the fee.

Timely Invoicing

Timely invoicing by CONSULTANT is required. 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 submit a properly completed invoice no later than 60 calendar days after the services which are the subject of the invoice were performed. An invoice received by AGENCY more than 60 calendar days after the services were performed shall be reduced by 5% to compensate AGENCY for the additional management costs. Additionally, since increases in administrative costs and budgetary problems caused by late invoicing correlate to the length of delay in invoicing, there will be an additional 5% reduction in compensation for each additional 30-calendar-day period beyond 60 days between the date the services were performed and the submission of the invoice for those services.

CONSULTANT shall submit a final invoice form within 60 days of the earliest of the following events: 1) completion and acceptance by AGENCY of all Work required by the contract; or 2) termination of the contract.

End of Exhibit C

MODIFICATION NUMBER 2 TO CONTRACT AE18-034

Contract Title: Matilija Dam Removal 65% Design Planning Project

This modification ("MODIFICATION NO. 2") is made and entered into by and between the Watershed Protection District, hereinafter referred to as AGENCY, and AECOM, hereinafter referred to as CONSULTANT.

WHEREAS, there now exists a binding contract between AGENCY and CONSULTANT originally dated 2/26/2018 for the CONSULTANT to provide engineering services to develop 65% designs to remove Matilija Dam in a manner that would reduce the impact of impounded sediment while minimizing costs and time associated with dam removal for a total contract amount of \$822,302.00 and a contract completion date of 7/11/2019 ("CONTRACT"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT 7/25/2018 for the CONSULTANT to perform biological clearance surveys and compliance monitoring for the investigations as part of the California Department of Fish and Wildlife (CDFW) 1602 Streambed Alteration Agreement for and additional contract amount of \$16,898. ("MODIFICATION NO.1"); and

WHEREAS it has become necessary to extend the contract time and task due dates due to a delay initiated from the acquisition of regulatory permits required for the field investigations; 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 2/26/18, 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:
Exhibit A shall remain unchanged.
3. Exhibit B (Time Schedule) shall be modified as follows:
See revised Exhibit B attached.
4. Exhibit C (Fees and Payment) shall be modified as follows:
Exhibit C shall remain unchanged.
5. The total contract amount shall hereby remain unchanged at \$839,200. The contract completion date is changed from 7/11/2019 to 11/30/2019.

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

FOR CONSULTANT

Name:

Theodore Edgsher

7/16/2019

Date

Title:

Vice President

FOR AGENCY:

Name:

[Signature]
Director of Public Works Agency

7/25/19

Date

GEC/16

EXHIBIT B - TIME SCHEDULE**1. Schedule**

All Work on this contract shall be completed by 11/30/2019.

CONSULTANT shall complete intermediate tasks as follows:

Task Table

Task	Description	Due Date
1	Field Investigations	
1.1	Geotechnical Field Investigations to Characterize Fine Sediment and Organics	09/01/2018
1.2	Field Investigations to Characterize Dam Concrete	09/01/2018
1.3	Field Investigations Memorandum	07/31/2019
1.4	Biological Support for Field Investigations	09/01/2018
2	Dam Removal Feasibility Study	
2.1	Structural Evaluation of Dam With and Without Orifices	08/31/2019
2.2	Detailed Sediment Transport Modeling From Dam to Ocean	08/31/2019
2.3	Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses	08/31/2019
2.4	Re-evaluation of Downstream Project Components	09/30/2019
2.5	Predictability Assessment of Flushing Storm Event	08/31/2019
2.6	Update Dam Removal Concept To 10 Percent Design	09/30/2019
2.7	Updated Dam Structural Analysis	09/30/2019
2.8	Dam Removal Feasibility Study Report	11/30/2019

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 3 TO CONTRACT AE18-034

Contract Title: Matilija Dam Removal 65% Design Planning Project

This modification ("MODIFICATION NO. 3") is made and entered into by and between the Watershed Protection District, hereinafter referred to as AGENCY, and AECOM, hereinafter referred to as CONSULTANT.

WHEREAS, there now exists a binding contract between AGENCY and CONSULTANT originally dated 2/26/2018 for the CONSULTANT to provide engineering services to develop 65% designs to remove Matilija Dam in a manner that would reduce the impact of impounded sediment while minimizing costs and time associated with dam removal for a total contract amount of \$822,302.00 and a contract completion date of 7/11/2019 ("CONTRACT"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT on 7/25/2018 for the CONSULTANT to perform biological clearance surveys and compliance monitoring in support of field investigations to comply with California Department of Fish and Wildlife (CDFW) requirements for an additional contract amount of \$16,898. ("MODIFICATION NO.1"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT on 7/25/2019 to extend the CONTRACT time and task due dates due to a delay initiated from the acquisition for regulatory permits required for the filed investigations at an unchanged contract amount \$839,200 and to extend the CONTRACT completion date from 7/11/2019 to 11/30/2019 ("MODIFICATION NO.2"); and

WHEREAS it has become necessary to add additional tasks for the CONSULTANT to review and update the 2004 Real Estate Plan prepared by the USACE; 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 2/26/18, 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:
See revised Exhibit A, attached.
3. Exhibit B (Time Schedule) shall be modified as follows:
See revised Exhibit B, attached.
4. Exhibit C (Fees and Payment) shall be modified as follows:
See revised Exhibit C, attached.
5. The total contract amount shall hereby increased by \$53,375 for a new CONTRACT total amount of \$892,575. The contract completion date is changed from 11/30/2019 to 06/30/2020.

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

FOR CONSULTANT

Name: Theodore B. Feldsher 12/24/2019

Date

Title: Vice President

FOR AGENCY:

Name: [Signature] 12/20/19

Date

Director of Public Works Agency

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

1. Overview of Project and Services

AGENCY has engaged CONSULTANT to provide the following services, which are more specifically described in the Basic Services section below, to assist AGENCY with the following project:

The Matilija Dam Removal 65% Planning Design Project, follows work completed by CONSULTANT in 2016 for the Agency. The CONSULTANT shall provide engineering services to develop 65% designs to remove Matilija Dam in a manner that would reduce the impact of impounded sediment while minimizing costs and time associated with dam removal.

2. Basic Services

The following Basic Services shall be performed by CONSULTANT:

Task 1 – Field Investigations

CONSULTANT shall perform field investigations to collect data needed for the following: 1) further analysis of the fine sediment deposits upstream of the dam, and 2) further characterization of the structural concrete comprising the dam to inform studies and structural analysis for dam removal. Field investigations shall be accomplished under the three subtasks described below.

Subtasks in Field Investigations shall include Project Management and oversight services. The CONSULTANT shall facilitate ongoing coordination and communication among staff and sub-consultants. The CONSULTANT shall coordinate general AGENCY update meetings/calls at monthly intervals, and shall address questions and concerns in a timely manner. The CONSULTANT shall also coordinate, or assist with coordinating, interaction with the California Division of Safety of Dams as necessary.

CONSULTANT services shall include implementation of quality assurance/quality control procedures following standard CONSULTANT processes. Prior to submission to the AGENCY, all deliverables shall undergo detail checks and technical reviews to verify the quality and integrity of the project tasks and written work products, and to verify that the deliverables are in accordance with the scope of work. Each technical review shall be documented using appropriate forms and this documentation shall be maintained in the CONSULTANT's project files. Invoices and project budget tracking reports shall be provided at monthly intervals.

Subtask 1.1 - Geotechnical Field Investigations to Characterize Fine Sediment and Organics

CONSULTANT shall plan the investigation, obtain a County drilling permit, obtain a DSOD permit (if one is needed), obtain and log sediment samples at six locations to an estimated depth of 60-90 feet, and perform laboratory testing. Sampling and testing shall be performed to screen for the presence of contaminants such as heavy metals and pesticides, and the results shall be compared to earlier test findings by the US Army Corps

of Engineers. Specific tests to identify the presence of metals include Title 22 (CAM17) and others depending on the target metal types. Specific tests for organics such as pesticides and hydrocarbons will include TPH, OCP, PCB, SVOC, and PAH. The tests shall be conducted in accordance with appropriate EPA sampling protocols and test methods. The borings shall be advanced through the water from a barge.

Previous investigations by the United States Army Corps of Engineers (USACE) identified that the characteristics of the organic materials in the fine sediment upstream of the dam could affect water quality during and following dam removal. Several borings were abandoned after methane gas was detected and as a result, the full depth of the sediment was not penetrated at those locations. The six borings included in the this scope of work, as indicted above, will be used to characterize the limits of the organic materials as well as collect other geotechnical information (SPT blowcount, grain size distribution and relative quantities, plasticity, shear strength, etc.) related to the sediment to confirm the transport of fine sediment from the reservoir during initial and subsequent flushing events.

Since sediment within the reservoir basin is known to be partially comprised of decomposed organic material, it is expected that methane gas emissions will occur during the drilling process. The drilling section of the Project Safety Plan shall describe specific measures addressing methane gas emissions, with alternate drilling methods that may be employed to eliminate or reduce emissions from low-pressure methane lenses. In some cases, the volume and pressure of methane escaping a penetrated lens may prohibit further advancing that boring and the drilling equipment will be removed when safe to do so. Based on the boring depth completed to that point and other factors, a decision shall be made, in consultation with the AGENCY, whether to characterize the sediment utilizing the data obtained to that depth or to drill in an alternative, representative location. Seven days of onsite drilling effort has been budgeted for this subtask.

Subtask 1.2 - Field Investigations to Characterize Dam Concrete

CONSULTANT shall perform concrete coring and testing to determine the appropriate material properties for use in the structural analyses under Subtask 2.1 and 2.7.

CONSULTANT shall develop a work plan, obtain DSOD approval, and obtain concrete cores from the downstream dam face near the two proposed orifice locations and at 4 to 6 other locations along the upstream face of the dam. The downstream cores shall be obtained from a barge platform in the plunge pool or other means of access. The upstream cores shall be obtained from the same barge platform used for the geotechnical investigations under Task 1.1. The core samples shall be 6 inches in diameter, and continuous samples shall be obtained for the full depth of each boring. The upstream borings shall be approximately 4 feet deep. Two downstream borings near the proposed orifice locations shall be approximately 4 feet deep and the remaining two shall be approximately 20 feet deep. Core samples selected for compressive strength testing will typically be at least 12 inches long. An investigation work plan and application for the concrete coring shall be prepared and submitted to DSOD for review and approval prior to the commencement of field work. The concrete core samples shall be logged and

photographed during drilling and then transported to the laboratory for further examination and testing. Selected samples shall be tested for bulk specific gravity, unconfined compressive strength, splitting tensile strength, and elastic modulus properties. Petrographic analysis and gel fluorescence testing shall also be conducted to assess the presence of Alkali Silica Reaction (ASR) in the concrete.

Subtask 1.3: Field Investigations Memorandum

CONSULTANT shall document the results from the field investigations described under Subtasks 1.1 and 1.2 in a technical memorandum (TM). The TM shall present the results of the investigations, including fine sediment boring logs, concrete core logs, and laboratory test results for both the sediment samples and the concrete core samples. All boring logs shall be photo documented for inclusion as appendices to the TM.

Subtask 1.4: Biological Support for Field Investigations

CONSULTANT shall conduct pre-construction surveys. To comply with permitting requirements, at least three pre-construction biological surveys, at least three days apart with the last survey within three days of mobilization, shall be conducted by two qualified biologists. CONSULTANT shall mobilize two biologists to conduct biological pre-construction surveys of the perimeter of Matilija Reservoir and the plunge pool at the base of the dam. Surveys shall be conducted in the habitat communities surrounding the water bodies out to 300 feet and does not include protocol-level biological surveys for sensitive species. The biologist shall coordinate with the AGENCY for access and appropriate routes to conduct the surveys. This work assumes three, 8-hour days to allow for travel, coordination, and access to the areas for surveys.

CONSULTANT shall perform geotechnical work monitoring. A qualified biological monitor shall be present periodically during work activities. Geotechnical work is anticipated to begin on July 31, 2018, and continue on weekdays through approximately August 9, 2018, for a total of 8 days of biological monitoring. The monitor shall be responsible for daily clearance surveys prior to work commencing, ensuring compliance with the species protection measures, and documenting BMP practices.

CONSULTANT shall coordinate with the AGENCY to discuss any special-status species findings during the course of the surveys and monitoring. If any sensitive biological resources are identified, the AGENCY shall be notified and applicable species protection measures shall be discussed and implemented. CONSULTANT'S biologist shall participate in conference calls to present interim finding of biological pre-construction surveys and monitoring.

Any non-compliance observations and/or sensitive resource observations shall be immediately reported to the project manager and communicated to the AGENCY. If active bird nests are found within the area potentially affected by the work, which was defined as 300 feet, work shall be redirected or postponed until the nest is no longer active or other protection measures are implemented in coordination with the AGENCY

This work assumes 6-hour days to allow for travel, access and a clearance survey prior to the start of each day's work and assumes the geotechnical investigation crews work an 8-hour day.

CONSULTANT shall provide reporting. A biological survey and monitoring report shall be completed (Project Completion Report) as required by the AGENCY, which shall include the following:

- Site conditions / vegetation in or adjacent to project area;
- Distance to adjacent or downstream sensitive biological resources and description of resource;
- Summary/general descriptions of vegetation types within the survey and monitoring area;
- Summary of preconstruction surveys via email documenting any nesting bird or other sensitive resources;
- Cumulative lists of common and special-status wildlife species found at the project site during all surveys (detailed species descriptions are not necessary);
- If special-status species that should be reported to the California Natural Diversity Database are observed, a statement shall be included of when such reports were submitted. Additionally, the completed California Native Species Field Survey Form(s) shall be appended to the project completion report;
- Documentation of BMPs implemented to avoid biological resource impacts; and
- Any problems/examples of non-compliance and how they were resolved.

Task 1 Deliverables:

- Conference calls shall be held at monthly intervals to facilitate coordination, input and provide progress summaries to the AGENCY/Contract Management Team. CONSULTANT shall prepare agendas and meeting minutes for each meeting.
- CONSULTANT shall coordinate quarterly (4) meetings between CONSULTANT/AGENCY/Contract Management Team/Technical Advisory Committee (TAC) in Ventura over the performance period involving CONSULTANT and two other team members.
- CONSULTANT shall coordinate one meeting between CONSULTANT/AGENCY/DSOD in Sacramento over the performance period involving the CONSULTANT and two other team members.
- Project Safety Plan
- Work plan and application for submission to DSOD
- Coordination with DSOD during permit processing as required
- Draft Field Investigations TM characterizing the fine sediment and assessing the concrete condition
- Revised Draft (if necessary) Field Investigations TM, incorporating comments received on Draft TM.
- Final Field Investigations TM, incorporating comments received on Revised Draft TM.
- Invoices, progress reports, meeting minutes, and other documentation as necessary.
- The biological monitor shall complete pre-construction field reports and daily monitoring field reports for inclusion in the Project Completion Report.

- The CONSULTANT'S qualified biologist shall prepare the Project Completion Report within 15 days of project completion and shall address AGENCY comments and return the final version within 7 days of receipt of AGENCY comments.

Task 2: Dam Removal Feasibility Study

CONSULTANT shall prepare a feasibility study to advance the conceptual design for installing two large diameter orifices in Matilija Dam, implementing fine sediment evacuation by opening the orifices during a flushing storm event, and demolition of the dam following sediment flushing. The feasibility study shall be accomplished under the subtasks described below. Subtasks in the Dam Removal Feasibility Study shall include Project Management and oversight services. CONSULTANT shall facilitate ongoing coordination and communication among staff and sub-consultants. CONSULTANT shall coordinate general AGENCY update meetings/calls at monthly intervals, and shall address questions and concerns in a timely manner. CONSULTANT shall also coordinate, or assist with coordinating, interaction with the California Division of Safety of Dams as necessary.

Project Management services shall include implementation of quality assurance/quality control procedures following standard CONSULTANT processes. Prior to submission to the AGENCY, all deliverables shall undergo detail checks and technical reviews to verify the quality and integrity of the project tasks and written work products, and to verify that the deliverables are in accordance with the scope of work. Each technical review shall be documented using appropriate forms and this documentation shall be maintained in the CONSULTANT'S project files. Invoices and project budget tracking reports shall be provided at monthly intervals.

Subtask 2.1: Structural Evaluation of Dam With and Without Orifices

CONSULTANT shall perform analyses to verify that installation of the proposed large diameter orifices into the dam shall not adversely impact the seismic stability or safety of the structure. Using the data obtained from the concrete cores under Subtask 1.2, the current strength of the concrete in the dam shall be estimated and compared with the strength assumed in the previous structural analyses (URS, AE11-06). The three-dimensional linear elastic finite element (ANSYS) model prepared by URS under the previous contract with the AGENCY (AE11-06), shall be modified to include the orifices and the suite of analyses re-run. The results of the runs on the modified model shall be compared to the results from the URS study, with specific focus on the stresses in the vicinity of the proposed orifices to verify that the presence of the orifices is not expected to significantly impact the stability of the dam during static or dynamic loading.

Subtask 2.2: Detailed Sediment Transport Modeling From Dam to Ocean

CONSULTANT shall review earlier modeling efforts for fine and coarse sediment transport prepared for the Matilija Dam Removal (by Reclamation and CONSULTANT),

incorporate information collected in Subtask 1.1, and develop detailed modeling of transport from the dam to the Pacific Ocean using the DREAM-2 model.

The DREAM-2 model is one of the two Dam Removal Express Assessment Models developed at Stillwater Sciences (Cui et al. 2006), which simulate the transport of both coarse and fine sediment following dam removal. The model, its predecessors, and sister models have been applied in more than a dozen large and small scale sedimentation analysis projects, including river sedimentation of a mining project that has released close to 2 billion tons of sediment (to date) into a river corridor (Pickup and Cui 2009), and the removal of Marmot Dam in the Sandy River, Oregon (Cui and Wilcox 2008). Comparisons of simulated and surveyed post-dam removal channel degradation/aggradation in the Sandy River, which has similar geomorphic conditions with Matilija Creek and Ventura River, indicated that the model likely outperformed any previous model simulations of similar magnitude (Cui et al. 2014). The model has also been extensively examined with flume experimental data (Cui et al. 2008) and against a natural landslide (Sutherland et al. 2002) and proven to perform satisfactorily. It is also worth noting that a preliminary DREAM-2 model was developed for the Matilija Dam removal project during the last contract phase completed in 2016 (AE14-033).

The future with project condition shall be modeled with rate of sediment input established in earlier studies and with downstream project components determined in collaboration with the AGENCY and the CONSULTANT. Modeling shall include peak flow and daily average hydrologic analyses under existing conditions, along with select representative years (such as the year that represents the occurrence of 100-yr flood). Two sets of model runs simulating sediment transport following dam removal, each comprised of 5 to 7 runs, are proposed under the most-likely scenario: dam removal during a 4-yr flood event (the minimum flood event required to remove the dam under the previous CONSULTANT study) and dam removal during a 10-yr flood event. In both scenarios a 100-yr flood event shall be inserted into the discharge series, representing it to occur at different years after dam removal. The purpose of the 100-yr flood modeling is to examine the maximum sediment deposition (i.e., worst-case-scenario) that would occur in different downstream river reaches during the 100-yr flood event so as to inform hydraulic modeling in Task 2.3. In addition to runs simulating sediment transport following dam removal described above, a separate model run shall be conducted simulating the terminal effect of dam removal. This run shall be conducted by using the projected post-removal sediment supply as model input, and extended to the future years when a new quasi-equilibrium bed profile is established. The simulated profile shall also be provided to Task 2.3 for evaluation of the long-term effect of dam removal on the 100-yr flood event.

In addition to the modeling runs, a mass conservation analysis similar to that presented in Cui et al (2011) for the Slab Creek Reservoir sedimentation process shall be conducted to better approximate the time at which sand and gravel will begin to pass the dam if the structure remains in place. The analysis shall apply basic geomorphic principles and shall utilize reasonable assumptions with regard to the profiles of sand and gravel deposits within the reservoir as the gravel continuously advances downstream and aggrades upward, replacing some of the more mobile sand deposits within the reservoir with

coarser sediment. The results of this analysis shall provide a reference condition for the no-project alternative.

Subtask 2.2 Sediment Transport Modeling Summary

Condition	Event Recurrence Interval or Flow Rate	Presumed Number of Model Runs
Baseline (current)	Available Discharge Record	1
Dam Removal	4 year and 10 year event during the year of dam removal, 100-yr peak flow in different years after dam removal	10-14
Long- Term Following Dam Removal	Available discharge record, running repeatedly to achieve a new quasi-equilibrium	1

Subtask 2.3 - Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses

CONSULTANT shall conduct hydraulic modeling along the reaches of Matilija Creek and the Ventura River from the dam to the Pacific Ocean. The purpose of this task is to determine changes in flood elevations along Matilija Creek and the Ventura River resulting from dam removal. The first step of this task is to review the existing conditions in the Reclamation HEC-RAS model to ensure that it is generally accurate and the model is functioning properly. Steady state flood modeling shall then be conducted using 100-year peak flow, as well as 10-year, 25-year, and 50-year flows, applied to the modeled river profiles provided in Task 2.2. The modeling first establishes the existing conditions and future conditions (with dam). Next, post-removal channel geometries shall be imported into the HEC-RAS model based on: 1) detailed sediment transport analyses (i.e., changes in channel bed elevations/geometry based on coarse sediment transport results from Task 2.2) and 2) proposed upgrades of the Robles Diversion Dam and other downstream project components, to be determined in collaboration between CONSULTANT and AGENCY. Post-removal modeling shall be conducted using the same peak flow events as used for existing-conditions modeling. Several post-removal channel profiles shall be selected to conduct hydraulic modeling. The profiles shall be selected based on sediment transport modeling results to represent the highest levels of aggradation in different reaches of the channel as the sediment wave gradually progresses downstream, resulting in the maximum sediment deposit occurring in different reaches in different years following dam removal. Then, the existing and proposed conditions model results shall be compared in profile plots and water surface elevation comparison tables. Additionally, overbank inundation depth comparisons shall be generated for existing and proposed conditions model results based on HEC-RAS water surface elevations and 2005 LiDAR topography. Inundation results shall be presented in a map format. Up to five different post-removal channel geometry conditions shall be evaluated to account for dynamic channel conditions as different reaches experience peak bedload sediment deposition at different times or under different hydrologic scenarios (i.e., peak discharge occurs in different years).

Subtask 2.4: Re-evaluation of Downstream Project Components (Santa Ana and Camino Cielo Bridges, Live Oak Acres and Meiners Oaks Levees, and Robles High Flow Bypass).

CONSULTANT shall re-evaluate the downstream project component designs in light of the results of 100-yr flood routing performed under Subtask 2.3.

The various downstream project components are currently at varying levels of design, approximately as follows: Santa Ana Bridge – 100%; Camino Cielo Bridge – 5%; Live Oak Acres Levee – 90%; Meiners Oaks Levee – 90%; Casitas Springs Levee – 5%; Robles High Flow Bypass – 90%; and, Foster Park Wells – 100%.

The design of each of the downstream project components is based on 100-yr flood levels that were developed for USACE's Alternative 4b dam removal project. CONSULTANT shall compare the 100-yr flood level used for downstream project component designs to levels required for FEMA certification based on 100-yr water surface elevation determined in Subtask 2.3. CONSULTANT shall develop and recommend alternative design revisions based on the results of the comparison of changes in hydraulics as well as input from the Contract Management Team, and review and update construction costs estimates, as appropriate.

Subtask 2.5: Predictability Assessment of Flushing Storm Event

CONSULTANT shall collect and review weather forecast data from the National Weather Service from the standpoint of how predictable flushing storm events are, and a model shall be developed to estimate risk associated with under-predicting a minimum flushing storm event.

Predicting that an incoming storm is of sufficient intensity to produce the required minimum flushing storm event is a key component of the feasibility study for the Project. Stream gage data for Matilija Creek and for the Ventura River indicate that storm events with adequate flushing flows have a recurrence interval of approximately three years. Historic storm events to be analysed, include flushing event storms and a range of storm events that result in flows significantly less than the minimum flushing storm event, shall be used to repeat the fine sediment analyses conducted during the previous study contract (URS, AE14-033) to determine the risks of under-predicting the storm event during dam removal. The results of the fine sediment and organics characterization from Subtask 1.1 shall provide updated information with regard to sediment gradation, erodibility, etc. that shall either affirm the previous fine sediment analysis (URS, AE14-033) or allow for updated analysis with the same methodology. The sediment profile, in particular a determination of its composition and erosive tendencies, will help predict the efficacy of each storm event type (peak flow rate, duration, and recurrence interval) in mobilizing the sediment.

Subtask 2.6 - Update Dam Removal Concept To 10 Percent Design

CONSULTANT shall advance the design for the large diameter orifices, excavation of the orifice openings, dam demolition, and restoration of the reservoir area from the current conceptual level to a 10 percent design. Document the updated design on engineering plans.

A list of conceptual drawings anticipated to be included at the 10 percent design level include:

1. Project location and general arrangement plan
2. Dam site area plan
3. Dam and plunge pool plan view
4. Upstream elevation view
5. Downstream elevation view
6. Dam section views
7. Large diameter orifice sections and details
8. Orifice excavation sequencing plan and details
9. Dam demolition sequencing – profile and details
10. Post-flush channel plan, profile, and sections
11. Sediment disposal areas - plan and sections
12. Post-project restoration plan -- reservoir area

Subtask 2.7 – Updated Dam Structural Analysis

CONSULTANT shall review and update as appropriate the 2013 (AE11-06) structural analysis for Matilija Dam to address comments or concerns with the analysis based on the findings of Subtask 2.1. The model geometry shall be updated to reflect the proposed orifices through the structure with the 10 Percent Design from Subtask 2.6. Using updated data on the concrete strength obtained in Subtask 1.2 and refined in Subtask 2.1, the three-dimensional linear elastic finite element (ANSYS) model, modified from the model used in the URS 2013 study, shall be used to evaluate usual (normal), unusual (flood), and extreme (seismic) loading conditions on the dam with and without the orifices and with and without sediment behind the dam to assess the safety of the dam.

Subtask 2.8: Dam Removal Feasibility Study Report

CONSULTANT shall document the results of Subtasks 2.1 through 2.7 in a comprehensive report for comment by the various stakeholders including DSOD. The Feasibility Study Report (Report) shall summarize the results of the data obtained and analysis performed in each subtask, and shall incorporate as appendices or by reference the technical memorandum provided in Subtask 1.3. It is anticipated that the content and format of the Report may evolve as work on the other subtasks progresses and the Report will be structured in response. Further, the Report shall focus in part on addressing specific areas of interest or concern expressed by DSOD or other regulatory entities.

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Incorporate stakeholder comments, where possible, into the final report and include an appendix of stakeholder comments and responses in the final report.

Draft Feasibility Study Table of Contents:

Executive Summary

- 1.0 Introduction**
- 2.0 Summary of Field Investigations**
- 3.0 Reservoir Fine Sediment**
- 4.0 Dam Concrete**
- 5.0 Structural Evaluation of Orifice Alternative**
- 6.0 Sediment Transport Modeling**
- 7.0 Hydraulic Studies Based on Sediment Modeling**
- 8.0 Re-evaluation of Downstream Project Components**
- 9.0 Assessment of Flushing Storm Events**
- 10.0 Dam Removal Concept – 10% Level Design**
- 11.0 Updated Structural Analysis of Dam**
- Appendix 1 – Stakeholder Comments**

Task 2 Deliverables:

- CONSULTANT/AGENCY/Contract Management Team conference calls shall be held at monthly intervals to facilitate coordination, input and provide progress summaries to the AGENCY/Management Team. CONSULTANT shall prepare agendas and meeting minutes for each meeting.
- CONSULTANT shall coordinate quarterly (4) meetings between CONSULTANT/AGENCY/Contract Management Team/Technical Advisory Team (TAC) in Ventura over the performance period involving CONSULTANT and two other team members.
- CONSULTANT shall coordinate two meetings between CONSULTANT/AGENCY/DSOD in Sacramento over the performance period involving CONSULTANT and two other team members.
- Draft Concrete Structural Strength Comparative Analysis and Stability Evaluation Report for AGENCY/Contract Management Team/TAC review
- Revised Draft Concrete Structural Strength Comparative Analysis and Stability Evaluation Report incorporating AGENCY/Contract Management Team/TAC comments
- Final Concrete Structural Strength Comparative Analysis and Stability Evaluation Report
- Draft Sediment Transport and Hydraulics Modelling Memo for AGENCY/Management Team/TAC Review
- Revised Sediment Transport and Hydraulics Modelling Memo incorporating AGENCY/Management Team/TAC comments
- Final Sediment Transport and Hydraulics Modelling Memo
- All native files for HEC-RAS and any other hydraulic computer modeling programs employed.
- Draft Re-evaluation of Downstream Project Components Designs Summary for AGENCY/Management Team/TAC Review
- Revised Draft Re-evaluation of Downstream Project Components Designs Summary incorporating AGENCY/Management Team/TAC comments

- Final Re-evaluation of Downstream Project Components Designs Summary
- Summary of Recommended Alternative Design Revisions for Downstream Project Components (depending on the outcome of the deliverables described above)
- Draft Summary of Risk Estimate in Under-Predicting a Flushing Storm Event for AGENCY/Management Team/TAC Review
- Revised Draft Summary of Risk Estimate in Under-Predicting a Flushing Storm Event incorporating AGENCY/Management Team/TAC comments
- Final Summary of Risk Estimate in Under-Predicting a Flushing Storm Event
- Draft 10 Percent Level Design package (to include conceptual drawings, preliminary descriptions of boring and demolition requirements and sequencing, a description of the key design elements, a description of restoration requirements and objectives, etc.) for Orifice Boring, Dam Demolition, and Reservoir Area Restoration for Management Team/TAC Review
- Revised Draft 10 Percent Level Design package for Orifice Boring, Dam Demolition, and Reservoir Area Restoration incorporating Management Team/TAC comments
- Final 10 Percent Level Design package for Orifice Boring, Dam Demolition, and Reservoir Area Restoration
- Draft Summary of Matilija Dam Structural Analysis for AGENCY/Contract Management Team/TAC review
- Revised Draft Summary of Matilija Dam Structural Analysis Incorporating AGENCY/Contract Management Team/TAC comments
- Final Summary of Matilija Dam Structural Analysis
- Draft Dam Removal Feasibility Report for AGENCY/Contract Management Team/TAC review
- Revised Draft Dam Removal Feasibility Report incorporating AGENCY/Contract Management Team/TAC comments
- Final Dam Removal Feasibility Report incorporating Contract Management Team comments
- Invoices, progress reports, meeting minutes, and other documentation as necessary.

Task 3 - Review and Update Real Estate Plan

Subtask 3.1 Review USACE Real Estate Plan

CONSULTANT shall review the 2004 Plan prepared by USACE to determine previously used methods and outcomes. CONSULTANT shall develop tabular and GIS exhibits to illustrate acquisitions, both extents and type of acquisition, to compare and contrast with the updated Plan.

Subtask 3.2 Development of Real Estate Plan/Downstream Project Component Decision Matrix

CONSULTANT shall, in consultation with AGENCY and Contract Management Team, develop a matrix to guide decisions for the Real Estate Plan and downstream infrastructure project components. The thresholds in the decision matrix will consider the final results of the project sediment transport and hydraulic analyses, Subtasks 2.2 and 2.3, and shall provide, at a minimum, guidance for developing the following recommendations, 1) new downstream infrastructure, 2) upgrades to existing infrastructure, 3) acquisition of properties and removal of habitable structures, and acquisition of inundation easements.

Subtask 3.3 Updated Real Estate Plan

Based on Subtasks 3.1 and 3.2, Consultant shall update the Real Estate Plan for the Project. The plan shall focus on acquisition of properties or improvements to private infrastructure affected by increases in flood elevations but shall not include acquisitions required for construction and maintenance of downstream public infrastructure project components. Property acquisitions required for downstream public infrastructure may be added to this plan as a separate subtask once this information is developed from the design of each component.

CONSULTANT shall collect parcel data, including rights-of-way and easement information, from the County Assessor and other publicly available data. The parcel data shall be used as a basis for the updated Plan. The parcel data ownership and zoning information shall be used to inform the Plan. CONSULTANT shall collect and use the 2005 LIDAR data to determine parcel elevations. Real estate costs based on publicly available published data (for example, Zillow or Realtor) as well as guidance provided by the AGENCY'S Real Estate Section shall be assigned to each parcel.

CONSULTANT shall prepare GIS map exhibits that include 100-yr flood levels and parcel information. CONSULTANT shall prepare tables summarizing all parcel information, including parcel elevations, zoning information, and magnitude of and change of inundation levels. These exhibits and tables will be used to identify parcels, structures and infrastructure of concern.

CONSULTANT shall use the decision matrix developed in Subtask 3.2 to identify inundated parcels recommended for further protection or mitigation measures. These may include public infrastructure or private infrastructure. The infrastructure identified in Subtask 2.4 (Re-evaluation of Downstream Components) shall also be considered in the Plan.

CONSULTANT shall also identify inundated parcels that will be designated for recommended acquisition. The acquisition strategy may differ based on zoning information, level or percentage of inundation, and change in inundation. The acquisition plan may also consider insurance coverage in lieu of land acquisition. CONSULTANT shall review changes in inundation levels against parcel elevations, considering the level of accuracy of the hydraulic model.

CONSULTANT shall use the methodology developed in Subtask 3.2 to develop the Real Estate Plan that will include: a description of the strategies and the decision matrix in Subtask 3.2, tabular and graphical representation of the updated Plan, a cost estimate for implementing the Plan based on recommended infrastructure improvements, land acquisition and insurance coverage. The updated Plan shall also include a section that compares the update Plan with the 2004 Plan, and a report summarizing the findings.

Deliverables:

- ***Draft Decision Matrix***
- ***Final Decision Matrix, incorporating comments received on draft***
- ***Draft Updated Real Estate Plan with map figures and cost data.***
- ***Revised Draft Updated Real Estate Plan (if necessary), incorporating comments received on initial draft***
- ***Final Draft Updated Real Estate Plan***

Report deliverables shall be provided in Word and single searchable PDF format. Tables and GIS layers and exhibits shall be provided in native electronic format.

3. Extra Services

Extra Services are separate from but related to the Basic Services described above. Extra Services shall be performed by CONSULTANT only after being authorized in writing by the Project Manager for AGENCY. AGENCY's written authorization will include a statement of the Extra Services required and time schedule for completion. CONSULTANT's billing and AGENCY's payment for Extra Services shall occur pursuant to Exhibit C.

4. County Services

AGENCY will provide or accomplish the following:

1. Full information as to the requirements of the services to be provided by CONSULTANT under the contract.
2. Review documents submitted by CONSULTANT and provide comments, direction, or approval as needed in a timely manner.
3. Provide environmental permitting for all field investigations.

End of Exhibit A

EXHIBIT B - TIME SCHEDULE

1. Schedule

All Work on this contract shall be completed by 6/30/2020.

CONSULTANT shall complete intermediate tasks as follows:

Task Table

Task	Description	Due Date
1	Field Investigations	
1.1	Geotechnical Field Investigations to Characterize Fine Sediment and Organics	07/07/2018
1.2	Field Investigations to Characterize Dam Concrete	07/07/2018
1.3	Field Investigations Memorandum	08/30/2018
1.4	Biological Support for Field Investigations	09/15/2018
2	Dam Removal Feasibility Study	
2.1	Structural Evaluation of Dam With and Without Orifices	03/13/2020
2.2	Detailed Sediment Transport Modeling From Dam to Ocean	01/31/2020
2.3	Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses	01/31/2020
2.4	Re-evaluation of Downstream Project Components	03/30/2020
2.5	Predictability Assessment of Flushing Storm Event	01/31/2020
2.6	Update Dam Removal Concept To 10 Percent Design	04/24/2020
2.7	Updated Dam Structural Analysis	03/13/2020
2.8	Dam Removal Feasibility Study Report	03/30/2020
3	Review and Update Real Estate Plan	
3.1	Review USACE Real Estate Plan	01/01/2020
3.2	Development of Real Estate Plan/Downstream Project Component Decision Matrix	2/29/2020
3.3	Update Real Estate Plan	3/31/2020

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

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EXHIBIT C – Fees and Payments

1. Compensation Summary

The following summarizes the maximum amount of compensation available to CONSULTANT under this contract. The actual amount of compensation shall be established and paid in accordance with the applicable provisions of the contract including this Exhibit C.

Maximum Fees for Basic Services:	\$ <u>892,575.00</u>
Maximum Fees for Extra Services:	\$ <u>0.00</u>
Maximum Reimbursement for Expenses:	\$ <u>0.00</u>
Total Amount Not to Exceed:	\$ <u>892,575.00</u>

2. Fees For Basic Services

AGENCY agrees to pay CONSULTANT the following fees for Basic Services

☒ a fixed fee compensation, in the lump sum amount of \$ 892,575.00 , for completion of all Basic Services.

Task Table

Task	Description	Lump Sum
1	Field Investigations	
1.1	Geotechnical Field Investigations to Characterize Fine Sediment and Organics	\$137,538.00
1.2	Field Investigations to Characterize Dam Concrete	\$61,612.00
1.3	Field Investigations Memorandum	\$32,034.00
1.4	Biological Support for Field Investigations	\$16,898.00
2	Dam Removal Feasibility Study	
2.1	Structural Evaluation of Dam With and Without Orifices	\$32,992.00
2.2	Detailed Sediment Transport Modeling From Dam to Ocean	\$135,594.00
2.3	Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses	\$43,886.00
2.4	Re-evaluation of Downstream Project Components	\$61,172.00
2.5	Predictability Assessment of Flushing Storm Event	\$42,070.00
2.6	Update Dam Removal Concept To 10 Percent Design	\$102,520.00
2.7	Updated Dam Structural Analysis	\$147,248.00
2.8	Dam Removal Feasibility Study Report	\$25,636.00
3	Review and Update Real Estate Plan	
3.1	Review USACE Real Estate Plan	\$4,787.00
3.2	Development of Real Estate Plan/Downstream Project Component Decision Matrix	\$24,991.00

MODIFICATION NUMBER 03 TO CONTRACT AE18-034

Task	Description	Lump Sum
3.3	Update Real Estate Plan	\$23,597.00
Total		\$892,575.00

3. Fees For Extra Services

For Extra Services authorized in writing in advance by AGENCY in accordance with Exhibit A, AGENCY agrees to pay CONSULTANT an **hourly rate** compensation for actual hours of Extra Services performed that is based upon the hourly rates set forth in the Rate Table for Basic Services above or, if none, then based upon the hourly rates set forth in the following Rate Table for Extra Services, which rates shall remain fixed for the duration of the contract, not to exceed the **maximum fee amount of \$ 0.00**.

4. Delays

If Work cannot be completed by the dates specified in Exhibit B through no fault of CONSULTANT, the fees 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 written modification to this contract.

5. Reimbursable Expenses

CONSULTANT shall be reimbursed a sum for the following reasonable out-of-pocket expenses that are incurred and paid for by CONSULTANT in furtherance of performance of its obligations under this contract, but only to the extent that such expenses are directly related to CONSULTANT's services hereunder and do not exceed the **maximum reimbursable amount of \$ \$0.00**:

(i) Outside printing directly related to deliverables but not for internal uses of CONSULTANT or its Subconsultants;

(ii) Reproduction or reprographic costs directly related to deliverables but not for internal uses of CONSULTANT or its Subconsultants. If CONSULTANT provides allowable reprographic services using its own equipment rather than using an outside service, the unit billing rates for such charges must be approved in advance by AGENCY;

(iii) Shipping, overnight mail, postage, messenger, courier and/or delivery services (but not for CONSULTANT's internal communications);

(iv) Only if authorized in writing in advance by AGENCY, reimbursement for business travel for the specific position descriptions so identified in the Rate Tables for Basic Services or Extra Services set forth above. AGENCY shall reimburse CONSULTANT for transportation, lodging, and meal expenses consistent with the policies and amounts approved for County employees as defined by policy number Chapter VII(C)-1, *Reimbursement of Employees County Business Expenses*, in the County's Administrative Policy Manual (latest edition);

(v) Only if authorized in writing in advance by AGENCY, fees and costs for Subconsultant services that are not included in the Rate Tables for Basic Services or Extra Services set forth above.

Exclusive List. The list of reimbursable expenses set forth above is the sole and exclusive list of reimbursable expenses that CONSULTANT is entitled to receive.

Approval Limits. Any reimbursable expense wherein a single item exceeds \$500 in value, whether purchased or leased, must be approved in writing in advance by AGENCY.

MODIFICATION NUMBER 03 TO CONTRACT AE18-034

No Administrative Charge or Mark-Ups. The reimbursement provided for herein shall not include an administrative charge, multiplier or other mark-up by CONSULTANT unless authorized in writing, in advance, by AGENCY.

No Reimbursement for Specified Basic Services Paid for by a Fixed Fee. Notwithstanding the above, expenses related to Basic Services specified in Exhibit B are not reimbursable if CONSULTANT is compensated for Basic Services by a fixed fee.

6. Payment

AGENCY shall make payments to CONSULTANT under the contract as follows:

Requests for Payment

To request payment, CONSULTANT shall complete and submit to AGENCY a Consultant Services Invoice Form that shall include, at a minimum, (i) personnel time records for Basic Services and Extra Services actually performed at the rates specified in this Exhibit C if applicable and (ii) receipts for all authorized reimbursable expense, along with the written AGENCY authorization for any specific reimbursable expenses requested for payment, if required above.

When invoicing for Extra Services, CONSULTANT shall clearly mark on the Invoice Form which services are Extra Services and keep those services separate from or Basic Services, and shall include a copy of the written AGENCY authorization for the Extra Services for which payment is requested.

CONSULTANT shall submit all invoices to:

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

Payment Schedule

Payments shall be made monthly by AGENCY upon presentation of a properly completed AGENCY Invoice Form as described above. Upon approval of the invoice, AGENCY shall pay CONSULTANT 95% of the maximum fee for the specific task/milestone. Upon completion and acceptance by AGENCY of the task/milestone, AGENCY shall pay CONSULTANT the balance of the fee.

Timely Invoicing

Timely invoicing by CONSULTANT is required. 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 submit a properly completed invoice no later than 60 calendar days after the services which are the subject of the invoice were performed. An invoice received by AGENCY more than 60 calendar days after the services were performed shall be reduced by 5% to compensate AGENCY for the additional management costs. Additionally, since increases in administrative costs and budgetary problems caused by late invoicing correlate to the length of delay in invoicing, there will be an additional 5% reduction in compensation for each additional 30-calendar-day period beyond 60 days between the date the services were performed and the submission of the invoice for those services.

CONSULTANT shall submit a final invoice form within 60 days of the earliest of the following events: 1) completion and acceptance by AGENCY of all Work required by the contract; or 2) termination of the contract.

End of Exhibit C

MODIFICATION NUMBER 4 TO CONTRACT AE18-034

Contract Title: Matilija Dam Removal 65% Design Planning Project

This modification ("MODIFICATION NO. 4") is made and entered into by and between the Watershed Protection District, hereinafter referred to as AGENCY, and AECOM, hereinafter referred to as CONSULTANT.

WHEREAS, there now exists a binding contract between AGENCY and CONSULTANT originally dated 2/26/2018 for the CONSULTANT to provide engineering services to develop 65% designs to remove Matilija Dam in a manner that would reduce the impact of impounded sediment while minimizing costs and time associated with dam removal for a total contract amount of \$822,302.00 and a contract completion date of 7/11/2019 ("CONTRACT"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT on 7/25/2018 for the CONSULTANT to perform biological clearance surveys and compliance monitoring in support of field investigations to comply with California Department of Fish and Wildlife (CDFW) requirements for an additional contract amount of \$16,898. ("MODIFICATION NO.1"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT on 7/25/2019 to extend the CONTRACT time and task due dates due to a delay initiated from the acquisition for regulatory permits required for the filed investigations at an unchanged contract amount of \$839,200 and to extend the CONTRACT completion date from 7/11/2019 to 11/30/2019 ("MODIFICATION NO.2"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT on 12/26/2019 to add additional tasks for the CONSULTANT to review and update the 2004 Real Estate Plan prepared by the USACE for an additional contract amount of \$53,375 and to extend the CONTRACT completion date from 11/30/2019 to 6/30/2020. ("MODIFICATION NO.3"); and

WHEREAS it has become necessary to add additional tasks to the CONTRACT for the CONSULTANT to assess possible short-term impacts caused by the flushing of fine sediment from the Project on water supplies and infrastructure owned and managed by the Water Supply Agencies and identify and evaluate the potential water supply mitigation alternatives; 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 2/26/18, 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:
See revised Exhibit A, attached.
3. Exhibit B (Time Schedule) shall be modified as follows:
See revised Exhibit B, attached.
4. Exhibit C (Fees and Payment) shall be modified as follows:
See revised Exhibit C, attached.
5. The total contract amount shall hereby be increased by \$ 32,769.00 for a new CONTRACT total amount of \$925,344. The contract completion date remains unchanged at 06/30/2020.

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

FOR CONSULTANT

Name:

Theodore B. Feldsher

2/21/2020

Date

Title: Vice President

FOR AGENCY:

Name:

[Signature]
Director of Public Works Agency

2/27/20

Date

OEC 2/25

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

1. Overview of Project and Services

AGENCY has engaged CONSULTANT to provide the following services, which are more specifically described in the Basic Services section below, to assist AGENCY with the following project:

The Matilija Dam Removal 65% Planning Design Project, follows work completed by CONSULTANT in 2016 for the Agency. The CONSULTANT shall provide engineering services to develop 65% designs to remove Matilija Dam in a manner that would reduce the impact of impounded sediment while minimizing costs and time associated with dam removal.

2. Basic Services

The following Basic Services shall be performed by CONSULTANT:

Task 1 – Field Investigations

CONSULTANT shall perform field investigations to collect data needed for the following: 1) further analysis of the fine sediment deposits upstream of the dam, and 2) further characterization of the structural concrete comprising the dam to inform studies and structural analysis for dam removal. Field investigations shall be accomplished under the three subtasks described below.

Subtasks in Field Investigations shall include Project Management and oversight services. The CONSULTANT shall facilitate ongoing coordination and communication among staff and sub-consultants. The CONSULTANT shall coordinate general AGENCY update meetings/calls at monthly intervals, and shall address questions and concerns in a timely manner. The CONSULTANT shall also coordinate, or assist with coordinating, interaction with the California Division of Safety of Dams as necessary.

CONSULTANT services shall include implementation of quality assurance/quality control procedures following standard CONSULTANT processes. Prior to submission to the AGENCY, all deliverables shall undergo detail checks and technical reviews to verify the quality and integrity of the project tasks and written work products, and to verify that the deliverables are in accordance with the scope of work. Each technical review shall be documented using appropriate forms and this documentation shall be maintained in the CONSULTANT's project files. Invoices and project budget tracking reports shall be provided at monthly intervals.

Subtask 1.1 - Geotechnical Field Investigations to Characterize Fine Sediment and Organics

CONSULTANT shall plan the investigation, obtain a County drilling permit, obtain a DSOD permit (if one is needed), obtain and log sediment samples at six locations to an estimated depth of 60-90 feet, and perform laboratory testing. Sampling and testing shall be performed to screen for the presence of contaminants such as heavy metals and pesticides, and the results shall be compared to earlier test findings by the US Army Corps

of Engineers. Specific tests to identify the presence of metals include Title 22 (CAM17) and others depending on the target metal types. Specific tests for organics such as pesticides and hydrocarbons will include TPH, OCP, PCB, SVOC, and PAH. The tests shall be conducted in accordance with appropriate EPA sampling protocols and test methods. The borings shall be advanced through the water from a barge.

Previous investigations by the United States Army Corps of Engineers (USACE) identified that the characteristics of the organic materials in the fine sediment upstream of the dam could affect water quality during and following dam removal. Several borings were abandoned after methane gas was detected and as a result, the full depth of the sediment was not penetrated at those locations. The six borings included in the this scope of work, as indicted above, will be used to characterize the limits of the organic materials as well as collect other geotechnical information (SPT blowcount, grain size distribution and relative quantities, plasticity, shear strength, etc.) related to the sediment to confirm the transport of fine sediment from the reservoir during initial and subsequent flushing events.

Since sediment within the reservoir basin is known to be partially comprised of decomposed organic material, it is expected that methane gas emissions will occur during the drilling process. The drilling section of the Project Safety Plan shall describe specific measures addressing methane gas emissions, with alternate drilling methods that may be employed to eliminate or reduce emissions from low-pressure methane lenses. In some cases, the volume and pressure of methane escaping a penetrated lens may prohibit further advancing that boring and the drilling equipment will be removed when safe to do so. Based on the boring depth completed to that point and other factors, a decision shall be made, in consultation with the AGENCY, whether to characterize the sediment utilizing the data obtained to that depth or to drill in an alternative, representative location. Seven days of onsite drilling effort has been budgeted for this subtask.

Subtask 1.2 - Field Investigations to Characterize Dam Concrete

CONSULTANT shall perform concrete coring and testing to determine the appropriate material properties for use in the structural analyses under Subtask 2.1 and 2.7.

CONSULTANT shall develop a work plan, obtain DSOD approval, and obtain concrete cores from the downstream dam face near the two proposed orifice locations and at 4 to 6 other locations along the upstream face of the dam. The downstream cores shall be obtained from a barge platform in the plunge pool or other means of access. The upstream cores shall be obtained from the same barge platform used for the geotechnical investigations under Task 1.1. The core samples shall be 6 inches in diameter, and continuous samples shall be obtained for the full depth of each boring. The upstream borings shall be approximately 4 feet deep. Two downstream borings near the proposed orifice locations shall be approximately 4 feet deep and the remaining two shall be approximately 20 feet deep. Core samples selected for compressive strength testing will typically be at least 12 inches long. An investigation work plan and application for the concrete coring shall be prepared and submitted to DSOD for review and approval prior to the commencement of field work. The concrete core samples shall be logged and

photographed during drilling and then transported to the laboratory for further examination and testing. Selected samples shall be tested for bulk specific gravity, unconfined compressive strength, splitting tensile strength, and elastic modulus properties. Petrographic analysis and gel fluorescence testing shall also be conducted to assess the presence of Alkali Silica Reaction (ASR) in the concrete.

Subtask 1.3: Field Investigations Memorandum

CONSULTANT shall document the results from the field investigations described under Subtasks 1.1 and 1.2 in a technical memorandum (TM). The TM shall present the results of the investigations, including fine sediment boring logs, concrete core logs, and laboratory test results for both the sediment samples and the concrete core samples. All boring logs shall be photo documented for inclusion as appendices to the TM.

Subtask 1.4: Biological Support for Field Investigations

CONSULTANT shall conduct pre-construction surveys. To comply with permitting requirements, at least three pre-construction biological surveys, at least three days apart with the last survey within three days of mobilization, shall be conducted by two qualified biologists. CONSULTANT shall mobilize two biologists to conduct biological pre-construction surveys of the perimeter of Matilija Reservoir and the plunge pool at the base of the dam. Surveys shall be conducted in the habitat communities surrounding the water bodies out to 300 feet and does not include protocol-level biological surveys for sensitive species. The biologist shall coordinate with the AGENCY for access and appropriate routes to conduct the surveys. This work assumes three, 8-hour days to allow for travel, coordination, and access to the areas for surveys.

CONSULTANT shall perform geotechnical work monitoring. A qualified biological monitor shall be present periodically during work activities. Geotechnical work is anticipated to begin on July 31, 2018, and continue on weekdays through approximately August 9, 2018, for a total of 8 days of biological monitoring. The monitor shall be responsible for daily clearance surveys prior to work commencing, ensuring compliance with the species protection measures, and documenting BMP practices.

CONSULTANT shall coordinate with the AGENCY to discuss any special-status species findings during the course of the surveys and monitoring. If any sensitive biological resources are identified, the AGENCY shall be notified and applicable species protection measures shall be discussed and implemented. CONSULTANT'S biologist shall participate in conference calls to present interim finding of biological pre-construction surveys and monitoring.

Any non-compliance observations and/or sensitive resource observations shall be immediately reported to the project manager and communicated to the AGENCY. If active bird nests are found within the area potentially affected by the work, which was defined as 300 feet, work shall be redirected or postponed until the nest is no longer active or other protection measures are implemented in coordination with the AGENCY

This work assumes 6-hour days to allow for travel, access and a clearance survey prior to the start of each day's work and assumes the geotechnical investigation crews work an 8-hour day.

CONSULTANT shall provide reporting. A biological survey and monitoring report shall be completed (Project Completion Report) as required by the AGENCY, which shall include the following:

- Site conditions / vegetation in or adjacent to project area;
- Distance to adjacent or downstream sensitive biological resources and description of resource;
- Summary/general descriptions of vegetation types within the survey and monitoring area;
- Summary of preconstruction surveys via email documenting any nesting bird or other sensitive resources;
- Cumulative lists of common and special-status wildlife species found at the project site during all surveys (detailed species descriptions are not necessary);
- If special-status species that should be reported to the California Natural Diversity Database are observed, a statement shall be included of when such reports were submitted. Additionally, the completed California Native Species Field Survey Form(s) shall be appended to the project completion report;
- Documentation of BMPs implemented to avoid biological resource impacts; and
- Any problems/examples of non-compliance and how they were resolved.

Task 1 Deliverables:

- Conference calls shall be held at monthly intervals to facilitate coordination, input and provide progress summaries to the AGENCY/Contract Management Team. CONSULTANT shall prepare agendas and meeting minutes for each meeting.
- CONSULTANT shall coordinate quarterly (4) meetings between CONSULTANT/AGENCY/Contract Management Team/Technical Advisory Committee (TAC) in Ventura over the performance period involving CONSULTANT and two other team members.
- CONSULTANT shall coordinate one meeting between CONSULTANT/AGENCY/DSOD in Sacramento over the performance period involving the CONSULTANT and two other team members.
- Project Safety Plan
- Work plan and application for submission to DSOD
- Coordination with DSOD during permit processing as required
- Draft Field Investigations TM characterizing the fine sediment and assessing the concrete condition
- Revised Draft (if necessary) Field Investigations TM, incorporating comments received on Draft TM.

- Final Field Investigations TM, incorporating comments received on Revised Draft TM.
- Invoices, progress reports, meeting minutes, and other documentation as necessary.
- The biological monitor shall complete pre-construction field reports and daily monitoring field reports for inclusion in the Project Completion Report.
- The CONSULTANT'S qualified biologist shall prepare the Project Completion Report within 15 days of project completion and shall address AGENCY comments and return the final version within 7 days of receipt of AGENCY comments.

Task 2: Dam Removal Feasibility Study

CONSULTANT shall prepare a feasibility study to advance the conceptual design for installing two large diameter orifices in Matilija Dam, implementing fine sediment evacuation by opening the orifices during a flushing storm event, and demolition of the dam following sediment flushing. The feasibility study shall be accomplished under the subtasks described below. Subtasks in the Dam Removal Feasibility Study shall include Project Management and oversight services. CONSULTANT shall facilitate ongoing coordination and communication among staff and sub-consultants. CONSULTANT shall coordinate general AGENCY update meetings/calls at monthly intervals, and shall address questions and concerns in a timely manner. CONSULTANT shall also coordinate, or assist with coordinating, interaction with the California Division of Safety of Dams as necessary.

Project Management services shall include implementation of quality assurance/quality control procedures following standard CONSULTANT processes. Prior to submission to the AGENCY, all deliverables shall undergo detail checks and technical reviews to verify the quality and integrity of the project tasks and written work products, and to verify that the deliverables are in accordance with the scope of work. Each technical review shall be documented using appropriate forms and this documentation shall be maintained in the CONSULTANT'S project files. Invoices and project budget tracking reports shall be provided at monthly intervals.

Subtask 2.1: Structural Evaluation of Dam With and Without Orifices

CONSULTANT shall perform analyses to verify that installation of the proposed large diameter orifices into the dam shall not adversely impact the seismic stability or safety of the structure. Using the data obtained from the concrete cores under Subtask 1.2, the current strength of the concrete in the dam shall be estimated and compared with the strength assumed in the previous structural analyses (URS, AE11-06). The three-dimensional linear elastic finite element (ANSYS) model prepared by URS under the previous contract with the AGENCY (AE11-06), shall be modified to include the orifices and the suite of analyses re-run. The results of the runs on the modified model shall be compared to the results from the URS study, with specific focus on the stresses in the

vicinity of the proposed orifices to verify that the presence of the orifices is not expected to significantly impact the stability of the dam during static or dynamic loading.

Subtask 2.2: Detailed Sediment Transport Modeling From Dam to Ocean

CONSULTANT shall review earlier modeling efforts for fine and coarse sediment transport prepared for the Matilija Dam Removal (by Reclamation and CONSULTANT), incorporate information collected in Subtask 1.1, and develop detailed modeling of transport from the dam to the Pacific Ocean using the DREAM-2 model.

The DREAM-2 model is one of the two Dam Removal Express Assessment Models developed at Stillwater Sciences (Cui et al. 2006), which simulate the transport of both coarse and fine sediment following dam removal. The model, its predecessors, and sister models have been applied in more than a dozen large and small scale sedimentation analysis projects, including river sedimentation of a mining project that has released close to 2 billion tons of sediment (to date) into a river corridor (Pickup and Cui 2009), and the removal of Marmot Dam in the Sandy River, Oregon (Cui and Wilcox 2008). Comparisons of simulated and surveyed post-dam removal channel degradation/aggradation in the Sandy River, which has similar geomorphic conditions with Matilija Creek and Ventura River, indicated that the model likely outperformed any previous model simulations of similar magnitude (Cui et al. 2014). The model has also been extensively examined with flume experimental data (Cui et al. 2008) and against a natural landslide (Sutherland et al. 2002) and proven to perform satisfactorily. It is also worth noting that a preliminary DREAM-2 model was developed for the Matilija Dam removal project during the last contract phase completed in 2016 (AE14-033).

The future with project condition shall be modeled with rate of sediment input established in earlier studies and with downstream project components determined in collaboration with the AGENCY and the CONSULTANT. Modeling shall include peak flow and daily average hydrologic analyses under existing conditions, along with select representative years (such as the year that represents the occurrence of 100-yr flood). Two sets of model runs simulating sediment transport following dam removal, each comprised of 5 to 7 runs, are proposed under the most-likely scenario: dam removal during a 4-yr flood event (the minimum flood event required to remove the dam under the previous CONSULTANT study) and dam removal during a 10-yr flood event. In both scenarios a 100-yr flood event shall be inserted into the discharge series, representing it to occur at different years after dam removal. The purpose of the 100-yr flood modeling is to examine the maximum sediment deposition (i.e., worst-case-scenario) that would occur in different downstream river reaches during the 100-yr flood event so as to inform hydraulic modeling in Task 2.3. In addition to runs simulating sediment transport following dam removal described above, a separate model run shall be conducted simulating the terminal effect of dam removal. This run shall be conducted by using the projected post-removal sediment supply as model input, and extended to the future years when a new quasi-equilibrium bed profile is established. The simulated profile shall also be provided to Task 2.3 for evaluation of the long-term effect of dam removal on the 100-yr flood event.

In addition to the modeling runs, a mass conservation analysis similar to that presented in Cui et al (2011) for the Slab Creek Reservoir sedimentation process shall be conducted to better approximate the time at which sand and gravel will begin to pass the dam if the structure remains in place. The analysis shall apply basic geomorphic principles and shall utilize reasonable assumptions with regard to the profiles of sand and gravel deposits within the reservoir as the gravel continuously advances downstream and aggrades upward, replacing some of the more mobile sand deposits within the reservoir with coarser sediment. The results of this analysis shall provide a reference condition for the no-project alternative.

Subtask 2.2 Sediment Transport Modeling Summary

Condition	Event Recurrence Interval or Flow Rate	Presumed Number of Model Runs
Baseline (current)	Available Discharge Record	1
Dam Removal	4 year and 10 year event during the year of dam removal, 100-yr peak flow in different years after dam removal	10-14
Long- Term Following Dam Removal	Available discharge record, running repeatedly to achieve a new quasi-equilibrium	1

Subtask 2.3 - Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses

CONSULTANT shall conduct hydraulic modeling along the reaches of Matilija Creek and the Ventura River from the dam to the Pacific Ocean. The purpose of this task is to determine changes in flood elevations along Matilija Creek and the Ventura River resulting from dam removal. The first step of this task is to review the existing conditions in the Reclamation HEC-RAS model to ensure that it is generally accurate and the model is functioning properly. Steady state flood modeling shall then be conducted using 100-year peak flow, as well as 10-year, 25-year, and 50-year flows, applied to the modeled river profiles provided in Task 2.2. The modeling first establishes the existing conditions and future conditions (with dam). Next, post-removal channel geometries shall be imported into the HEC-RAS model based on: 1) detailed sediment transport analyses (i.e., changes in channel bed elevations/geometry based on coarse sediment transport results from Task 2.2) and 2) proposed upgrades of the Robles Diversion Dam and other downstream project components, to be determined in collaboration between CONSULTANT and AGENCY. Post-removal modeling shall be conducted using the same peak flow events as used for existing-conditions modeling. Several post-removal channel profiles shall be selected to conduct hydraulic modeling. The profiles shall be selected based on sediment transport modeling results to represent the highest levels of aggradation in different reaches of the channel as the sediment wave gradually progresses downstream, resulting in the maximum sediment deposit occurring in different reaches in different years following dam removal. Then, the existing and proposed conditions model results shall be compared in profile plots and water surface elevation comparison tables. Additionally, overbank inundation depth comparisons shall be generated for existing and proposed conditions model results based on HEC-RAS water

surface elevations and 2005 LiDAR topography. Inundation results shall be presented in a map format. Up to five different post-removal channel geometry conditions shall be evaluated to account for dynamic channel conditions as different reaches experience peak bedload sediment deposition at different times or under different hydrologic scenarios (i.e., peak discharge occurs in different years).

Subtask 2.4: Re-evaluation of Downstream Project Components (Santa Ana and Camino Cielo Bridges, Live Oak Acres and Meiners Oaks Levees, and Robles High Flow Bypass).

CONSULTANT shall re-evaluate the downstream project component designs in light of the results of 100-yr flood routing performed under Subtask 2.3.

The various downstream project components are currently at varying levels of design, approximately as follows: Santa Ana Bridge – 100%; Camino Cielo Bridge – 5%; Live Oak Acres Levee – 90%; Meiners Oaks Levee – 90%; Casitas Springs Levee – 5%; Robles High Flow Bypass – 90%; and, Foster Park Wells – 100%.

The design of each of the downstream project components is based on 100-yr flood levels that were developed for USACE's Alternative 4b dam removal project. CONSULTANT shall compare the 100-yr flood level used for downstream project component designs to levels required for FEMA certification based on 100-yr water surface elevation determined in Subtask 2.3. CONSULTANT shall develop and recommend alternative design revisions based on the results of the comparison of changes in hydraulics as well as input from the Contract Management Team, and review and update construction costs estimates, as appropriate.

Subtask 2.5: Predictability Assessment of Flushing Storm Event

CONSULTANT shall collect and review weather forecast data from the National Weather Service from the standpoint of how predictable flushing storm events are, and a model shall be developed to estimate risk associated with under-predicting a minimum flushing storm event.

Predicting that an incoming storm is of sufficient intensity to produce the required minimum flushing storm event is a key component of the feasibility study for the Project. Stream gage data for Matilija Creek and for the Ventura River indicate that storm events with adequate flushing flows have a recurrence interval of approximately three years. Historic storm events to be analysed, include flushing event storms and a range of storm events that result in flows significantly less than the minimum flushing storm event, shall be used to repeat the fine sediment analyses conducted during the previous study contract (URS, AE14-033) to determine the risks of under-predicting the storm event during dam removal. The results of the fine sediment and organics characterization from Subtask 1.1 shall provide updated information with regard to sediment gradation, erodibility, etc. that shall either affirm the previous fine sediment analysis (URS, AE14-033) or allow for updated analysis with the same methodology. The sediment profile, in

particular a determination of its composition and erosive tendencies, will help predict the efficacy of each storm event type (peak flow rate, duration, and recurrence interval) in mobilizing the sediment.

Subtask 2.6 - Update Dam Removal Concept To 10 Percent Design

CONSULTANT shall advance the design for the large diameter orifices, excavation of the orifice openings, dam demolition, and restoration of the reservoir area from the current conceptual level to a 10 percent design. Document the updated design on engineering plans.

A list of conceptual drawings anticipated to be included at the 10 percent design level include:

1. Project location and general arrangement plan
2. Dam site area plan
3. Dam and plunge pool plan view
4. Upstream elevation view
5. Downstream elevation view
6. Dam section views
7. Large diameter orifice sections and details
8. Orifice excavation sequencing plan and details
9. Dam demolition sequencing – profile and details
10. Post-flush channel plan, profile, and sections
11. Sediment disposal areas - plan and sections
12. Post-project restoration plan -- reservoir area

Subtask 2.7 – Updated Dam Structural Analysis

CONSULTANT shall review and update as appropriate the 2013 (AE11-06) structural analysis for Matilija Dam to address comments or concerns with the analysis based on the findings of Subtask 2.1. The model geometry shall be updated to reflect the proposed orifices through the structure with the 10 Percent Design from Subtask 2.6. Using updated data on the concrete strength obtained in Subtask 1.2 and refined in Subtask 2.1, the three-dimensional linear elastic finite element (ANSYS) model, modified from the model used in the URS 2013 study, shall be used to evaluate usual (normal), unusual (flood), and extreme (seismic) loading conditions on the dam with and without the orifices and with and without sediment behind the dam to assess the safety of the dam.

Subtask 2.8: Dam Removal Feasibility Study Report

CONSULTANT shall document the results of Subtasks 2.1 through 2.7 in a comprehensive report for comment by the various stakeholders including DSOD. The Feasibility Study Report (Report) shall summarize the results of the data obtained and analysis performed in each subtask, and shall incorporate as appendices or by reference the technical memorandum provided in Subtask 1.3. It is anticipated that the content and

format of the Report may evolve as work on the other subtasks progresses and the Report will be structured in response. Further, the Report shall focus in part on addressing specific areas of interest or concern expressed by DSOD or other regulatory entities. Incorporate stakeholder comments, where possible, into the final report and include an appendix of stakeholder comments and responses in the final report.

Draft Feasibility Study Table of Contents:

Executive Summary

- 1.0 Introduction**
- 2.0 Summary of Field Investigations**
- 3.0 Reservoir Fine Sediment**
- 4.0 Dam Concrete**
- 5.0 Structural Evaluation of Orifice Alternative**
- 6.0 Sediment Transport Modeling**
- 7.0 Hydraulic Studies Based on Sediment Modeling**
- 8.0 Re-evaluation of Downstream Project Components**
- 9.0 Assessment of Flushing Storm Events**
- 10.0 Dam Removal Concept – 10% Level Design**
- 11.0 Updated Structural Analysis of Dam**
- Appendix 1 – Stakeholder Comments**

Task 2 Deliverables:

- CONSULTANT/AGENCY/Contract Management Team conference calls shall be held at monthly intervals to facilitate coordination, input and provide progress summaries to the AGENCY/Management Team. CONSULTANT shall prepare agendas and meeting minutes for each meeting.
- CONSULTANT shall coordinate quarterly (4) meetings between CONSULTANT/AGENCY/Contract Management Team/Technical Advisory Team (TAC) in Ventura over the performance period involving CONSULTANT and two other team members.
- CONSULTANT shall coordinate two meetings between CONSULTANT/AGENCY/DSOD in Sacramento over the performance period involving CONSULTANT and two other team members.
- Draft Concrete Structural Strength Comparative Analysis and Stability Evaluation Report for AGENCY/Contract Management Team/TAC review
- Revised Draft Concrete Structural Strength Comparative Analysis and Stability Evaluation Report incorporating AGENCY/Contract Management Team/TAC comments
- Final Concrete Structural Strength Comparative Analysis and Stability Evaluation Report
- Draft Sediment Transport and Hydraulics Modelling Memo for AGENCY/Management Team/TAC Review

- Revised Sediment Transport and Hydraulics Modelling Memo incorporating AGENCY/Management Team/TAC comments
- Final Sediment Transport and Hydraulics Modelling Memo
- All native files for HEC-RAS and any other hydraulic computer modeling programs employed.
- Draft Re-evaluation of Downstream Project Components Designs Summary for AGENCY/Management Team/TAC Review
- Revised Draft Re-evaluation of Downstream Project Components Designs Summary incorporating AGENCY/Management Team/TAC comments
- Final Re-evaluation of Downstream Project Components Designs Summary
- Summary of Recommended Alternative Design Revisions for Downstream Project Components (depending on the outcome of the deliverables described above)
- Draft Summary of Risk Estimate in Under-Predicting a Flushing Storm Event for AGENCY/Management Team/TAC Review
- Revised Draft Summary of Risk Estimate in Under-Predicting a Flushing Storm Event incorporating AGENCY/Management Team/TAC comments
- Final Summary of Risk Estimate in Under-Predicting a Flushing Storm Event
- Draft 10 Percent Level Design package (to include conceptual drawings, preliminary descriptions of boring and demolition requirements and sequencing, a description of the key design elements, a description of restoration requirements and objectives, etc.) for Orifice Boring, Dam Demolition, and Reservoir Area Restoration for Management Team/TAC Review
- Revised Draft 10 Percent Level Design package for Orifice Boring, Dam Demolition, and Reservoir Area Restoration incorporating Management Team/TAC comments
- Final 10 Percent Level Design package for Orifice Boring, Dam Demolition, and Reservoir Area Restoration
- Draft Summary of Matilija Dam Structural Analysis for AGENCY/Contract Management Team/TAC review
- Revised Draft Summary of Matilija Dam Structural Analysis Incorporating AGENCY/Contract Management Team/TAC comments
- Final Summary of Matilija Dam Structural Analysis
- Draft Dam Removal Feasibility Report for AGENCY/Contract Management Team/TAC review
- Revised Draft Dam Removal Feasibility Report incorporating AGENCY/Contract Management Team/TAC comments
- Final Dam Removal Feasibility Report incorporating Contract Management Team comments
- Invoices, progress reports, meeting minutes, and other documentation as necessary.

Task 3 - Review and Update Real Estate Plan

Subtask 3.1 Review USACE Real Estate Plan

CONSULTANT shall review the 2004 Plan prepared by USACE to determine previously used methods and outcomes. CONSULTANT shall develop tabular and GIS exhibits to

illustrate acquisitions, both extents and type of acquisition, to compare and contrast with the updated Plan.

Subtask 3.2 Development of Real Estate Plan/Downstream Project Component Decision Matrix

CONSULTANT shall, in consultation with AGENCY and Contract Management Team, develop a matrix to guide decisions for the Real Estate Plan and downstream infrastructure project components. The thresholds in the decision matrix will consider the final results of the project sediment transport and hydraulic analyses, Subtasks 2.2 and 2.3, and shall provide, at a minimum, guidance for developing the following recommendations, 1) new downstream infrastructure, 2) upgrades to existing infrastructure, 3) acquisition of properties and removal of habitable structures, and acquisition of inundation easements.

Subtask 3.3 Updated Real Estate Plan

Based on Subtasks 3.1 and 3.2, Consultant shall update the Real Estate Plan for the Project. The plan shall focus on acquisition of properties or improvements to private infrastructure affected by increases in flood elevations but shall not include acquisitions required for construction and maintenance of downstream public infrastructure project components. Property acquisitions required for downstream public infrastructure may be added to this plan as a separate subtask once this information is developed from the design of each component.

CONSULTANT shall collect parcel data, including rights-of-way and easement information, from the County Assessor and other publicly available data. The parcel data shall be used as a basis for the updated Plan. The parcel data ownership and zoning information shall be used to inform the Plan. CONSULTANT shall collect and use the 2005 LIDAR data to determine parcel elevations. Real estate costs based on publicly available published data (for example, Zillow or Realtor) as well as guidance provided by the AGENCY'S Real Estate Section shall be assigned to each parcel.

CONSULTANT shall prepare GIS map exhibits that include 100-yr flood levels and parcel information. CONSULTANT shall prepare tables summarizing all parcel information, including parcel elevations, zoning information, and magnitude of and change of inundation levels. These exhibits and tables will be used to identify parcels, structures and infrastructure of concern.

CONSULTANT shall use the decision matrix developed in Subtask 3.2 to identify inundated parcels recommended for further protection or mitigation measures. These may include public infrastructure or private infrastructure. The infrastructure identified in Subtask 2.4 (Re-evaluation of Downstream Components) shall also be considered in the Plan.

CONSULTANT shall also identify inundated parcels that will be designated for recommended acquisition. The acquisition strategy may differ based on zoning information, level or percentage of inundation, and change in inundation. The acquisition plan may also consider insurance coverage in lieu of land acquisition. CONSULTANT

shall review changes in inundation levels against parcel elevations, considering the level of accuracy of the hydraulic model.

CONSULTANT shall use the methodology developed in Subtask 3.2 to develop the Real Estate Plan that will include: a description of the strategies and the decision matrix in Subtask 3.2, tabular and graphical representation of the updated Plan, a cost estimate for implementing the Plan based on recommended infrastructure improvements, land acquisition and insurance coverage. The updated Plan shall also include a section that compares the update Plan with the 2004 Plan, and a report summarizing the findings.

Deliverables:

- Draft Decision Matrix
- Final Decision Matrix, incorporating comments received on draft
- Draft Updated Real Estate Plan with map figures and cost data.
- Revised Draft Updated Real Estate Plan (if necessary), incorporating comments received on initial draft
- Final Draft Updated Real Estate Plan

Report deliverables shall be provided in Word and single searchable PDF format. Tables and GIS layers and exhibits shall be provided in native electronic format.

Task 4 – Water Supply Mitigation

Short Term Sediment Impact Water Supply Mitigation Alternatives Refinement

CONSULTANT shall assess possible short-term impacts caused by the flushing of fine sediment from the Project on water supplies and infrastructure owned and managed by the Water Supply Agencies listed below, then identify and evaluate potential water supply mitigation alternatives. The objective of the mitigation alternatives is to reduce the severity of any potential impact of the Project or the potential for reduced water supply or reduction in water quality caused primarily by the flushing of fine sediment from the reservoir during and following the initial flushing event. The outcome of this analysis will be a preferred alternative for each Water Supply Agency.

A range of water supply mitigation alternatives was previously developed in the Water Supply Mitigation Options Evaluation Report (AECOM, 2016). The intent of this task is to advance and refine the alternatives identified in the previous report, and further assess any potential new alternatives.

The Water Supply Agencies that will be considered as part of this task are identified as follows:

- ***Meiners Oaks Water District***
- ***Ventura River Water District***
- ***City of Ventura***

- **Casitas Municipal Water District**

Subtask 4.1 - Data Review

CONSULTANT shall review the following reports and background information:

- **Matilija Dam Ecosystem Restoration Feasibility Study – Final Report (USACE, September 2004)**
- **Water Supply Mitigation Options Evaluation Report (AECOM, March 2016)**
- **Matilija Dam Removal Concepts Evaluation Report (AECOM, March 2016)**
- **Detailed Sediment Transport Modelling and Hydraulic Studies to Determine 100-yr Water Surface Elevations (Stillwater Sciences, July 2019)**
- **Other pertinent information, such as groundwater management authority (GMA) reports, consumer confidence reports (CCR), etc.**

Subtask 4.2 - Analysis of Short-Term Impacts to Water Supply Agencies

CONSULTANT shall review the impacts defined in the previous Water Supply Mitigation Options Evaluation Report (2016). Based on the review of available data, the CONSULTANT shall define the short-term impacts to the Water Supply Agencies. The potential impacts shall be defined based on reduction in water supply volume and potential impacts to water quality.

CONSULTANT shall update the short-term impacts defined in the previous Water Supply Mitigation Options Evaluation Report (2016) based on new available data, if applicable.

Subtask 4.3 - Development of Conceptual Alternatives

CONSULTANT shall review the alternatives in the previous Water Supply Mitigation Options Evaluation Report (2016). Based on the information identified in Subtasks 4.1 and 4.2, the CONSULTANT shall identify new alternatives that were not considered as part of the previous report.

CONSULTANT shall develop the new alternatives to facilitate discussions with the Water Supply Agencies, the Contract Management Team, and project stakeholders; including development of conceptual drawings, descriptions, etc.

Subtask 4.4 - Coordination with Water Supply Agencies

CONSULTANT shall schedule meetings with the Water Supply Agencies to review and discuss results of the analysis in Subtask 4.2 and the alternatives defined in Subtask 4.3.

Meetings shall be held with the Water Supply Agencies at their preferred locations (up to three separate meetings with each agency over a total of three days) to further refine and agree on the alternatives. The outcome of the meetings shall be a list of alternatives that will be developed for further refinement. Minutes shall be provided to project stakeholders summarizing meeting outcomes.

Subtask 4.5 - Refinement of Alternatives

CONSULTANT shall refine the alternatives that were identified for further refinement in the Water Supply Agency meetings, per Subtask 4.4.

CONSULTANT shall evaluate any new alternatives based on the four evaluation criteria defined in the previous Water Supply Mitigation Options Evaluation Report. The four evaluation criteria are defined as:

- ***Cost – Considers the estimated lifecycle cost as well as the potential return on investment.***
- ***Environmental – This criterion considers the potential environmental impacts for each alternative as well as possible environmental permitting requirements.***
- ***Feasibility – The feasibility evaluation represents the general effectiveness of each alternative with regards to mitigating potential water volume losses as well as the constructability and scheduling. Additionally, it considers comments and feedback received from the Water Supply Agencies, Contract Management Team, and project stakeholders.***
- ***Adaptability – The adaptability criterion considers whether the proposed alternative has any future benefits beyond the mitigation needs of the dam removal project.***

Based on the alternatives evaluation, the AGENCY will select the preferred alternative for each Water Supply Agency to be carried forward to the feasibility study phase. The preferred alternative will be discussed and agreed to by the Water Supply Agencies and Contract Management Team prior to a decision on final recommendations.

Deliverables:

- ***Water Supply Mitigation Alternatives Refinement:***
 - ***Draft Water Supply Mitigation Alternatives Report describing the alternatives evaluation process and the preferred alternative.***
 - ***Revised Draft (if necessary) Water Supply Mitigation Alternatives Report, incorporating comments received on initial draft.***
 - ***Final Water Supply Mitigation Alternatives Report, incorporating comments received on draft(s).***

Report deliverables shall be provided in Word and single searchable PDF format. Tables and GIS layers and exhibits shall be provided in native electronic format.

3. Extra Services

Extra Services are separate from but related to the Basic Services described above. Extra Services shall be performed by CONSULTANT only after being authorized in writing by the Project Manager for AGENCY. AGENCY's written authorization will include a statement of the Extra Services required and time schedule for completion. CONSULTANT's billing and AGENCY's payment for Extra Services shall occur pursuant to Exhibit C.

4. County Services

AGENCY will provide or accomplish the following:

1. Full information as to the requirements of the services to be provided by CONSULTANT under the contract.
2. Review documents submitted by CONSULTANT and provide comments, direction, or approval as needed in a timely manner.
3. Provide environmental permitting for all field investigations.

End of Exhibit A

EXHIBIT B - TIME SCHEDULE

1. Schedule

All Work on this contract shall be completed by 6/30/2020.

CONSULTANT shall complete intermediate tasks as follows:

Task Table

Task	Description	Due Date
1	Field Investigations	
1.1	Geotechnical Field Investigations to Characterize Fine Sediment and Organics	07/07/2018
1.2	Field Investigations to Characterize Dam Concrete	07/07/2018
1.3	Field Investigations Memorandum	08/30/2018
1.4	Biological Support for Field Investigations	09/15/2018
2	Dam Removal Feasibility Study	
2.1	Structural Evaluation of Dam With and Without Orifices	03/13/2020
2.2	Detailed Sediment Transport Modeling From Dam to Ocean	01/31/2020
2.3	Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses	01/31/2020
2.4	Re-evaluation of Downstream Project Components	03/30/2020
2.5	Predictability Assessment of Flushing Storm Event	01/31/2020
2.6	Update Dam Removal Concept To 10 Percent Design	04/24/2020
2.7	Updated Dam Structural Analysis	03/13/2020
2.8	Dam Removal Feasibility Study Report	03/30/2020
3	Review and Update Real Estate Plan	
3.1	Review USACE Real Estate Plan	01/01/2020
3.2	Development of Real Estate Plan/Downstream Project Component Decision Matrix	2/29/2020
3.3	Update Real Estate Plan	3/31/2020
4	Water Supply Mitigation	5/15/2020
4.1	Data Review	2/29/2020
4.2	Analysis of Short-Term Impacts to Water Supply Agencies	3/31/2020
4.3	Development of Conceptual Alternatives	3/31/2020
4.4	Coordination with Water Supply Agencies	5/31/2020
4.5	Refinement of Alternatives	5/31/2020

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 04 TO CONTRACT AE18-034

EXHIBIT C – Fees and Payments

1. Compensation Summary

The following summarizes the maximum amount of compensation available to CONSULTANT under this contract. The actual amount of compensation shall be established and paid in accordance with the applicable provisions of the contract including this Exhibit C.

Maximum Fees for Basic Services:	\$ <u>925,344.00</u>
Maximum Fees for Extra Services:	\$ <u>0.00</u>
Maximum Reimbursement for Expenses:	\$ <u>0.00</u>
Total Amount Not to Exceed:	\$ <u>925,344.00</u>

2. Fees For Basic Services

AGENCY agrees to pay CONSULTANT the following fees for Basic Services

☒ a **fixed fee** compensation, in the lump sum amount of \$925,344.00, for completion of all Basic Services.

Task Table

Task	Description	Lump Sum
1	Field Investigations	
1.1	Geotechnical Field Investigations to Characterize Fine Sediment and Organics	\$137,538.00
1.2	Field Investigations to Characterize Dam Concrete	\$61,612.00
1.3	Field Investigations Memorandum	\$32,034.00
1.4	Biological Support for Field Investigations	\$16,898.00
2	Dam Removal Feasibility Study	
2.1	Structural Evaluation of Dam With and Without Orifices	\$32,992.00
2.2	Detailed Sediment Transport Modeling From Dam to Ocean	\$135,594.00
2.3	Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses	\$43,886.00
2.4	Re-evaluation of Downstream Project Components	\$61,172.00
2.5	Predictability Assessment of Flushing Storm Event	\$42,070.00
2.6	Update Dam Removal Concept To 10 Percent Design	\$102,520.00
2.7	Updated Dam Structural Analysis	\$147,248.00
2.8	Dam Removal Feasibility Study Report	\$25,636.00
3	Review and Update Real Estate Plan	
3.1	Review USACE Real Estate Plan	\$4,787.00
3.2	Development of Real Estate Plan/Downstream Project Component Decision Matrix	\$24,991.00

MODIFICATION NUMBER 04 TO CONTRACT AE18-034

Task	Description	Lump Sum
3.3	Update Real Estate Plan	\$23,597.00
4	<i>Water Supply Mitigation</i>	
4.1	<i>Data Review</i>	\$2,074.00
4.2	<i>Analysis of Short-Term Impacts to Water Supply Agencies</i>	\$4,197.00
4.3	<i>Development of Conceptual Alternatives</i>	\$5,821.00
4.4	<i>Coordination with Water Supply Agencies</i>	\$7,565.00
4.5	<i>Refinement of Alternatives</i>	\$13,112.00
Total		\$925,344.00

3. Fees For Extra Services

For Extra Services authorized in writing in advance by AGENCY in accordance with Exhibit A, AGENCY agrees to pay CONSULTANT an **hourly rate** compensation for actual hours of Extra Services performed that is based upon the hourly rates set forth in the Rate Table for Basic Services above or, if none, then based upon the hourly rates set forth in the following Rate Table for Extra Services, which rates shall remain fixed for the duration of the contract, not to exceed the **maximum fee amount of \$ 0.00**.

4. Delays

If Work cannot be completed by the dates specified in Exhibit B through no fault of CONSULTANT, the fees 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 written modification to this contract.

5. Reimbursable Expenses

CONSULTANT shall be reimbursed a sum for the following reasonable out-of-pocket expenses that are incurred and paid for by CONSULTANT in furtherance of performance of its obligations under this contract, but only to the extent that such expenses are directly related to CONSULTANT's services hereunder and do not exceed the **maximum reimbursable amount of \$ 0.00**:

(i) Outside printing directly related to deliverables but not for internal uses of CONSULTANT or its Subconsultants;

(ii) Reproduction or reprographic costs directly related to deliverables but not for internal uses of CONSULTANT or its Subconsultants. If CONSULTANT provides allowable reprographic services using its own equipment rather than using an outside service, the unit billing rates for such charges must be approved in advance by AGENCY;

(iii) Shipping, overnight mail, postage, messenger, courier and/or delivery services (but not for CONSULTANT's internal communications);

(iv) Only if authorized in writing in advance by AGENCY, reimbursement for business travel for the specific position descriptions so identified in the Rate Tables for Basic Services or Extra Services set forth above. AGENCY shall reimburse CONSULTANT for transportation, lodging, and meal expenses consistent with the policies and amounts approved for County employees as defined by policy number Chapter VII(C)-1, *Reimbursement of Employees County Business Expenses*, in the County's Administrative Policy Manual (latest edition);

(v) Only if authorized in writing in advance by AGENCY, fees and costs for Subconsultant services that are not included in the Rate Tables for Basic Services or Extra Services set forth above.

Exclusive List. The list of reimbursable expenses set forth above is the sole and exclusive list of reimbursable expenses that CONSULTANT is entitled to receive.

Approval Limits. Any reimbursable expense wherein a single item exceeds \$500 in value, whether purchased or leased, must be approved in writing in advance by AGENCY.

No Administrative Charge or Mark-Ups. The reimbursement provided for herein shall not include an administrative charge, multiplier or other mark-up by CONSULTANT unless authorized in writing, in advance, by AGENCY.

No Reimbursement for Specified Basic Services Paid for by a Fixed Fee. Notwithstanding the above, expenses related to Basic Services specified in Exhibit B are not reimbursable if CONSULTANT is compensated for Basic Services by a fixed fee.

6. Payment

AGENCY shall make payments to CONSULTANT under the contract as follows:

Requests for Payment

To request payment, CONSULTANT shall complete and submit to AGENCY a Consultant Services Invoice Form that shall include, at a minimum, (i) personnel time records for Basic Services and Extra Services actually performed at the rates specified in this Exhibit C if applicable and (ii) receipts for all authorized reimbursable expense, along with the written AGENCY authorization for any specific reimbursable expenses requested for payment, if required above.

When invoicing for Extra Services, CONSULTANT shall clearly mark on the Invoice Form which services are Extra Services and keep those services separate from or Basic Services, and shall include a copy of the written AGENCY authorization for the Extra Services for which payment is requested.

CONSULTANT shall submit all invoices to:

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

Payment Schedule

Payments shall be made monthly by AGENCY upon presentation of a properly completed AGENCY Invoice Form as described above. Upon approval of the invoice, AGENCY shall pay CONSULTANT 95% of the maximum fee for the specific task/milestone. Upon completion and acceptance by AGENCY of the task/milestone, AGENCY shall pay CONSULTANT the balance of the fee.

Timely Invoicing

Timely invoicing by CONSULTANT is required. 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 submit a properly completed invoice no later than 60 calendar days after the services which are the subject of the invoice were performed. An invoice received by AGENCY more than 60 calendar days after the services were performed shall be reduced by 5% to compensate AGENCY for the additional management costs. Additionally, since increases in administrative costs and budgetary problems caused by late invoicing correlate to the length of delay in invoicing, there will be an additional 5% reduction in compensation for each additional 30-calendar-day period beyond 60 days between the date the services were performed and the submission of the invoice for those services.

MODIFICATION NUMBER 04 TO CONTRACT AE18-034

CONSULTANT shall submit a final invoice form within 60 days of the earliest of the following events: 1) completion and acceptance by AGENCY of all Work required by the contract; or 2) termination of the contract.

End of Exhibit C

MODIFICATION NUMBER 5 TO CONTRACT AE18-034

Contract Title: Matilija Dam Removal 65% Design Planning Project

This modification ("MODIFICATION NO. 5") is made and entered into by and between the Watershed Protection District, hereinafter referred to as AGENCY, and AECOM, hereinafter referred to as CONSULTANT.

WHEREAS, there now exists a binding contract between AGENCY and CONSULTANT originally dated 2/26/2018 for the CONSULTANT to provide engineering services to develop 65% designs to remove Matilija Dam in a manner that would reduce the impact of impounded sediment while minimizing costs and time associated with dam removal for a total contract amount of \$822,302.00 and a contract completion date of 7/11/2019 ("CONTRACT"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT on 7/25/2018 for the CONSULTANT to perform biological clearance surveys and compliance monitoring in support of field investigations to comply with California Department of Fish and Wildlife (CDFW) requirements for an additional contract amount of \$16,898. ("MODIFICATION NO.1"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT on 7/25/2019 to extend the CONTRACT time and task due dates due to a delay initiated from the acquisition for regulatory permits required for the filed investigations at an unchanged contract amount of \$839,200 and to extend the CONTRACT completion date from 7/11/2019 to 11/30/2019 ("MODIFICATION NO.2"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT on 12/26/2019 to add additional tasks for the CONSULTANT to review and update the 2004 Real Estate Plan prepared by the USACE for an additional contract amount of \$53,375 and to extend the CONTRACT completion date from 11/30/2019 to 6/30/2020. ("MODIFICATION NO.3"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT on 2/27/2020 to add additional tasks to the CONTRACT for the CONSULTANT to assess possible short-term impacts caused by the flushing of fine sediment from the Project on downstream water supply infrastructure and identify and evaluate the potential water supply mitigation alternatives for an additional contract amount of \$32,769.00. ("MODIFICATION No. 4"); and

WHEREAS it has become necessary to add additional tasks to the CONTRACT to address concerns regarding the potential long-term impacts to the operation of Casitas Municipal Water District's Robles Diversion Facility caused by increased sediment delivery following the removal of Matilija Dam. CONSULTANT shall review background information, evaluate relevant case studies, formulate alternative options, conduct a workshop and prepare a final report; 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 2/26/18, 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:
See attached revised Exhibit A, Modification No.5.
3. Exhibit B (Time Schedule) shall be modified as follows:
See attached revised Exhibit B, Modification No.5.
4. Exhibit C (Fees and Payment) shall be modified as follows:
See attached revised Exhibit C, Modification No. 5.
5. The total contract amount shall hereby be increased by \$ 79,488.00 for a new CONTRACT total amount of \$1,004,832.00. The contract completion date is changed from 06/30/2020 to 12/31/2020.

MODIFICATION NUMBER 6 TO CONTRACT AE18-034

Contract Title: Matilija Dam REMOVAL 65% DESIGN PLANNING PROJECT

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

FOR CONSULTANT

Name:

Craig J. Smith

7/20/2020

Date

Title:

Assoc. Vice Pres.

FOR AGENCY:

Name:

Jeff Rath

7/28/20

Date

Director of Public Works Agency

ASC 7/24

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

1. Overview of Project and Services

AGENCY has engaged CONSULTANT to provide the following services, which are more specifically described in the Basic Services section below, to assist AGENCY with the following project:

The Matilija Dam Removal 65% Planning Design Project, follows work completed by CONSULTANT in 2016 for the Agency. The CONSULTANT shall provide engineering services to develop 65% designs to remove Matilija Dam in a manner that would reduce the impact of impounded sediment while minimizing costs and time associated with dam removal.

2. Basic Services

The following Basic Services shall be performed by CONSULTANT:

Task 1 – Field Investigations

CONSULTANT shall perform field investigations to collect data needed for the following: 1) further analysis of the fine sediment deposits upstream of the dam, and 2) further characterization of the structural concrete comprising the dam to inform studies and structural analysis for dam removal. Field investigations shall be accomplished under the three subtasks described below.

Subtasks in Field Investigations shall include Project Management and oversight services. The CONSULTANT shall facilitate ongoing coordination and communication among staff and sub-consultants. The CONSULTANT shall coordinate general AGENCY update meetings/calls at monthly intervals, and shall address questions and concerns in a timely manner. The CONSULTANT shall also coordinate, or assist with coordinating, interaction with the California Division of Safety of Dams as necessary.

CONSULTANT services shall include implementation of quality assurance/quality control procedures following standard CONSULTANT processes. Prior to submission to the AGENCY, all deliverables shall undergo detail checks and technical reviews to verify the quality and integrity of the project tasks and written work products, and to verify that the deliverables are in accordance with the scope of work. Each technical review shall be documented using appropriate forms and this documentation shall be maintained in the CONSULTANT's project files. Invoices and project budget tracking reports shall be provided at monthly intervals.

Subtask 1.1 - Geotechnical Field Investigations to Characterize Fine Sediment and Organics

CONSULTANT shall plan the investigation, obtain a County drilling permit, obtain a DSOD permit (if one is needed), obtain and log sediment samples at six locations to an estimated depth of 60-90 feet, and perform laboratory testing. Sampling and testing shall be performed to screen for the presence of contaminants such as heavy metals and pesticides, and the results shall be compared to earlier test findings by the US Army Corps

of Engineers. Specific tests to identify the presence of metals include Title 22 (CAM17) and others depending on the target metal types. Specific tests for organics such as pesticides and hydrocarbons will include TPH, OCP, PCB, SVOC, and PAH. The tests shall be conducted in accordance with appropriate EPA sampling protocols and test methods. The borings shall be advanced through the water from a barge.

Previous investigations by the United States Army Corps of Engineers (USACE) identified that the characteristics of the organic materials in the fine sediment upstream of the dam could affect water quality during and following dam removal. Several borings were abandoned after methane gas was detected and as a result, the full depth of the sediment was not penetrated at those locations. The six borings included in the this scope of work, as indicted above, will be used to characterize the limits of the organic materials as well as collect other geotechnical information (SPT blowcount, grain size distribution and relative quantities, plasticity, shear strength, etc.) related to the sediment to confirm the transport of fine sediment from the reservoir during initial and subsequent flushing events.

Since sediment within the reservoir basin is known to be partially comprised of decomposed organic material, it is expected that methane gas emissions will occur during the drilling process. The drilling section of the Project Safety Plan shall describe specific measures addressing methane gas emissions, with alternate drilling methods that may be employed to eliminate or reduce emissions from low-pressure methane lenses. In some cases, the volume and pressure of methane escaping a penetrated lens may prohibit further advancing that boring and the drilling equipment will be removed when safe to do so. Based on the boring depth completed to that point and other factors, a decision shall be made, in consultation with the AGENCY, whether to characterize the sediment utilizing the data obtained to that depth or to drill in an alternative, representative location. Seven days of onsite drilling effort has been budgeted for this subtask.

Subtask 1.2 - Field Investigations to Characterize Dam Concrete

CONSULTANT shall perform concrete coring and testing to determine the appropriate material properties for use in the structural analyses under Subtask 2.1 and 2.7.

CONSULTANT shall develop a work plan, obtain DSOD approval, and obtain concrete cores from the downstream dam face near the two proposed orifice locations and at 4 to 6 other locations along the upstream face of the dam. The downstream cores shall be obtained from a barge platform in the plunge pool or other means of access. The upstream cores shall be obtained from the same barge platform used for the geotechnical investigations under Task 1.1. The core samples shall be 6 inches in diameter, and continuous samples shall be obtained for the full depth of each boring. The upstream borings shall be approximately 4 feet deep. Two downstream borings near the proposed orifice locations shall be approximately 4 feet deep and the remaining two shall be approximately 20 feet deep. Core samples selected for compressive strength testing will typically be at least 12 inches long. An investigation work plan and application for the concrete coring shall be prepared and submitted to DSOD for review and approval prior to the commencement of field work. The concrete core samples shall be logged and

photographed during drilling and then transported to the laboratory for further examination and testing. Selected samples shall be tested for bulk specific gravity, unconfined compressive strength, splitting tensile strength, and elastic modulus properties. Petrographic analysis and gel fluorescence testing shall also be conducted to assess the presence of Alkali Silica Reaction (ASR) in the concrete.

Subtask 1.3: Field Investigations Memorandum

CONSULTANT shall document the results from the field investigations described under Subtasks 1.1 and 1.2 in a technical memorandum (TM). The TM shall present the results of the investigations, including fine sediment boring logs, concrete core logs, and laboratory test results for both the sediment samples and the concrete core samples. All boring logs shall be photo documented for inclusion as appendices to the TM.

Subtask 1.4: Biological Support for Field Investigations

CONSULTANT shall conduct pre-construction surveys. To comply with permitting requirements, at least three pre-construction biological surveys, at least three days apart with the last survey within three days of mobilization, shall be conducted by two qualified biologists. CONSULTANT shall mobilize two biologists to conduct biological pre-construction surveys of the perimeter of Matilija Reservoir and the plunge pool at the base of the dam. Surveys shall be conducted in the habitat communities surrounding the water bodies out to 300 feet and does not include protocol-level biological surveys for sensitive species. The biologist shall coordinate with the AGENCY for access and appropriate routes to conduct the surveys. This work assumes three, 8-hour days to allow for travel, coordination, and access to the areas for surveys.

CONSULTANT shall perform geotechnical work monitoring. A qualified biological monitor shall be present periodically during work activities. Geotechnical work is anticipated to begin on July 31, 2018, and continue on weekdays through approximately August 9, 2018, for a total of 8 days of biological monitoring. The monitor shall be responsible for daily clearance surveys prior to work commencing, ensuring compliance with the species protection measures, and documenting BMP practices.

CONSULTANT shall coordinate with the AGENCY to discuss any special-status species findings during the course of the surveys and monitoring. If any sensitive biological resources are identified, the AGENCY shall be notified and applicable species protection measures shall be discussed and implemented. CONSULTANT'S biologist shall participate in conference calls to present interim finding of biological pre-construction surveys and monitoring.

Any non-compliance observations and/or sensitive resource observations shall be immediately reported to the project manager and communicated to the AGENCY. If active bird nests are found within the area potentially affected by the work, which was defined as 300 feet, work shall be redirected or postponed until the nest is no longer active or other protection measures are implemented in coordination with the AGENCY

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This work assumes 6-hour days to allow for travel, access and a clearance survey prior to the start of each day's work and assumes the geotechnical investigation crews work an 8-hour day.

CONSULTANT shall provide reporting. A biological survey and monitoring report shall be completed (Project Completion Report) as required by the AGENCY, which shall include the following:

- Site conditions / vegetation in or adjacent to project area;
- Distance to adjacent or downstream sensitive biological resources and description of resource;
- Summary/general descriptions of vegetation types within the survey and monitoring area;
- Summary of preconstruction surveys via email documenting any nesting bird or other sensitive resources;
- Cumulative lists of common and special-status wildlife species found at the project site during all surveys (detailed species descriptions are not necessary);
- If special-status species that should be reported to the California Natural Diversity Database are observed, a statement shall be included of when such reports were submitted. Additionally, the completed California Native Species Field Survey Form(s) shall be appended to the project completion report;
- Documentation of BMPs implemented to avoid biological resource impacts; and
- Any problems/examples of non-compliance and how they were resolved.

Task 1 Deliverables:

- Conference calls shall be held at monthly intervals to facilitate coordination, input and provide progress summaries to the AGENCY/Contract Management Team. CONSULTANT shall prepare agendas and meeting minutes for each meeting.
- CONSULTANT shall coordinate quarterly (4) meetings between CONSULTANT/AGENCY/Contract Management Team/Technical Advisory Committee (TAC) in Ventura over the performance period involving CONSULTANT and two other team members.
- CONSULTANT shall coordinate one meeting between CONSULTANT/AGENCY/DSOD in Sacramento over the performance period involving the CONSULTANT and two other team members.
- Project Safety Plan
- Work plan and application for submission to DSOD
- Coordination with DSOD during permit processing as required
- Draft Field Investigations TM characterizing the fine sediment and assessing the concrete condition
- Revised Draft (if necessary) Field Investigations TM, incorporating comments received on Draft TM.

- Final Field Investigations TM, incorporating comments received on Revised Draft TM.
- Invoices, progress reports, meeting minutes, and other documentation as necessary.
- The biological monitor shall complete pre-construction field reports and daily monitoring field reports for inclusion in the Project Completion Report.
- The CONSULTANT'S qualified biologist shall prepare the Project Completion Report within 15 days of project completion and shall address AGENCY comments and return the final version within 7 days of receipt of AGENCY comments.

Task 2: Dam Removal Feasibility Study

CONSULTANT shall prepare a feasibility study to advance the conceptual design for installing two large diameter orifices in Matilija Dam, implementing fine sediment evacuation by opening the orifices during a flushing storm event, and demolition of the dam following sediment flushing. The feasibility study shall be accomplished under the subtasks described below. Subtasks in the Dam Removal Feasibility Study shall include Project Management and oversight services. CONSULTANT shall facilitate ongoing coordination and communication among staff and sub-consultants. CONSULTANT shall coordinate general AGENCY update meetings/calls at monthly intervals, and shall address questions and concerns in a timely manner. CONSULTANT shall also coordinate, or assist with coordinating, interaction with the California Division of Safety of Dams as necessary.

Project Management services shall include implementation of quality assurance/quality control procedures following standard CONSULTANT processes. Prior to submission to the AGENCY, all deliverables shall undergo detail checks and technical reviews to verify the quality and integrity of the project tasks and written work products, and to verify that the deliverables are in accordance with the scope of work. Each technical review shall be documented using appropriate forms and this documentation shall be maintained in the CONSULTANT'S project files. Invoices and project budget tracking reports shall be provided at monthly intervals.

Subtask 2.1: Structural Evaluation of Dam With and Without Orifices

CONSULTANT shall perform analyses to verify that installation of the proposed large diameter orifices into the dam shall not adversely impact the seismic stability or safety of the structure. Using the data obtained from the concrete cores under Subtask 1.2, the current strength of the concrete in the dam shall be estimated and compared with the strength assumed in the previous structural analyses (URS, AE11-06). The three-dimensional linear elastic finite element (ANSYS) model prepared by URS under the previous contract with the AGENCY (AE11-06), shall be modified to include the orifices and the suite of analyses re-run. The results of the runs on the modified model shall be compared to the results from the URS study, with specific focus on the stresses in the

vicinity of the proposed orifices to verify that the presence of the orifices is not expected to significantly impact the stability of the dam during static or dynamic loading.

Subtask 2.2: Detailed Sediment Transport Modeling From Dam to Ocean

CONSULTANT shall review earlier modeling efforts for fine and coarse sediment transport prepared for the Matilija Dam Removal (by Reclamation and CONSULTANT), incorporate information collected in Subtask 1.1, and develop detailed modeling of transport from the dam to the Pacific Ocean using the DREAM-2 model.

The DREAM-2 model is one of the two Dam Removal Express Assessment Models developed at Stillwater Sciences (Cui et al. 2006), which simulate the transport of both coarse and fine sediment following dam removal. The model, its predecessors, and sister models have been applied in more than a dozen large and small scale sedimentation analysis projects, including river sedimentation of a mining project that has released close to 2 billion tons of sediment (to date) into a river corridor (Pickup and Cui 2009), and the removal of Marmot Dam in the Sandy River, Oregon (Cui and Wilcox 2008). Comparisons of simulated and surveyed post-dam removal channel degradation/aggradation in the Sandy River, which has similar geomorphic conditions with Matilija Creek and Ventura River, indicated that the model likely outperformed any previous model simulations of similar magnitude (Cui et al. 2014). The model has also been extensively examined with flume experimental data (Cui et al. 2008) and against a natural landslide (Sutherland et al. 2002) and proven to perform satisfactorily. It is also worth noting that a preliminary DREAM-2 model was developed for the Matilija Dam removal project during the last contract phase completed in 2016 (AE14-033).

The future with project condition shall be modeled with rate of sediment input established in earlier studies and with downstream project components determined in collaboration with the AGENCY and the CONSULTANT. Modeling shall include peak flow and daily average hydrologic analyses under existing conditions, along with select representative years (such as the year that represents the occurrence of 100-yr flood). Two sets of model runs simulating sediment transport following dam removal, each comprised of 5 to 7 runs, are proposed under the most-likely scenario: dam removal during a 4-yr flood event (the minimum flood event required to remove the dam under the previous CONSULTANT study) and dam removal during a 10-yr flood event. In both scenarios a 100-yr flood event shall be inserted into the discharge series, representing it to occur at different years after dam removal. The purpose of the 100-yr flood modeling is to examine the maximum sediment deposition (i.e., worst-case-scenario) that would occur in different downstream river reaches during the 100-yr flood event so as to inform hydraulic modeling in Task 2.3. In addition to runs simulating sediment transport following dam removal described above, a separate model run shall be conducted simulating the terminal effect of dam removal. This run shall be conducted by using the projected post-removal sediment supply as model input, and extended to the future years when a new quasi-equilibrium bed profile is established. The simulated profile shall also be provided to Task 2.3 for evaluation of the long-term effect of dam removal on the 100-yr flood event.

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In addition to the modeling runs, a mass conservation analysis similar to that presented in Cui et al (2011) for the Slab Creek Reservoir sedimentation process shall be conducted to better approximate the time at which sand and gravel will begin to pass the dam if the structure remains in place. The analysis shall apply basic geomorphic principles and shall utilize reasonable assumptions with regard to the profiles of sand and gravel deposits within the reservoir as the gravel continuously advances downstream and aggrades upward, replacing some of the more mobile sand deposits within the reservoir with coarser sediment. The results of this analysis shall provide a reference condition for the no-project alternative.

Subtask 2.2 Sediment Transport Modeling Summary

Condition	Event Recurrence Interval or Flow Rate	Presumed Number of Model Runs
Baseline (current)	Available Discharge Record	1
Dam Removal	4 year and 10 year event during the year of dam removal, 100-yr peak flow in different years after dam removal	10-14
Long- Term Following Dam Removal	Available discharge record, running repeatedly to achieve a new quasi-equilibrium	1

Subtask 2.3 - Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses

CONSULTANT shall conduct hydraulic modeling along the reaches of Matilija Creek and the Ventura River from the dam to the Pacific Ocean. The purpose of this task is to determine changes in flood elevations along Matilija Creek and the Ventura River resulting from dam removal. The first step of this task is to review the existing conditions in the Reclamation HEC-RAS model to ensure that it is generally accurate and the model is functioning properly. Steady state flood modeling shall then be conducted using 100-year peak flow, as well as 10-year, 25-year, and 50-year flows, applied to the modeled river profiles provided in Task 2.2. The modeling first establishes the existing conditions and future conditions (with dam). Next, post-removal channel geometries shall be imported into the HEC-RAS model based on: 1) detailed sediment transport analyses (i.e., changes in channel bed elevations/geometry based on coarse sediment transport results from Task 2.2) and 2) proposed upgrades of the Robles Diversion Dam and other downstream project components, to be determined in collaboration between CONSULTANT and AGENCY. Post-removal modeling shall be conducted using the same peak flow events as used for existing-conditions modeling. Several post-removal channel profiles shall be selected to conduct hydraulic modeling. The profiles shall be selected based on sediment transport modeling results to represent the highest levels of aggradation in different reaches of the channel as the sediment wave gradually progresses downstream, resulting in the maximum sediment deposit occurring in different reaches in different years following dam removal. Then, the existing and proposed conditions model results shall be compared in profile plots and water surface elevation comparison tables. Additionally, overbank inundation depth comparisons shall be generated for existing and proposed conditions model results based on HEC-RAS water

surface elevations and 2005 LiDAR topography. Inundation results shall be presented in a map format. Up to five different post-removal channel geometry conditions shall be evaluated to account for dynamic channel conditions as different reaches experience peak bedload sediment deposition at different times or under different hydrologic scenarios (i.e., peak discharge occurs in different years).

Subtask 2.4: Re-evaluation of Downstream Project Components (Santa Ana and Camino Cielo Bridges, Live Oak Acres and Meiners Oaks Levees, and Robles High Flow Bypass).

CONSULTANT shall re-evaluate the downstream project component designs in light of the results of 100-yr flood routing performed under Subtask 2.3.

The various downstream project components are currently at varying levels of design, approximately as follows: Santa Ana Bridge – 100%; Camino Cielo Bridge – 5%; Live Oak Acres Levee – 90%; Meiners Oaks Levee – 90%; Casitas Springs Levee – 5%; Robles High Flow Bypass – 90%; and, Foster Park Wells – 100%.

The design of each of the downstream project components is based on 100-yr flood levels that were developed for USACE's Alternative 4b dam removal project. CONSULTANT shall compare the 100-yr flood level used for downstream project component designs to levels required for FEMA certification based on 100-yr water surface elevation determined in Subtask 2.3. CONSULTANT shall develop and recommend alternative design revisions based on the results of the comparison of changes in hydraulics as well as input from the Contract Management Team, and review and update construction costs estimates, as appropriate.

Subtask 2.5: Predictability Assessment of Flushing Storm Event

CONSULTANT shall collect and review weather forecast data from the National Weather Service from the standpoint of how predictable flushing storm events are, and a model shall be developed to estimate risk associated with under-predicting a minimum flushing storm event.

Predicting that an incoming storm is of sufficient intensity to produce the required minimum flushing storm event is a key component of the feasibility study for the Project. Stream gage data for Matilija Creek and for the Ventura River indicate that storm events with adequate flushing flows have a recurrence interval of approximately three years. Historic storm events to be analysed, include flushing event storms and a range of storm events that result in flows significantly less than the minimum flushing storm event, shall be used to repeat the fine sediment analyses conducted during the previous study contract (URS, AE14-033) to determine the risks of under-predicting the storm event during dam removal. The results of the fine sediment and organics characterization from Subtask 1.1 shall provide updated information with regard to sediment gradation, erodibility, etc. that shall either affirm the previous fine sediment analysis (URS, AE14-033) or allow for updated analysis with the same methodology. The sediment profile, in

particular a determination of its composition and erosive tendencies, will help predict the efficacy of each storm event type (peak flow rate, duration, and recurrence interval) in mobilizing the sediment.

Subtask 2.6 - Update Dam Removal Concept To 10 Percent Design

CONSULTANT shall advance the design for the large diameter orifices, excavation of the orifice openings, dam demolition, and restoration of the reservoir area from the current conceptual level to a 10 percent design. Document the updated design on engineering plans.

A list of conceptual drawings anticipated to be included at the 10 percent design level include:

1. Project location and general arrangement plan
2. Dam site area plan
3. Dam and plunge pool plan view
4. Upstream elevation view
5. Downstream elevation view
6. Dam section views
7. Large diameter orifice sections and details
8. Orifice excavation sequencing plan and details
9. Dam demolition sequencing – profile and details
10. Post-flush channel plan, profile, and sections
11. Sediment disposal areas - plan and sections
12. Post-project restoration plan -- reservoir area

Subtask 2.7 – Updated Dam Structural Analysis

CONSULTANT shall review and update as appropriate the 2013 (AE11-06) structural analysis for Matilija Dam to address comments or concerns with the analysis based on the findings of Subtask 2.1. The model geometry shall be updated to reflect the proposed orifices through the structure with the 10 Percent Design from Subtask 2.6. Using updated data on the concrete strength obtained in Subtask 1.2 and refined in Subtask 2.1, the three-dimensional linear elastic finite element (ANSYS) model, modified from the model used in the URS 2013 study, shall be used to evaluate usual (normal), unusual (flood), and extreme (seismic) loading conditions on the dam with and without the orifices and with and without sediment behind the dam to assess the safety of the dam.

Subtask 2.8: Dam Removal Feasibility Study Report

CONSULTANT shall document the results of Subtasks 2.1 through 2.7 in a comprehensive report for comment by the various stakeholders including DSOD. The Feasibility Study Report (Report) shall summarize the results of the data obtained and analysis performed in each subtask, and shall incorporate as appendices or by reference the technical memorandum provided in Subtask 1.3. It is anticipated that the content and

format of the Report may evolve as work on the other subtasks progresses and the Report will be structured in response. Further, the Report shall focus in part on addressing specific areas of interest or concern expressed by DSOD or other regulatory entities. Incorporate stakeholder comments, where possible, into the final report and include an appendix of stakeholder comments and responses in the final report.

Draft Feasibility Study Table of Contents:

Executive Summary

1.0 Introduction

2.0 Summary of Field Investigations

3.0 Reservoir Fine Sediment

4.0 Dam Concrete

5.0 Structural Evaluation of Orifice Alternative

6.0 Sediment Transport Modeling

7.0 Hydraulic Studies Based on Sediment Modeling

8.0 Re-evaluation of Downstream Project Components

9.0 Assessment of Flushing Storm Events

10.0 Dam Removal Concept – 10% Level Design

11.0 Updated Structural Analysis of Dam

Appendix 1 – Stakeholder Comments

Task 2 Deliverables:

- CONSULTANT/AGENCY/Contract Management Team conference calls shall be held at monthly intervals to facilitate coordination, input and provide progress summaries to the AGENCY/Management Team. CONSULTANT shall prepare agendas and meeting minutes for each meeting.
- CONSULTANT shall coordinate quarterly (4) meetings between CONSULTANT/AGENCY/Contract Management Team/Technical Advisory Team (TAC) in Ventura over the performance period involving CONSULTANT and two other team members.
- CONSULTANT shall coordinate two meetings between CONSULTANT/AGENCY/DSOD in Sacramento over the performance period involving CONSULTANT and two other team members.
- Draft Concrete Structural Strength Comparative Analysis and Stability Evaluation Report for AGENCY/Contract Management Team/TAC review
- Revised Draft Concrete Structural Strength Comparative Analysis and Stability Evaluation Report incorporating AGENCY/Contract Management Team/TAC comments
- Final Concrete Structural Strength Comparative Analysis and Stability Evaluation Report
- Draft Sediment Transport and Hydraulics Modelling Memo for AGENCY/Management Team/TAC Review

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- Revised Sediment Transport and Hydraulics Modelling Memo incorporating AGENCY/Management Team/TAC comments
- Final Sediment Transport and Hydraulics Modelling Memo
- All native files for HEC-RAS and any other hydraulic computer modeling programs employed.
- Draft Re-evaluation of Downstream Project Components Designs Summary for AGENCY/Management Team/TAC Review
- Revised Draft Re-evaluation of Downstream Project Components Designs Summary incorporating AGENCY/Management Team/TAC comments
- Final Re-evaluation of Downstream Project Components Designs Summary
- Summary of Recommended Alternative Design Revisions for Downstream Project Components (depending on the outcome of the deliverables described above)
- Draft Summary of Risk Estimate in Under-Predicting a Flushing Storm Event for AGENCY/Management Team/TAC Review
- Revised Draft Summary of Risk Estimate in Under-Predicting a Flushing Storm Event incorporating AGENCY/Management Team/TAC comments
- Final Summary of Risk Estimate in Under-Predicting a Flushing Storm Event
- Draft 10 Percent Level Design package (to include conceptual drawings, preliminary descriptions of boring and demolition requirements and sequencing, a description of the key design elements, a description of restoration requirements and objectives, etc.) for Orifice Boring, Dam Demolition, and Reservoir Area Restoration for Management Team/TAC Review
- Revised Draft 10 Percent Level Design package for Orifice Boring, Dam Demolition, and Reservoir Area Restoration incorporating Management Team/TAC comments
- Final 10 Percent Level Design package for Orifice Boring, Dam Demolition, and Reservoir Area Restoration
- Draft Summary of Matilija Dam Structural Analysis for AGENCY/Contract Management Team/TAC review
- Revised Draft Summary of Matilija Dam Structural Analysis Incorporating AGENCY/Contract Management Team/TAC comments
- Final Summary of Matilija Dam Structural Analysis
- Draft Dam Removal Feasibility Report for AGENCY/Contract Management Team/TAC review
- Revised Draft Dam Removal Feasibility Report incorporating AGENCY/Contract Management Team/TAC comments
- Final Dam Removal Feasibility Report incorporating Contract Management Team comments
- Invoices, progress reports, meeting minutes, and other documentation as necessary.

Task 3 - Review and Update Real Estate Plan

Subtask 3.1 Review USACE Real Estate Plan

CONSULTANT shall review the 2004 Plan prepared by USACE to determine previously used methods and outcomes. CONSULTANT shall develop tabular and GIS exhibits to

illustrate acquisitions, both extents and type of acquisition, to compare and contrast with the updated Plan.

Subtask 3.2 Development of Real Estate Plan/Downstream Project Component Decision Matrix

CONSULTANT shall, in consultation with AGENCY and Contract Management Team, develop a matrix to guide decisions for the Real Estate Plan and downstream infrastructure project components. The thresholds in the decision matrix will consider the final results of the project sediment transport and hydraulic analyses, Subtasks 2.2 and 2.3, and shall provide, at a minimum, guidance for developing the following recommendations, 1) new downstream infrastructure, 2) upgrades to existing infrastructure, 3) acquisition of properties and removal of habitable structures, and acquisition of inundation easements.

Subtask 3.3 Updated Real Estate Plan

Based on Subtasks 3.1 and 3.2, Consultant shall update the Real Estate Plan for the Project. The plan shall focus on acquisition of properties or improvements to private infrastructure affected by increases in flood elevations but shall not include acquisitions required for construction and maintenance of downstream public infrastructure project components. Property acquisitions required for downstream public infrastructure may be added to this plan as a separate subtask once this information is developed from the design of each component.

CONSULTANT shall collect parcel data, including rights-of-way and easement information, from the County Assessor and other publicly available data. The parcel data shall be used as a basis for the updated Plan. The parcel data ownership and zoning information shall be used to inform the Plan. CONSULTANT shall collect and use the 2005 LIDAR data to determine parcel elevations. Real estate costs based on publicly available published data (for example, Zillow or Realtor) as well as guidance provided by the AGENCY'S Real Estate Section shall be assigned to each parcel.

CONSULTANT shall prepare GIS map exhibits that include 100-yr flood levels and parcel information. CONSULTANT shall prepare tables summarizing all parcel information, including parcel elevations, zoning information, and magnitude of and change of inundation levels. These exhibits and tables will be used to identify parcels, structures and infrastructure of concern.

CONSULTANT shall use the decision matrix developed in Subtask 3.2 to identify inundated parcels recommended for further protection or mitigation measures. These may include public infrastructure or private infrastructure. The infrastructure identified in Subtask 2.4 (Re-evaluation of Downstream Components) shall also be considered in the Plan.

CONSULTANT shall also identify inundated parcels that will be designated for recommended acquisition. The acquisition strategy may differ based on zoning information, level or percentage of inundation, and change in inundation. The acquisition

plan may also consider insurance coverage in lieu of land acquisition. CONSULTANT shall review changes in inundation levels against parcel elevations, considering the level of accuracy of the hydraulic model.

CONSULTANT shall use the methodology developed in Subtask 3.2 to develop the Real Estate Plan that will include: a description of the strategies and the decision matrix in Subtask 3.2, tabular and graphical representation of the updated Plan, a cost estimate for implementing the Plan based on recommended infrastructure improvements, land acquisition and insurance coverage. The updated Plan shall also include a section that compares the update Plan with the 2004 Plan, and a report summarizing the findings.

Deliverables:

- Draft Decision Matrix
- Final Decision Matrix, incorporating comments received on draft
- Draft Updated Real Estate Plan with map figures and cost data.
- Revised Draft Updated Real Estate Plan (if necessary), incorporating comments received on initial draft
- Final Draft Updated Real Estate Plan

Report deliverables shall be provided in Word and single searchable PDF format. Tables and GIS layers and exhibits shall be provided in native electronic format.

Task 4 – Impacts to Water Supply Infrastructure

Subtask 4.1 Short-Term Alternatives Refinement

CONSULTANT shall assess possible short-term impacts caused by the flushing of fine sediment from the Project on water supplies and infrastructure owned and managed by the Water Supply Agencies listed below, then identify and evaluate potential water supply mitigation alternatives. The objective of the mitigation alternatives is to reduce the severity of any potential impact of the Project or the potential for reduced water supply or reduction in water quality caused primarily by the flushing of fine sediment from the reservoir during and following the initial flushing event. The outcome of this analysis will be a preferred alternative for each Water Supply Agency.

A range of water supply mitigation alternatives was previously developed in the Water Supply Mitigation Options Evaluation Report (AECOM, 2016). The intent of this task is to advance and refine the alternatives identified in the previous report, and further assess any potential new alternatives.

The Water Supply Agencies that will be considered as part of this task are identified as follows:

- Meiners Oaks Water District
- Ventura River Water District
- City of Ventura

- Casitas Municipal Water District

Subtask 4.1.1 - Data Review

CONSULTANT shall review the following reports and background information:

- Matilija Dam Ecosystem Restoration Feasibility Study – Final Report (USACE, September 2004)
- Water Supply Mitigation Options Evaluation Report (AECOM, March 2016)
- Matilija Dam Removal Concepts Evaluation Report (AECOM, March 2016)
- Detailed Sediment Transport Modelling and Hydraulic Studies to Determine 100-yr Water Surface Elevations (Stillwater Sciences, July 2019)
- Other pertinent information, such as groundwater management authority (GMA) reports, consumer confidence reports (CCR), etc.

Subtask 4.1.2 - Analysis of Short-Term Impacts to Water Supply Agencies

CONSULTANT shall review the impacts defined in the previous Water Supply Mitigation Options Evaluation Report (2016). Based on the review of available data, the CONSULTANT shall define the short-term impacts to the Water Supply Agencies. The potential impacts shall be defined based on reduction in water supply volume and potential impacts to water quality.

CONSULTANT shall update the short-term impacts defined in the previous Water Supply Mitigation Options Evaluation Report (2016) based on new available data, if applicable.

Subtask 4.1.3 - Development of Conceptual Alternatives

CONSULTANT shall review the alternatives in the previous Water Supply Mitigation Options Evaluation Report (2016). Based on the information identified in ***Subtasks 4.1.1 and 4.1.2***, the CONSULTANT shall identify new alternatives that were not considered as part of the previous report.

CONSULTANT shall develop the new alternatives to facilitate discussions with the Water Supply Agencies, the Contract Management Team, and project stakeholders; including development of conceptual drawings, descriptions, etc.

Subtask 4.1.4 - Coordination with Water Supply Agencies

CONSULTANT shall schedule meetings with the Water Supply Agencies to review and discuss results of the analysis in ***Subtask 4.1.2*** and the alternatives defined in ***Subtask 4.1.3***.

Meetings shall be held with the Water Supply Agencies at their preferred locations (up to three separate meetings with each agency over a total of three days) to further refine and

agree on the alternatives. The outcome of the meetings shall be a list of alternatives that will be developed for further refinement. Minutes shall be provided to project stakeholders summarizing meeting outcomes.

Subtask 4.1.5 - Refinement of Alternatives

CONSULTANT shall refine the alternatives that were identified for further refinement in the Water Supply Agency meetings, per ***Subtask 4.1.4***.

CONSULTANT shall evaluate any new alternatives based on the four evaluation criteria defined in the previous Water Supply Mitigation Options Evaluation Report. The four evaluation criteria are defined as:

- **Cost** – Considers the estimated lifecycle cost as well as the potential return on investment.
- **Environmental** – This criterion considers the potential environmental impacts for each alternative as well as possible environmental permitting requirements.
- **Feasibility** – The feasibility evaluation represents the general effectiveness of each alternative with regards to mitigating potential water volume losses as well as the constructability and scheduling. Additionally, it considers comments and feedback received from the Water Supply Agencies, Contract Management Team, and project stakeholders.
- **Adaptability** – The adaptability criterion considers whether the proposed alternative has any future benefits beyond the mitigation needs of the dam removal project.

Based on the alternatives evaluation, the AGENCY will select the preferred alternative for each Water Supply Agency to be carried forward to the feasibility study phase. The preferred alternative will be discussed and agreed to by the Water Supply Agencies and Contract Management Team prior to a decision on final recommendations.

Deliverables:

- ***Short-Term Alternatives Refinement***
 - Draft Water Supply Mitigation Alternatives Report describing the alternatives evaluation process and the preferred alternative.
 - Revised Draft (if necessary) Water Supply Mitigation Alternatives Report, incorporating comments received on initial draft.
 - Final Water Supply Mitigation Alternatives Report, incorporating comments received on draft(s).

Report deliverables shall be provided in Word and single searchable PDF format. Tables and GIS layers and exhibits shall be provided in native electronic format.

Subtask 4.2 – Long-term Alternative Options Study (Robles Diversion)

Subtask 4.2.1 – Background and Operational Review

CONSULTANT shall prepare a data request for CMWD, VCWPD, Bureau of Reclamation (BOR), and NMFS, which shall be presented at a kick-off meeting. CONSULTANT shall review background information available from CMWD, VCWPD, BOR, and NMFS including record drawings, operation and maintenance records, relevant sections of the Biological Opinion, operating permits, and diversion activities to gain an understanding of the fish screen operations, constraints, and diversion impacts.

CONSULTANT shall also meet with the Robles Working Group (RWG), comprising CMWD, VCWPD, NMFS, BOR, and CDFW staff, in a workshop format, followed by a site visit to all relevant facilities, to better understand operation and maintenance concerns and issues.

CONSULTANT shall review the design prepared by Tetra Tech and interview key stakeholders to summarize areas of concerns, recommendations for improvements or modifications.

Subtask 4.2.2 - Case Study Evaluation

CONSULTANT shall prepare a case study of other relevant projects that could have important lessons learned for this project. Four projects shall be reviewed and studied, including:

- **Alameda Creek Fish Passage Project (SFPUC)**
- **Salinas River Diversion Facility (MCWRA)**
- **Nelson Dam Removal (Yakima, WA)**
- **One other project to be determined**

Subtask 4.2.3 - Alternative Options and Draft Summary Report

CONSULTANT shall formulate alternative options and prepare a draft summary report of the alternative options activities. The report shall include:

- **Findings of Tasks 1 and 2 with collected comments addressed.**
- **Description and discussion of alternative options for potential further analysis shall include:**
 - **capital improvement descriptions**
 - **likely ability of alternative to mitigate dam removal impacts**
 - **O&M requirements**
 - **order of magnitude cost evaluation**
 - **qualitative assessment of alternative efficacy**

- *site plan with improvement(s) footprint*
 - *project execution description (constructability, schedule)*
- **Alternative Options Evaluation Criteria – Preliminary Rating/Ranking Concepts**
 - *preliminary options decision matrix*
 - *preliminary options risk assessment*
- **Robles Diversion Work Plan – scope of work, budget, schedule for the feasibility analysis and design.**

Subtask 4.2.4 - Workshop and Final Summary Report

CONSULTANT shall host a workshop with the RWG, to review the preliminary alternative options and gather feedback. CONSULTANT shall also present the findings of the case studies and identify where lessons learned could be incorporated into the project. The objective of the workshop is to identify and confirm the alternative options to carry forward for future further study.

Deliverables:

- **Long-Term Alternatives Options:**
 - *Draft Technical Memorandum of findings shall be prepared for the Background and Operational Review. The TM shall be issued for review and comments. Comments shall be addressed as part of the Summary Report*
 - *Technical Memorandum of findings and lessons learned shall be prepared for the Case Study Evaluation. The TM shall be issued for review and comments. Comments shall be addressed as part of the Summary Report*
 - *Summary Report. A draft summary report shall be issued for review and comments. After the workshop and receipt of comments from members of the RWG, the final report shall be issued.*
 - *Robles Diversion Work Plan. The work plan shall be issued with a detailed scope of work, budget, and schedule that can be used for future grant proposals.*
 - *For all meetings, draft agenda shall be distributed at least three days prior to each meeting. Minutes shall be prepared and provided within five business days after each meeting. Workshop meetings for the RWG shall be presented with the aid of PowerPoint presentations. Presentations shall be provided to the Agency.*
 - *All deliverables shall be reviewed by a senior technical staff member for technical feasibility, completeness, and presentation prior to submittal to the AGENCY. Report deliverables shall be provided in Word and single searchable PDF format. Tables and GIS layers and exhibits shall be provided in native electronic format.*

3. Extra Services

Extra Services are separate from but related to the Basic Services described above. Extra Services shall be performed by CONSULTANT only after being authorized in writing by the Project Manager for AGENCY. AGENCY's written authorization will include a statement of the Extra Services required and time schedule for completion. CONSULTANT's billing and AGENCY's payment for Extra Services shall occur pursuant to Exhibit C.

4. County Services

AGENCY will provide or accomplish the following:

1. Full information as to the requirements of the services to be provided by CONSULTANT under the contract.
2. Review documents submitted by CONSULTANT and provide comments, direction, or approval as needed in a timely manner.
3. Provide environmental permitting for all field investigations.

End of Exhibit A

EXHIBIT B - TIME SCHEDULE

1. Schedule

All Work on this contract shall be completed by **12/31/2020**.

CONSULTANT shall complete intermediate tasks as follows:

Task Table

Task	Description	Due Date
1	Field Investigations	
1.1	Geotechnical Field Investigations to Characterize Fine Sediment and Organics	07/07/2018
1.2	Field Investigations to Characterize Dam Concrete	07/07/2018
1.3	Field Investigations Memorandum	08/30/2018
1.4	Biological Support for Field Investigations	09/15/2018
2	Dam Removal Feasibility Study	
2.1	Structural Evaluation of Dam With and Without Orifices	03/13/2020
2.2	Detailed Sediment Transport Modeling From Dam to Ocean	01/31/2020
2.3	Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses	01/31/2020
2.4	Re-evaluation of Downstream Project Components	03/30/2020
2.5	Predictability Assessment of Flushing Storm Event	01/31/2020
2.6	Update Dam Removal Concept To 10 Percent Design	04/24/2020
2.7	Updated Dam Structural Analysis	03/13/2020
2.8	Dam Removal Feasibility Study Report	03/30/2020
3	Review and Update Real Estate Plan	
3.1	Review USACE Real Estate Plan	01/01/2020
3.2	Development of Real Estate Plan/Downstream Project Component Decision Matrix	2/29/2020
3.3	Update Real Estate Plan	3/31/2020
4	Impacts to Water Supply Infrastructure	
4.1	Short-Term Impacts Alternatives Refinement	8/31/2020
4.1.1	Data Review	5/31/2020
4.1.2	Analysis of Short-Term Impacts to Water Supply Agencies	6/30/2020
4.1.3	Development of Conceptual Alternatives	7/31/2020
4.1.4	Coordination with Water Supply Agencies	8/31/2020
4.1.5	Refinement of Alternatives	8/31/2020
4.2	Long-term Impacts Alternative Options Study (Robles Diversion)	9/30/2020
4.2.1	Background and Operational Review	7/31/2020
4.2.2	Case Study Evaluation	8/31/2020
4.2.3	Preliminary Evaluation and Draft Summary Report	9/30/2020
4.2.4	Workshop and Final Summary Report	10/31/2020

MODIFICATION NUMBER 05 TO CONTRACT AE18-034

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 05 TO CONTRACT AE18-034

EXHIBIT C – Fees and Payments

1. Compensation Summary

The following summarizes the maximum amount of compensation available to CONSULTANT under this contract. The actual amount of compensation shall be established and paid in accordance with the applicable provisions of the contract including this Exhibit C.

Maximum Fees for Basic Services:	\$ <u>1,004,832.00</u>
Maximum Fees for Extra Services:	\$ <u>0.00</u>
Maximum Reimbursement for Expenses:	\$ <u>0.00</u>
Total Amount Not to Exceed:	\$ <u>1,004,832.00</u>

2. Fees For Basic Services

AGENCY agrees to pay CONSULTANT the following fees for Basic Services

☒ a **fixed fee** compensation, in the lump sum amount of \$1,004,832.00, for completion of all Basic Services.

Task Table

Task	Description	Lump Sum
1	Field Investigations	
1.1	Geotechnical Field Investigations to Characterize Fine Sediment and Organics	\$137,538.00
1.2	Field Investigations to Characterize Dam Concrete	\$61,612.00
1.3	Field Investigations Memorandum	\$32,034.00
1.4	Biological Support for Field Investigations	\$16,898.00
2	Dam Removal Feasibility Study	
2.1	Structural Evaluation of Dam With and Without Orifices	\$32,992.00
2.2	Detailed Sediment Transport Modeling From Dam to Ocean	\$135,594.00
2.3	Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses	\$43,886.00
2.4	Re-evaluation of Downstream Project Components	\$61,172.00
2.5	Predictability Assessment of Flushing Storm Event	\$42,070.00
2.6	Update Dam Removal Concept To 10 Percent Design	\$102,520.00
2.7	Updated Dam Structural Analysis	\$147,248.00
2.8	Dam Removal Feasibility Study Report	\$25,636.00
3	Review and Update Real Estate Plan	
3.1	Review USACE Real Estate Plan	\$4,787.00
3.2	Development of Real Estate Plan/Downstream Project Component Decision Matrix	\$24,991.00

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Task	Description	Lump Sum
3.3	Update Real Estate Plan	\$23,597.00
4	<i>Impacts to Water Supply Infrastructure</i>	
4.1	<i>Short-Term Impacts Alternatives Refinement</i>	
4.1.1	Data Review	\$2,074.00
4.1.2	Analysis of Short-Term Impacts to Water Supply Agencies	\$4,197.00
4.1.3	Development of Conceptual Alternatives	\$5,821.00
4.1.4	Coordination with Water Supply Agencies	\$7,565.00
4.1.5	Refinement of Alternatives	\$13,112.00
4.2	<i>Long-term Impacts Alternative Options Study (Robles Diversion)</i>	
4.2.1	<i>Background and Operational Review</i>	\$33,588.00
4.2.2	<i>Case Study Evaluation</i>	\$15,660.00
4.2.3	<i>Preliminary Evaluation and Draft Summary Report</i>	\$18,684.00
4.2.4	<i>Workshop and Final Summary Report</i>	\$11,556.00
Total		\$1,004,832.00

3. Fees For Extra Services

For Extra Services authorized in writing in advance by AGENCY in accordance with Exhibit A, AGENCY agrees to pay CONSULTANT an **hourly rate** compensation for actual hours of Extra Services performed that is based upon the hourly rates set forth in the Rate Table for Basic Services above or, if none, then based upon the hourly rates set forth in the following Rate Table for Extra Services, which rates shall remain fixed for the duration of the contract, not to exceed the **maximum fee amount of \$ 0.00**.

4. Delays

If Work cannot be completed by the dates specified in Exhibit B through no fault of CONSULTANT, the fees 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 written modification to this contract.

5. Reimbursable Expenses

CONSULTANT shall be reimbursed a sum for the following reasonable out-of-pocket expenses that are incurred and paid for by CONSULTANT in furtherance of performance of its obligations under this contract, but only to the extent that such expenses are directly related to CONSULTANT's services hereunder and do not exceed the **maximum reimbursable amount of \$ \$0.00** :

(i) Outside printing directly related to deliverables but not for internal uses of CONSULTANT or its Subconsultants;

(ii) Reproduction or reprographic costs directly related to deliverables but not for internal uses of CONSULTANT or its Subconsultants. If CONSULTANT provides allowable reprographic services using its own equipment rather than using an outside service, the unit billing rates for such charges must be approved in advance by AGENCY;

MODIFICATION NUMBER 05 TO CONTRACT AE18-034

(iii) Shipping, overnight mail, postage, messenger, courier and/or delivery services (but not for CONSULTANT's internal communications);

(iv) Only if authorized in writing in advance by AGENCY, reimbursement for business travel for the specific position descriptions so identified in the Rate Tables for Basic Services or Extra Services set forth above. AGENCY shall reimburse CONSULTANT for transportation, lodging, and meal expenses consistent with the policies and amounts approved for County employees as defined by policy number Chapter VII(C)-1, *Reimbursement of Employees County Business Expenses*, in the County's Administrative Policy Manual (latest edition);

(v) Only if authorized in writing in advance by AGENCY, fees and costs for Subconsultant services that are not included in the Rate Tables for Basic Services or Extra Services set forth above.

Exclusive List. The list of reimbursable expenses set forth above is the sole and exclusive list of reimbursable expenses that CONSULTANT is entitled to receive.

Approval Limits. Any reimbursable expense wherein a single item exceeds \$500 in value, whether purchased or leased, must be approved in writing in advance by AGENCY.

No Administrative Charge or Mark-Ups. The reimbursement provided for herein shall not include an administrative charge, multiplier or other mark-up by CONSULTANT unless authorized in writing, in advance, by AGENCY.

No Reimbursement for Specified Basic Services Paid for by a Fixed Fee. Notwithstanding the above, expenses related to Basic Services specified in Exhibit B are not reimbursable if CONSULTANT is compensated for Basic Services by a fixed fee.

6. Payment

AGENCY shall make payments to CONSULTANT under the contract as follows:

Requests for Payment

To request payment, CONSULTANT shall complete and submit to AGENCY a Consultant Services Invoice Form that shall include, at a minimum, (i) personnel time records for Basic Services and Extra Services actually performed at the rates specified in this Exhibit C if applicable and (ii) receipts for all authorized reimbursable expense, along with the written AGENCY authorization for any specific reimbursable expenses requested for payment, if required above.

When invoicing for Extra Services, CONSULTANT shall clearly mark on the Invoice Form which services are Extra Services and keep those services separate from or Basic Services, and shall include a copy of the written AGENCY authorization for the Extra Services for which payment is requested.

CONSULTANT shall submit all invoices to:

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

Payment Schedule

Payments shall be made monthly by AGENCY upon presentation of a properly completed AGENCY Invoice Form as described above. Upon approval of the invoice, AGENCY shall pay CONSULTANT 95% of the maximum fee for the specific task/milestone. Upon completion and acceptance by AGENCY of the task/milestone, AGENCY shall pay CONSULTANT the balance of the fee.

Timely Invoicing

MODIFICATION NUMBER 05 TO CONTRACT AE18-034

Timely invoicing by CONSULTANT is required. 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 submit a properly completed invoice no later than 60 calendar days after the services which are the subject of the invoice were performed. An invoice received by AGENCY more than 60 calendar days after the services were performed shall be reduced by 5% to compensate AGENCY for the additional management costs. Additionally, since increases in administrative costs and budgetary problems caused by late invoicing correlate to the length of delay in invoicing, there will be an additional 5% reduction in compensation for each additional 30-calendar-day period beyond 60 days between the date the services were performed and the submission of the invoice for those services.

CONSULTANT shall submit a final invoice form within 60 days of the earliest of the following events: 1) completion and acceptance by AGENCY of all Work required by the contract; or 2) termination of the contract.

End of Exhibit C

MODIFICATION NUMBER 6 TO CONTRACT AE18-034

Contract Title: Matilija Dam Removal 65% Design Planning Project

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

WHEREAS, there now exists a binding contract between AGENCY and CONSULTANT originally dated 2/26/2018 for the CONSULTANT to provide engineering services to develop 65% designs to remove Matilija Dam in a manner that would reduce the impact of impounded sediment while minimizing costs and time associated with dam removal for a total contract amount of \$822,302.00 and a contract completion date of 7/11/2019 ("CONTRACT"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT on 7/25/2018 for the CONSULTANT to perform biological clearance surveys and compliance monitoring in support of field investigations to comply with California Department of Fish and Wildlife (CDFW) requirements for an additional contract amount of \$16,898. ("MODIFICATION NO.1"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT on 7/25/2019 to extend the CONTRACT time and task due dates due to a delay initiated from the acquisition for regulatory permits required for the filed investigations at an unchanged contract amount of \$839,200 and to extend the CONTRACT completion date from 7/11/2019 to 11/30/2019 ("MODIFICATION NO.2"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT on 12/26/2019 to add additional tasks for the CONSULTANT to review and update the 2004 Real Estate Plan prepared by the USACE for an additional contract amount of \$53,375 and to extend the CONTRACT completion date from 11/30/2019 to 6/30/2020. ("MODIFICATION NO.3"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT on 2/27/2020 to add additional tasks to the CONTRACT for the CONSULTANT to assess possible short-term impacts caused by the flushing of fine sediment from the Project on downstream water supply infrastructure and identify and evaluate the potential water supply mitigation alternatives for an additional contract amount of \$32,769.00. ("MODIFICATION No. 4"); and

WHEREAS, AGENCY and CONSULTANT entered into a written modification to CONTRACT on 7/28/2020 to add additional tasks to the CONTRACT to address concerns regarding the potential long-term impacts to the operation of Casitas Municipal Water District's Robles Diversion Facility caused by increased sediment delivery following the removal of Matilija Dam. CONSULTANT shall review background information, evaluate relevant case studies, formulate alternative options, conduct a workshop and prepare a final report for and additional contract amount of \$ 79,488.00 and to extend the CONTRACT completion date from 6/30/2020 to 12/31/2020 ("MODIFICATION NO.5"); and

WHEREAS it has become necessary to add additional tasks to the CONTRACT to 1) address concerns regarding downstream impacts from sediment deposition after the dam is removed by completing additional detailed hydraulic modeling and analysis using 2-dimensional (2D) methods and completing a screening level assessment of bank erosion, and 2) advancing the design of the removal of Matilija Dam from 10 percent to 30 percent, and 30 percent to 65 percent; 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 2/26/18, 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:
See revised Exhibit A, attached. (Modification No. 6)
3. Exhibit B (Time Schedule) shall be modified as follows:
See revised Exhibit B, attached. (Modification No. 6)
4. Exhibit C (Fees and Payment) shall be modified as follows:
See revised Exhibit C, attached. (Modification No. 6)

MODIFICATION NUMBER 5 TO CONTRACT AE18-034

Contract Title: Matilija Dam REMOVAL 65% DESIGN PLANNING PROJECT

5. The total contract amount shall hereby be increased by \$ 683,901.00 for a new CONTRACT total amount of \$1,688,733.00. The contract completion date is changed from 12/31/2020 to 3/31/22.

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

FOR CONSULTANT

Name: _____ Date _____

Title: _____

FOR AGENCY:

Name: _____ Date _____
Director of Public Works Agency

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

1. Overview of Project and Services

AGENCY has engaged CONSULTANT to provide the following services, which are more specifically described in the Basic Services section below, to assist AGENCY with the following project:

The Matilija Dam Removal 65% Planning Design Project, follows work completed by CONSULTANT in 2016 for the Agency. The CONSULTANT shall provide engineering services to develop 65% designs to remove Matilija Dam in a manner that would reduce the impact of impounded sediment while minimizing costs and time associated with dam removal.

2. Basic Services

The following Basic Services shall be performed by CONSULTANT:

Task 1 – Field Investigations

CONSULTANT shall perform field investigations to collect data needed for the following: 1) further analysis of the fine sediment deposits upstream of the dam, and 2) further characterization of the structural concrete comprising the dam to inform studies and structural analysis for dam removal. Field investigations shall be accomplished under the three subtasks described below.

Subtasks in Field Investigations shall include Project Management and oversight services. The CONSULTANT shall facilitate ongoing coordination and communication among staff and sub-consultants. The CONSULTANT shall coordinate general AGENCY update meetings/calls at monthly intervals, and shall address questions and concerns in a timely manner. The CONSULTANT shall also coordinate, or assist with coordinating, interaction with the California Division of Safety of Dams as necessary.

CONSULTANT services shall include implementation of quality assurance/quality control procedures following standard CONSULTANT processes. Prior to submission to the AGENCY, all deliverables shall undergo detail checks and technical reviews to verify the quality and integrity of the project tasks and written work products, and to verify that the deliverables are in accordance with the scope of work. Each technical review shall be documented using appropriate forms and this documentation shall be maintained in the CONSULTANT's project files. Invoices and project budget tracking reports shall be provided at monthly intervals.

Subtask 1.1 - Geotechnical Field Investigations to Characterize Fine Sediment and Organics

CONSULTANT shall plan the investigation, obtain a County drilling permit, obtain a DSOD permit (if one is needed), obtain and log sediment samples at six locations to an

estimated depth of 60-90 feet, and perform laboratory testing. Sampling and testing shall be performed to screen for the presence of contaminants such as heavy metals and pesticides, and the results shall be compared to earlier test findings by the US Army Corps of Engineers. Specific tests to identify the presence of metals include Title 22 (CAM17) and others depending on the target metal types. Specific tests for organics such as pesticides and hydrocarbons will include TPH, OCP, PCB, SVOC, and PAH. The tests shall be conducted in accordance with appropriate EPA sampling protocols and test methods. The borings shall be advanced through the water from a barge.

Previous investigations by the United States Army Corps of Engineers (USACE) identified that the characteristics of the organic materials in the fine sediment upstream of the dam could affect water quality during and following dam removal. Several borings were abandoned after methane gas was detected and as a result, the full depth of the sediment was not penetrated at those locations. The six borings included in the this scope of work, as indicted above, will be used to characterize the limits of the organic materials as well as collect other geotechnical information (SPT blowcount, grain size distribution and relative quantities, plasticity, shear strength, etc.) related to the sediment to confirm the transport of fine sediment from the reservoir during initial and subsequent flushing events.

Since sediment within the reservoir basin is known to be partially comprised of decomposed organic material, it is expected that methane gas emissions will occur during the drilling process. The drilling section of the Project Safety Plan shall describe specific measures addressing methane gas emissions, with alternate drilling methods that may be employed to eliminate or reduce emissions from low-pressure methane lenses. In some cases, the volume and pressure of methane escaping a penetrated lens may prohibit further advancing that boring and the drilling equipment will be removed when safe to do so. Based on the boring depth completed to that point and other factors, a decision shall be made, in consultation with the AGENCY, whether to characterize the sediment utilizing the data obtained to that depth or to drill in an alternative, representative location. Seven days of onsite drilling effort has been budgeted for this subtask.

Subtask 1.2 - Field Investigations to Characterize Dam Concrete

CONSULTANT shall perform concrete coring and testing to determine the appropriate material properties for use in the structural analyses under Subtask 2.1 and 2.7.

CONSULTANT shall develop a work plan, obtain DSOD approval, and obtain concrete cores from the downstream dam face near the two proposed orifice locations and at 4 to 6 other locations along the upstream face of the dam. The downstream cores shall be obtained from a barge platform in the plunge pool or other means of access. The upstream cores shall be obtained from the same barge platform used for the geotechnical investigations under Task 1.1. The core samples shall be 6 inches in diameter, and continuous samples shall be obtained for the full depth of each boring. The upstream borings shall be approximately 4 feet deep. Two downstream borings near the proposed orifice locations shall be approximately 4 feet deep and the remaining two shall be approximately 20 feet deep. Core samples selected for compressive strength testing will

typically be at least 12 inches long. An investigation work plan and application for the concrete coring shall be prepared and submitted to DSOD for review and approval prior to the commencement of field work. The concrete core samples shall be logged and photographed during drilling and then transported to the laboratory for further examination and testing. Selected samples shall be tested for bulk specific gravity, unconfined compressive strength, splitting tensile strength, and elastic modulus properties. Petrographic analysis and gel fluorescence testing shall also be conducted to assess the presence of Alkali Silica Reaction (ASR) in the concrete.

Subtask 1.3 - Field Investigations Memorandum

CONSULTANT shall document the results from the field investigations described under Subtasks 1.1 and 1.2 in a technical memorandum (TM). The TM shall present the results of the investigations, including fine sediment boring logs, concrete core logs, and laboratory test results for both the sediment samples and the concrete core samples. All boring logs shall be photo documented for inclusion as appendices to the TM.

Subtask 1.4 - Biological Support for Field Investigations

CONSULTANT shall conduct pre-construction surveys. To comply with permitting requirements, at least three pre-construction biological surveys, at least three days apart with the last survey within three days of mobilization, shall be conducted by two qualified biologists. CONSULTANT shall mobilize two biologists to conduct biological pre-construction surveys of the perimeter of Matilija Reservoir and the plunge pool at the base of the dam. Surveys shall be conducted in the habitat communities surrounding the water bodies out to 300 feet and does not include protocol-level biological surveys for sensitive species. The biologist shall coordinate with the AGENCY for access and appropriate routes to conduct the surveys. This work assumes three, 8-hour days to allow for travel, coordination, and access to the areas for surveys.

CONSULTANT shall perform geotechnical work monitoring. A qualified biological monitor shall be present periodically during work activities. Geotechnical work is anticipated to begin on July 31, 2018, and continue on weekdays through approximately August 9, 2018, for a total of 8 days of biological monitoring. The monitor shall be responsible for daily clearance surveys prior to work commencing, ensuring compliance with the species protection measures, and documenting BMP practices.

CONSULTANT shall coordinate with the AGENCY to discuss any special-status species findings during the course of the surveys and monitoring. If any sensitive biological resources are identified, the AGENCY shall be notified and applicable species protection measures shall be discussed and implemented. CONSULTANT'S biologist shall participate in conference calls to present interim finding of biological pre-construction surveys and monitoring.

Any non-compliance observations and/or sensitive resource observations shall be immediately reported to the project manager and communicated to the AGENCY. If active

MODIFICATION NUMBER 06 TO CONTRACT AE18-034

bird nests are found within the area potentially affected by the work, which was defined as 300 feet, work shall be redirected or postponed until the nest is no longer active or other protection measures are implemented in coordination with the AGENCY

This work assumes 6-hour days to allow for travel, access and a clearance survey prior to the start of each day's work and assumes the geotechnical investigation crews work an 8-hour day.

CONSULTANT shall provide reporting. A biological survey and monitoring report shall be completed (Project Completion Report) as required by the AGENCY, which shall include the following:

- Site conditions / vegetation in or adjacent to project area;
- Distance to adjacent or downstream sensitive biological resources and description of resource;
- Summary/general descriptions of vegetation types within the survey and monitoring area;
- Summary of preconstruction surveys via email documenting any nesting bird or other sensitive resources;
- Cumulative lists of common and special-status wildlife species found at the project site during all surveys (detailed species descriptions are not necessary);
- If special-status species that should be reported to the California Natural Diversity Database are observed, a statement shall be included of when such reports were submitted. Additionally, the completed California Native Species Field Survey Form(s) shall be appended to the project completion report;
- Documentation of BMPs implemented to avoid biological resource impacts; and
- Any problems/examples of non-compliance and how they were resolved.

Task 1 Deliverables:

- Conference calls shall be held at monthly intervals to facilitate coordination, input and provide progress summaries to the AGENCY/Contract Management Team. CONSULTANT shall prepare agendas and meeting minutes for each meeting.
- CONSULTANT shall coordinate quarterly (4) meetings between CONSULTANT/AGENCY/Contract Management Team/Technical Advisory Committee (TAC) in Ventura over the performance period involving CONSULTANT and two other team members.
- CONSULTANT shall coordinate one meeting between CONSULTANT/AGENCY/DSOD in Sacramento over the performance period involving the CONSULTANT and two other team members.
- Project Safety Plan
- Work plan and application for submission to DSOD
- Coordination with DSOD during permit processing as required

- Draft Field Investigations TM characterizing the fine sediment and assessing the concrete condition
- Revised Draft (if necessary) Field Investigations TM, incorporating comments received on Draft TM.
- Final Field Investigations TM, incorporating comments received on Revised Draft TM.
- Invoices, progress reports, meeting minutes, and other documentation as necessary.
- The biological monitor shall complete pre-construction field reports and daily monitoring field reports for inclusion in the Project Completion Report.
- The CONSULTANT'S qualified biologist shall prepare the Project Completion Report within 15 days of project completion and shall address AGENCY comments and return the final version within 7 days of receipt of AGENCY comments.

Task 2 - Dam Removal Feasibility Study

CONSULTANT shall prepare a feasibility study to advance the conceptual design for installing two large diameter orifices in Matilija Dam, implementing fine sediment evacuation by opening the orifices during a flushing storm event, and demolition of the dam following sediment flushing. The feasibility study shall be accomplished under the subtasks described below. Subtasks in the Dam Removal Feasibility Study shall include Project Management and oversight services. CONSULTANT shall facilitate ongoing coordination and communication among staff and sub-consultants. CONSULTANT shall coordinate general AGENCY update meetings/calls at monthly intervals, and shall address questions and concerns in a timely manner. CONSULTANT shall also coordinate, or assist with coordinating, interaction with the California Division of Safety of Dams as necessary.

Project Management services shall include implementation of quality assurance/quality control procedures following standard CONSULTANT processes. Prior to submission to the AGENCY, all deliverables shall undergo detail checks and technical reviews to verify the quality and integrity of the project tasks and written work products, and to verify that the deliverables are in accordance with the scope of work. Each technical review shall be documented using appropriate forms and this documentation shall be maintained in the CONSULTANT'S project files. Invoices and project budget tracking reports shall be provided at monthly intervals.

Subtask 2.1 - Structural Evaluation of Dam With and Without Orifices

CONSULTANT shall perform analyses to verify that installation of the proposed large diameter orifices into the dam shall not adversely impact the seismic stability or safety of the structure. Using the data obtained from the concrete cores under Subtask 1.2, the current strength of the concrete in the dam shall be estimated and compared with the strength assumed in the previous structural analyses (URS, AE11-06). The three-dimensional linear elastic finite element (ANSYS) model prepared by URS under the

previous contract with the AGENCY (AE11-06), shall be modified to include the orifices and the suite of analyses re-run. The results of the runs on the modified model shall be compared to the results from the URS study, with specific focus on the stresses in the vicinity of the proposed orifices to verify that the presence of the orifices is not expected to significantly impact the stability of the dam during static or dynamic loading.

Subtask 2.2 - Detailed Sediment Transport Modeling From Dam to Ocean

CONSULTANT shall review earlier modeling efforts for fine and coarse sediment transport prepared for the Matilija Dam Removal (by Reclamation and CONSULTANT), incorporate information collected in Subtask 1.1, and develop detailed modeling of transport from the dam to the Pacific Ocean using the DREAM-2 model.

The DREAM-2 model is one of the two Dam Removal Express Assessment Models developed at Stillwater Sciences (Cui et al. 2006), which simulate the transport of both coarse and fine sediment following dam removal. The model, its predecessors, and sister models have been applied in more than a dozen large and small scale sedimentation analysis projects, including river sedimentation of a mining project that has released close to 2 billion tons of sediment (to date) into a river corridor (Pickup and Cui 2009), and the removal of Marmot Dam in the Sandy River, Oregon (Cui and Wilcox 2008). Comparisons of simulated and surveyed post-dam removal channel degradation/aggradation in the Sandy River, which has similar geomorphic conditions with Matilija Creek and Ventura River, indicated that the model likely outperformed any previous model simulations of similar magnitude (Cui et al. 2014). The model has also been extensively examined with flume experimental data (Cui et al. 2008) and against a natural landslide (Sutherland et al. 2002) and proven to perform satisfactorily. It is also worth noting that a preliminary DREAM-2 model was developed for the Matilija Dam removal project during the last contract phase completed in 2016 (AE14-033).

The future with project condition shall be modeled with rate of sediment input established in earlier studies and with downstream project components determined in collaboration with the AGENCY and the CONSULTANT. Modeling shall include peak flow and daily average hydrologic analyses under existing conditions, along with select representative years (such as the year that represents the occurrence of 100-yr flood). Two sets of model runs simulating sediment transport following dam removal, each comprised of 5 to 7 runs, are proposed under the most-likely scenario: dam removal during a 4-yr flood event (the minimum flood event required to remove the dam under the previous CONSULTANT study) and dam removal during a 10-yr flood event. In both scenarios a 100-yr flood event shall be inserted into the discharge series, representing it to occur at different years after dam removal. The purpose of the 100-yr flood modeling is to examine the maximum sediment deposition (i.e., worst-case-scenario) that would occur in different downstream river reaches during the 100-yr flood event so as to inform hydraulic modeling in Task 2.3. In addition to runs simulating sediment transport following dam removal described above, a separate model run shall be conducted simulating the terminal effect of dam removal. This run shall be conducted by using the projected post-removal sediment supply as model input, and extended to the future years when a new quasi-equilibrium

bed profile is established. The simulated profile shall also be provided to Task 2.3 for evaluation of the long-term effect of dam removal on the 100-yr flood event.

In addition to the modeling runs, a mass conservation analysis similar to that presented in Cui et al (2011) for the Slab Creek Reservoir sedimentation process shall be conducted to better approximate the time at which sand and gravel will begin to pass the dam if the structure remains in place. The analysis shall apply basic geomorphic principles and shall utilize reasonable assumptions with regard to the profiles of sand and gravel deposits within the reservoir as the gravel continuously advances downstream and aggrades upward, replacing some of the more mobile sand deposits within the reservoir with coarser sediment. The results of this analysis shall provide a reference condition for the no-project alternative.

Subtask 2.2 Sediment Transport Modeling Summary

Condition	Event Recurrence Interval or Flow Rate	Presumed Number of Model Runs
Baseline (current)	Available Discharge Record	1
Dam Removal	4 year and 10 year event during the year of dam removal, 100-yr peak flow in different years after dam removal	10-14
Long- Term Following Dam Removal	Available discharge record, running repeatedly to achieve a new quasi-equilibrium	1

Subtask 2.3 - Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses

CONSULTANT shall conduct hydraulic modeling along the reaches of Matilija Creek and the Ventura River from the dam to the Pacific Ocean. The purpose of this task is to determine changes in flood elevations along Matilija Creek and the Ventura River resulting from dam removal. The first step of this task is to review the existing conditions in the Reclamation HEC-RAS model to ensure that it is generally accurate and the model is functioning properly. Steady state flood modeling shall then be conducted using 100-year peak flow, as well as 10-year, 25-year, and 50-year flows, applied to the modeled river profiles provided in Task 2.2. The modeling first establishes the existing conditions and future conditions (with dam). Next, post-removal channel geometries shall be imported into the HEC-RAS model based on: 1) detailed sediment transport analyses (i.e., changes in channel bed elevations/geometry based on coarse sediment transport results from Task 2.2) and 2) proposed upgrades of the Robles Diversion Dam and other downstream project components, to be determined in collaboration between CONSULTANT and AGENCY. Post-removal modeling shall be conducted using the same peak flow events as used for existing-conditions modeling. Several post-removal channel profiles shall be selected to conduct hydraulic modeling. The profiles shall be selected based on sediment transport modeling results to represent the highest levels of aggradation in different reaches of the channel as the sediment wave gradually progresses downstream, resulting in the maximum sediment deposit occurring in different reaches in different years following dam removal. Then, the existing and proposed

conditions model results shall be compared in profile plots and water surface elevation comparison tables. Additionally, overbank inundation depth comparisons shall be generated for existing and proposed conditions model results based on HEC-RAS water surface elevations and 2005 LiDAR topography. Inundation results shall be presented in a map format. Up to five different post-removal channel geometry conditions shall be evaluated to account for dynamic channel conditions as different reaches experience peak bedload sediment deposition at different times or under different hydrologic scenarios (i.e., peak discharge occurs in different years).

CONSULTANT shall conduct an additional 1D hydraulic modeling run that removes the Casitas Springs and Live Oak Acres Levees, and the levee upstream of Robles Diversion from the model. These levees are not accredited by FEMA and could be breached during a 100-yr storm event. Following the revised model runs with levees removed, revised inundation maps shall be prepared for these three reaches. The results of this additional analysis shall be incorporated into the existing Hydraulic Modeling Report that has been prepared for this sub-task. Draft revisions shall be submitted to the project team for review, and all comments shall be addressed in final report.

Subtask 2.4 - Re-evaluation of Downstream Project Components (Santa Ana and Camino Cielo Bridges, Live Oak Acres and Meiners Oaks Levees, and Robles High Flow Bypass).

CONSULTANT shall re-evaluate the downstream project component designs in light of the results of 100-yr flood routing performed under Subtask 2.3.

The various downstream project components are currently at varying levels of design, approximately as follows: Santa Ana Bridge – 100%; Camino Cielo Bridge – 5%; Live Oak Acres Levee – 90%; Meiners Oaks Levee – 90%; Casitas Springs Levee – 5%; Robles High Flow Bypass – 90%; and, Foster Park Wells – 100%.

The design of each of the downstream project components is based on 100-yr flood levels that were developed for USACE's Alternative 4b dam removal project. CONSULTANT shall compare the 100-yr flood level used for downstream project component designs to levels required for FEMA certification based on 100-yr water surface elevation determined in Subtask 2.3. CONSULTANT shall develop and recommend alternative design revisions based on the results of the comparison of changes in hydraulics as well as input from the Contract Management Team, and review and update construction costs estimates, as appropriate.

Subtask 2.5 - Predictability Assessment of Flushing Storm Event

CONSULTANT shall collect and review weather forecast data from the National Weather Service from the standpoint of how predictable flushing storm events are, and a model shall be developed to estimate risk associated with under-predicting a minimum flushing storm event.

Predicting that an incoming storm is of sufficient intensity to produce the required minimum flushing storm event is a key component of the feasibility study for the Project. Stream gage data for Matilija Creek and for the Ventura River indicate that storm events with adequate flushing flows have a recurrence interval of approximately three years. Historic storm events to be analysed, include flushing event storms and a range of storm events that result in flows significantly less than the minimum flushing storm event, shall be used to repeat the fine sediment analyses conducted during the previous study contract (URS, AE14-033) to determine the risks of under-predicting the storm event during dam removal. The results of the fine sediment and organics characterization from Subtask 1.1 shall provide updated information with regard to sediment gradation, erodibility, etc. that shall either affirm the previous fine sediment analysis (URS, AE14-033) or allow for updated analysis with the same methodology. The sediment profile, in particular a determination of its composition and erosive tendencies, will help predict the efficacy of each storm event type (peak flow rate, duration, and recurrence interval) in mobilizing the sediment.

Subtask 2.6 - Update Dam Removal Concept To 10 Percent Design

CONSULTANT shall advance the design for the large diameter orifices, excavation of the orifice openings, dam demolition, and restoration of the reservoir area from the current conceptual level to a 10 percent design. Document the updated design on engineering plans.

A list of conceptual drawings anticipated to be included at the 10 percent design level include:

1. Project location and general arrangement plan
2. Dam site area plan
3. Dam and plunge pool plan view
4. Upstream elevation view
5. Downstream elevation view
6. Dam section views
7. Large diameter orifice sections and details
8. Orifice excavation sequencing plan and details
9. Dam demolition sequencing – profile and details
10. Post-flush channel plan, profile, and sections
11. Sediment disposal areas - plan and sections
12. Post-project restoration plan -- reservoir area

Subtask 2.7 – Updated Dam Structural Analysis

CONSULTANT shall review and update as appropriate the 2013 (AE11-06) structural analysis for Matilija Dam to address comments or concerns with the analysis based on the findings of Subtask 2.1. The model geometry shall be updated to reflect the proposed orifices through the structure with the 10 Percent Design from Subtask 2.6. Using updated

data on the concrete strength obtained in Subtask 1.2 and refined in Subtask 2.1, the three-dimensional linear elastic finite element (ANSYS) model, modified from the model used in the URS 2013 study, shall be used to evaluate usual (normal), unusual (flood), and extreme (seismic) loading conditions on the dam with and without the orifices and with and without sediment behind the dam to assess the safety of the dam.

Subtask 2.8 - Dam Removal Feasibility Study Report

CONSULTANT shall document the results of Subtasks 2.1 through 2.7 in a comprehensive report for comment by the various stakeholders including DSOD. The Feasibility Study Report (Report) shall summarize the results of the data obtained and analysis performed in each subtask, and shall incorporate as appendices or by reference the technical memorandum provided in Subtask 1.3. It is anticipated that the content and format of the Report may evolve as work on the other subtasks progresses and the Report will be structured in response. Further, the Report shall focus in part on addressing specific areas of interest or concern expressed by DSOD or other regulatory entities. Incorporate stakeholder comments, where possible, into the final report and include an appendix of stakeholder comments and responses in the final report.

Draft Feasibility Study Table of Contents:

Executive Summary

- 1.0 Introduction
- 2.0 Summary of Field Investigations
- 3.0 Reservoir Fine Sediment
- 4.0 Dam Concrete
- 5.0 Structural Evaluation of Orifice Alternative
- 6.0 Sediment Transport Modeling
- 7.0 Hydraulic Studies Based on Sediment Modeling
- 8.0 Re-evaluation of Downstream Project Components
- 9.0 Assessment of Flushing Storm Events
- 10.0 Dam Removal Concept – 10% Level Design
- 11.0 Updated Structural Analysis of Dam
- Appendix 1 – Stakeholder Comments

Subtask 2.9 – Detailed 1D and 2D Hydraulic Analysis

CONSULTANT shall develop a 2D hydraulic model in SRH – 2D to analyze inundation extents for future conditions, with and without dam removal, for flow events including 25-year, 50-year, and 100-year recurrence intervals. The 2D model shall provide a more detailed analysis focusing on river reaches with flood risk potential where the 1D model did not fully capture flow complexities. The 2D model shall be developed for the entire 16-mile project reach, however

the assessment of post dam removal conditions shall focus on the following four Ventura River reaches:

- ***Adjacent to Ventura Water Purification Plant and OVSD's Wastewater Treatment Plant (HEC-RAS Stations 4.73 to 5.49)***
- ***Adjacent to Casitas Vista (HEC-RAS Stations 5.97 to 6.63)***
- ***Downstream from the Santa Ana Bridge (HEC-RAS Stations 8.05 to 9.23)***
- ***From Live Oak Acres to Upstream of Robles Diversion Dam (HEC-RAS Stations 10.13 to 15.15)***

This Subtask shall include the following:

Subtask 2.9.1 – Gather New Input Data for SRH-2D Model

CONSULTANT shall compile 2D model inputs from three primary sources, including: 1) hydrologic data obtained from USGS StreamStats; 2) existing infrastructure, comprised of bridge and levee geometry data, and; 3) land cover classifications for the five critical reaches identified above. Manning's n roughness values for the 2D model grid shall be developed using existing aerial imagery to simulate the extent and density of riparian vegetation, channel bed morphology and floodplain cover. Manning's n roughness values for the remainder of the project reach shall be determined through a more generalized distribution of channel and overbank roughness.

Subtask 2.9.2 – Existing Conditions 2D Hydraulic Modeling

CONSULTANT shall develop a hydraulic model in SRH-2D incorporating all the input data gathered in Activity 2.9.1. The 2D model shall have a variable grid size, with the main channel having a denser grid cell spacing and the overbank and floodplain areas having a coarser grid. The 2D model shall be set up to perform steady-state flow routing with a focus on the 100-year peak flow. Results shall be compared to those from the existing conditions 1D HEC-RAS model for validation.

Subtask 2.9.3 – Existing Conditions 2D Hydraulic Modeling Review and Revisions

CONSULTANT shall review the results from the initial existing conditions SRH-2D model and shall provide summarized draft figures for review. CONSULTANT shall then perform on iteration of model revisions based on review comments. Figures depicting final existing conditions model results shall be prepared.

Subtask 2.9.4 – Proposed Conditions 2D Hydraulic and Sediment Transport Modeling

CONSULTANT shall update the existing conditions SRH-2D model to include the: 1) Santa Ana Bridge, 2) Camino Cielo Bridge, 3) Live Oak Acres Levee, and 4) Meiners Oaks Levee. Two scenarios shall be modeled for the Robles Diversion Dam including current conditions and failure of the crib wall during a 100-year storm event.

CONSULTANT shall then update the channel geometry in the four critical sub-reaches to reflect future sediment transport associated with dam removal. Event-based sediment transport modeling shall be conducted in SRH2-D for each of the four critical sub-reaches to assess channel conditions as the sediment pulse generated by dam removal moves through each reach. The proposed modeling approach shall utilize sediment transport rates from DREAM-2 as the upstream boundary condition. The SRH-2D sediment transport model shall be extended a minimum of ½ mile upstream and downstream from the study reach to reduce the impacts of model boundary conditions on the desired results.

CONSULTANT shall conduct Sediment transport within SRH-2D (using a TBD hydrologic time series) with the goal of achieving sediment deposition volumes within each critical sub-reach that are generally consistent with the DREAM-2 simulations. Prior to completing the SRH-2D modeling, the DREAM-2 sediment deposition volumes predicted within each sub-reach shall be analyzed to determine deposition expected to occur during one or several closely spaced hydrologic events, or if deposition is resulting from multiple events over several DREAM-2 model runs. If the latter is the case, the target sediment deposition volume will be adjusted or the sub-reach will be further subdivided. Issues with achieving general continuity in sediment volume between the two modeling approaches are most likely to occur over longer reaches, i.e. the specific study reach downstream from Robles so that reach will be divided into multiple sub-reaches. This sub-task shall result in SRH-2D outputs that predict sediment deposition patterns/volumes within each sub-reach.

CONSULTANT shall model changes in 100-yr water surface elevations (WSE's) resulting from the sediment deposition using two approaches: 1) 100-yr WSE's simulated using steady state 100-yr discharge flowing over the fixed channel bed resulting from the previous sub-task, and 2) maximum 100-yr WSE's analyzed during the sediment transport simulations. These results shall be compared and ultimately reviewed/vetted by the project's technical advisors in Task 2.9.5 to

determine the efficacy of outputs generated by each approach. All outputs shall also be compared to the results of the proposed conditions 1D HEC-RAS, DREAM-2, and existing conditions SRH-2D models.

Subtask 2.9.5 – Proposed Conditions 2D Hydraulic and Sediment Transport Modeling Review and Revisions

CONSULTANT shall summarize results from the initial proposed conditions SRH-2D model in draft figures and videos and provide them for review. Based on review comments, CONSULTANT shall conduct one iteration of modeling revisions, after which the CONSULTANT shall prepare final existing conditions figures and videos.

Subtask 2.9.6 - 2D Hydraulic Model Report

CONSULTANT shall prepare a draft report summarizing the modeling approach and results described in earlier sections. This report shall be produced as a stand-alone 2D hydraulics report. CONSULTANT shall submit the draft report for review, then prepare a final report that addresses all reviewer comments.

Subtask 2.10 – Bank Erosion Screening Level Assessment

Due to the likely occurrence of changes in the riverbed elevation following dam removal, altering river flow patterns could result in increased or decreased bank erosion. The hydrology following dam removal is unknown, and thus it is not feasible to predict the impacts of dam removal on flooding, sediment transport, and erosion and deposition with a large degree of accuracy. The analysis provided in this subtask, therefore, shall focus on estimating the range of the potential impacts.

In this study, CONSULTANT shall leverage the existing 1-D hydraulic and sediment modeling for the entire length of the river downstream of Matilija Dam and the 2-D mobile-bed and hydrodynamic model being performed at select locations in sub-task 2.9. The sediment deposition and hydraulic information contained within these models shall be analyzed using relatively simple empirical equations that assess the likelihood of bank erosion given bank properties and hydraulic variables.

CONSULTANT shall use this “spreadsheet” level analysis of the results of the 1D and 2D results at key locations along the river as a screening level analysis of bank erosion. Simplified analysis shall identify areas of the river that have the potential for significant bank erosion in existing and proposed dam removal scenarios.

CONSULTANT's quantification of the amount of potential erosion shall be used to provide a qualitative description of the potential magnitude (e.g. none or little, medium, significant) as well as anticipated qualitative change after dam removal.

Subtask 2.10.1 – Identify Key Locations

CONSULTANT shall identify key locations based on analysis of past flood events, a review of readily available aerial photographs of the river, and discussions with AGENCY staff and the Contract Management Team (CMT). CONSULTANT shall identify locations that are known to have experienced extreme flooding, erosion or deposition, or where the river is braided, and the main channel could move to an alternate location that its current alignment.

CONSULTANT shall identified additional key locations based on the 2D modeling results, where increased in near bank velocities and shear stresses are evident.

Subtask 2.10.2 – Geology Field Reconnaissance

CONSULTANT shall complete field reconnaissance in key areas identified above to confirm assumptions or digital data associated with existing geology, erosion, and ground cover. The reconnaissance results shall be summarized in the draft and final memorandum discussed below.

Subtask 2.10.3 - Spreadsheet Level Calculations

At each key location identified in sub-task 2.10.1, CONSULTANT shall modify the existing topography based on the results of the sediment transport analysis, which is based on either the 1-D or 2-D modeling results, depending upon the location. CONSULTANT shall perform calculations for conditions of changes in bed elevation for a variety of flow rates to determine changes in sediment transport capacity, changes in shear stress, velocity and bank stability, and localized changes in water surface elevation. Bank stability shall be based upon the comparison of estimated shear stress along the riverbank to the critical shear stress of the bank material. The shear stress shall be estimated from hydraulic calculations. If the shear stress exceeds the critical shear stress, then bank erosion is possible. If appropriate, the ARS BSTEM model shall be used to estimate the amount of slope failure. Alternatively, the excess shear stress and estimated soil properties shall be used to estimate the amount of bank erosion.

Subtask 2.10.4 – Bank Erosion Reporting

CONSULTANT shall prepare a draft and final technical memorandum describing the data, methods of analysis and results. The results shall primarily be in table format and text, summarizing the potential for changes in bank erosion and/or stability, both for the existing condition and following dam removal. A list of assumptions and limitations shall also be provided.

Task 2 Deliverables:

- CONSULTANT/AGENCY/Contract Management Team conference calls shall be held at monthly intervals to facilitate coordination, input and provide progress summaries to the AGENCY/Management Team. CONSULTANT shall prepare agendas and meeting minutes for each meeting.
- CONSULTANT shall coordinate quarterly (4) meetings between CONSULTANT/AGENCY/Contract Management Team/Technical Advisory Team (TAC) in Ventura over the performance period involving CONSULTANT and two other team members.
- CONSULTANT shall coordinate two meetings between CONSULTANT/AGENCY/DSOD in Sacramento over the performance period involving CONSULTANT and two other team members.
- Draft Concrete Structural Strength Comparative Analysis and Stability Evaluation Report for AGENCY/Contract Management Team/TAC review
- Revised Draft Concrete Structural Strength Comparative Analysis and Stability Evaluation Report incorporating AGENCY/Contract Management Team/TAC comments
- Final Concrete Structural Strength Comparative Analysis and Stability Evaluation Report
- Draft Sediment Transport and Hydraulics Modelling Memo for AGENCY/Management Team/TAC Review
- Revised Sediment Transport and Hydraulics Modelling Memo incorporating AGENCY/Management Team/TAC comments
- Final Sediment Transport and Hydraulics Modelling Memo
- All native files for HEC-RAS and any other hydraulic computer modeling programs employed.
- Draft Re-evaluation of Downstream Project Components Designs Summary for AGENCY/Management Team/TAC Review
- Revised Draft Re-evaluation of Downstream Project Components Designs Summary incorporating AGENCY/Management Team/TAC comments
- Final Re-evaluation of Downstream Project Components Designs Summary
- Summary of Recommended Alternative Design Revisions for Downstream Project Components (depending on the outcome of the deliverables described above)
- Draft Summary of Risk Estimate in Under-Predicting a Flushing Storm Event for AGENCY/Management Team/TAC Review

- Revised Draft Summary of Risk Estimate in Under-Predicting a Flushing Storm Event incorporating AGENCY/Management Team/TAC comments
- Final Summary of Risk Estimate in Under-Predicting a Flushing Storm Event
- Draft 10 Percent Level Design package (to include conceptual drawings, preliminary descriptions of boring and demolition requirements and sequencing, a description of the key design elements, a description of restoration requirements and objectives, etc.) for Orifice Boring, Dam Demolition, and Reservoir Area Restoration for Management Team/TAC Review
- Revised Draft 10 Percent Level Design package for Orifice Boring, Dam Demolition, and Reservoir Area Restoration incorporating Management Team/TAC comments
- Final 10 Percent Level Design package for Orifice Boring, Dam Demolition, and Reservoir Area Restoration
- Draft Summary of Matilija Dam Structural Analysis for AGENCY/Contract Management Team/TAC review
- Revised Draft Summary of Matilija Dam Structural Analysis Incorporating AGENCY/Contract Management Team/TAC comments
- Final Summary of Matilija Dam Structural Analysis
- Draft Dam Removal Feasibility Report for AGENCY/Contract Management Team/TAC review
- Revised Draft Dam Removal Feasibility Report incorporating AGENCY/Contract Management Team/TAC comments
- Final Dam Removal Feasibility Report incorporating Contract Management Team comments
- Invoices, progress reports, meeting minutes, and other documentation as necessary
- ***Draft Technical Memorandum describing the methods of analysis, data and sources, and analysis results for the 2D Hydraulic Analysis***
- ***Final Technical Memorandum describing the methods of analysis, data and sources, and analysis results incorporating comments received from the AGENCY and CMT for the 2D Hydraulic Analysis.***
- ***Draft Technical Memorandum describing the methods of analysis, data and sources, and analysis results for the Bank Erosion Analysis***
- ***Final Technical Memorandum describing the methods of analysis, data and sources, and analysis results incorporating comments received from the AGENCY and CMT for the Bank Erosion Analysis***

Task 3 - Review and Update Real Estate Plan

Subtask 3.1 Review USACE Real Estate Plan

CONSULTANT shall review the 2004 Plan prepared by USACE to determine previously used methods and outcomes. CONSULTANT shall develop tabular and GIS exhibits to illustrate acquisitions, both extents and type of acquisition, to compare and contrast with the updated Plan.

Subtask 3.2 Development of Real Estate Plan/Downstream Project Component Decision Matrix

CONSULTANT shall, in consultation with AGENCY and Contract Management Team, develop a matrix to guide decisions for the Real Estate Plan and downstream infrastructure project components. The thresholds in the decision matrix will consider the final results of the project sediment transport and hydraulic analyses, Subtasks 2.2 and 2.3, and shall provide, at a minimum, guidance for developing the following recommendations, 1) new downstream infrastructure, 2) upgrades to existing infrastructure, 3) acquisition of properties and removal of habitable structures, and acquisition of inundation easements.

Subtask 3.3 Updated Real Estate Plan

Based on Subtasks 3.1 and 3.2, Consultant shall update the Real Estate Plan for the Project. The plan shall focus on acquisition of properties or improvements to private infrastructure affected by increases in flood elevations but shall not include acquisitions required for construction and maintenance of downstream public infrastructure project components. Property acquisitions required for downstream public infrastructure may be added to this plan as a separate subtask once this information is developed from the design of each component.

CONSULTANT shall collect parcel data, including rights-of-way and easement information, from the County Assessor and other publicly available data. The parcel data shall be used as a basis for the updated Plan. The parcel data ownership and zoning information shall be used to inform the Plan. CONSULTANT shall collect and use the 2005 LIDAR data to determine parcel elevations. Real estate costs based on publicly available published data (for example, Zillow or Realtor) as well as guidance provided by the AGENCY'S Real Estate Section shall be assigned to each parcel.

CONSULTANT shall prepare GIS map exhibits that include 100-yr flood levels and parcel information. CONSULTANT shall prepare tables summarizing all parcel information, including parcel elevations, zoning information, and magnitude of and change of inundation levels. These exhibits and tables will be used to identify parcels, structures and infrastructure of concern.

CONSULTANT shall use the decision matrix developed in Subtask 3.2 to identify inundated parcels recommended for further protection or mitigation measures. These may include public infrastructure or private infrastructure. The infrastructure identified in Subtask 2.4 (Re-evaluation of Downstream Components) shall also be considered in the Plan.

CONSULTANT shall also identify inundated parcels that will be designated for recommended acquisition. The acquisition strategy may differ based on zoning information, level or percentage of inundation, and change in inundation. The acquisition plan may also consider insurance coverage in lieu of land acquisition. CONSULTANT shall review changes in inundation levels against parcel elevations, considering the level of accuracy of the hydraulic model.

CONSULTANT shall use the methodology developed in Subtask 3.2 to develop the Real Estate Plan that will include: a description of the strategies and the decision matrix in Subtask 3.2, tabular and graphical representation of the updated Plan, a cost estimate for implementing the Plan based on recommended infrastructure improvements, land acquisition and insurance coverage. The updated Plan shall also include a section that compares the update Plan with the 2004 Plan, and a report summarizing the findings.

Deliverables:

- Draft Decision Matrix
- Final Decision Matrix, incorporating comments received on draft
- Draft Updated Real Estate Plan with map figures and cost data.
- Revised Draft Updated Real Estate Plan (if necessary), incorporating comments received on initial draft
- Final Draft Updated Real Estate Plan

Report deliverables shall be provided in Word and single searchable PDF format. Tables and GIS layers and exhibits shall be provided in native electronic format.

Task 4 – Impacts to Water Supply Infrastructure

Subtask 4.1 Short-Term Alternatives Refinement

CONSULTANT shall assess possible short-term impacts caused by the flushing of fine sediment from the Project on water supplies and infrastructure owned and managed by the Water Supply Agencies listed below, then identify and evaluate potential water supply mitigation alternatives. The objective of the mitigation alternatives is to reduce the severity of any potential impact of the Project or the potential for reduced water supply or reduction in water quality caused primarily by the flushing of fine sediment from the reservoir during and following the initial flushing event. The outcome of this analysis will be a preferred alternative for each Water Supply Agency.

A range of water supply mitigation alternatives was previously developed in the Water Supply Mitigation Options Evaluation Report (AECOM, 2016). The intent of this task is to advance and refine the alternatives identified in the previous report, and further assess any potential new alternatives.

The Water Supply Agencies that will be considered as part of this task are identified as follows:

- Meiners Oaks Water District
- Ventura River Water District
- City of Ventura
- Casitas Municipal Water District

Subtask 4.1.1 - Data Review

CONSULTANT shall review the following reports and background information:

- Matilija Dam Ecosystem Restoration Feasibility Study – Final Report (USACE, September 2004)
- Water Supply Mitigation Options Evaluation Report (AECOM, March 2016)
- Matilija Dam Removal Concepts Evaluation Report (AECOM, March 2016)
- Detailed Sediment Transport Modelling and Hydraulic Studies to Determine 100-yr Water Surface Elevations (Stillwater Sciences, July 2019)
- Other pertinent information, such as groundwater management authority (GMA) reports, consumer confidence reports (CCR), etc.

Subtask 4.1.2 - Analysis of Short-Term Impacts to Water Supply Agencies

CONSULTANT shall review the impacts defined in the previous Water Supply Mitigation Options Evaluation Report (2016). Based on the review of available data, the CONSULTANT shall define the short-term impacts to the Water Supply Agencies. The potential impacts shall be defined based on reduction in water supply volume and potential impacts to water quality.

CONSULTANT shall update the short-term impacts defined in the previous Water Supply Mitigation Options Evaluation Report (2016) based on new available data, if applicable.

Subtask 4.1.3 - Development of Conceptual Alternatives

CONSULTANT shall review the alternatives in the previous Water Supply Mitigation Options Evaluation Report (2016). Based on the information identified in Subtasks 4.1.1 and 4.1.2, the CONSULTANT shall identify new alternatives that were not considered as part of the previous report.

CONSULTANT shall develop the new alternatives to facilitate discussions with the Water Supply Agencies, the Contract Management Team, and project stakeholders; including development of conceptual drawings, descriptions, etc.

Subtask 4.1.4 - Coordination with Water Supply Agencies

CONSULTANT shall schedule meetings with the Water Supply Agencies to review and discuss results of the analysis in Subtask 4.1.2 and the alternatives defined in Subtask 4.1.3.

Meetings shall be held with the Water Supply Agencies at their preferred locations (up to three separate meetings with each agency over a total of three days) to further refine and agree on the alternatives. The outcome of the meetings shall be a list of alternatives that

will be developed for further refinement. Minutes shall be provided to project stakeholders summarizing meeting outcomes.

Subtask 4.1.5 - Refinement of Alternatives

CONSULTANT shall refine the alternatives that were identified for further refinement in the Water Supply Agency meetings, per Subtask 4.1.4.

CONSULTANT shall evaluate any new alternatives based on the four evaluation criteria defined in the previous Water Supply Mitigation Options Evaluation Report. The four evaluation criteria are defined as:

- **Cost** – Considers the estimated lifecycle cost as well as the potential return on investment.
- **Environmental** – This criterion considers the potential environmental impacts for each alternative as well as possible environmental permitting requirements.
- **Feasibility** – The feasibility evaluation represents the general effectiveness of each alternative with regards to mitigating potential water volume losses as well as the constructability and scheduling. Additionally, it considers comments and feedback received from the Water Supply Agencies, Contract Management Team, and project stakeholders.
- **Adaptability** – The adaptability criterion considers whether the proposed alternative has any future benefits beyond the mitigation needs of the dam removal project.

Based on the alternatives evaluation, the AGENCY will select the preferred alternative for each Water Supply Agency to be carried forward to the feasibility study phase. The preferred alternative will be discussed and agreed to by the Water Supply Agencies and Contract Management Team prior to a decision on final recommendations.

Deliverables:

- **Short-Term Alternatives Refinement:**
 - Draft Water Supply Mitigation Alternatives Report describing the alternatives evaluation process and the preferred alternative.
 - Revised Draft (if necessary) Water Supply Mitigation Alternatives Report, incorporating comments received on initial draft.
 - Final Water Supply Mitigation Alternatives Report, incorporating comments received on draft(s).

Report deliverables shall be provided in Word and single searchable PDF format. Tables and GIS layers and exhibits shall be provided in native electronic format.

Subtask 4.2 – Long-term Alternative Options Study (Robles Diversion)

Subtask 4.2.1 – Background and Operational Review

CONSULTANT shall prepare a data request for CMWD, VCWPD, Bureau of Reclamation (BOR), and NMFS, which shall be presented at a kick-off meeting. CONSULTANT shall review background information available from CMWD, VCWPD, BOR, and NMFS including record drawings, operation and maintenance records, relevant sections of the Biological Opinion, operating permits, and diversion activities to gain an understanding of the fish screen operations, constraints, and diversion impacts.

CONSULTANT shall also meet with the Robles Working Group (RWG), comprising CMWD, VCWPD, NMFS, BOR, and CDFW staff, in a workshop format, followed by a site visit to all relevant facilities, to better understand operation and maintenance concerns and issues.

CONSULTANT shall review the design prepared by Tetra Tech and interview key stakeholders to summarize areas of concerns, recommendations for improvements or modifications.

Subtask 4.2.2 - Case Study Evaluation

CONSULTANT shall prepare a case study of other relevant projects that could have important lessons learned for this project. Four projects shall be reviewed and studied, including:

- Alameda Creek Fish Passage Project (SFPUC)
- Salinas River Diversion Facility (MCWRA)
- Nelson Dam Removal (Yakima, WA)
- One other project to be determined

Subtask 4.2.3 - Alternative Options and Draft Summary Report

CONSULTANT shall formulate alternative options and prepare a draft summary report of the alternative options activities. The report shall include:

- Findings of Tasks 1 and 2 with collected comments addressed.
- Description and discussion of alternative options for potential further analysis shall include:
 - capital improvement descriptions
 - likely ability of alternative to mitigate dam removal impacts
 - O&M requirements
 - order of magnitude cost evaluation
 - qualitative assessment of alternative efficacy
 - site plan with improvement(s) footprint
 - project execution description (constructability, schedule)

- Alternative Options Evaluation Criteria – Preliminary Rating/Ranking Concepts
 - preliminary options decision matrix
 - preliminary options risk assessment
- Robles Diversion Work Plan – scope of work, budget, schedule for the feasibility analysis and design.

Subtask 4.2.4 - Workshop and Final Summary Report

CONSULTANT shall host a workshop with the RWG, to review the preliminary alternative options and gather feedback. CONSULTANT shall also present the findings of the case studies and identify where lessons learned could be incorporated into the project. The objective of the workshop is to identify and confirm the alternative options to carry forward for future further study.

Deliverables:

- Long-Term Alternatives Options:
 - Draft Technical Memorandum of findings shall be prepared for the Background and Operational Review. The TM shall be issued for review and comments. Comments shall be addressed as part of the Summary Report
 - Technical Memorandum of findings and lessons learned shall be prepared for the Case Study Evaluation. The TM shall be issued for review and comments. Comments shall be addressed as part of the Summary Report
 - Summary Report. A draft summary report shall be issued for review and comments. After the workshop and receipt of comments from members of the RWG, the final report shall be issued.
 - Robles Diversion Work Plan. The work plan shall be issued with a detailed scope of work, budget, and schedule that can be used for future grant proposals.
 - For all meetings, draft agenda shall be distributed at least three days prior to each meeting. Minutes shall be prepared and provided within five business days after each meeting. Workshop meetings for the RWG shall be presented with the aid of PowerPoint presentations. Presentations shall be provided to the Agency.
 - All deliverables shall be reviewed by a senior technical staff member for technical feasibility, completeness, and presentation prior to submittal to the AGENCY. Report deliverables shall be provided in Word and single searchable PDF format. Tables and GIS layers and exhibits shall be provided in native electronic format.

Task 5 – 30 Percent Design

Subtask 5.1 – 30 Percent Plans

CONSULTANT shall develop construction plans, including sections and details necessary to depict the 30 percent design of the orifices through the dam, optional regulating gates for the orifices, demolition of the dam following sediment flushing, and reservoir area restoration.

A draft 30 percent plan package shall be submitted to the AGENCY and CMT for review and comment. The CONSULTANT shall incorporate comments and submit a revised plan package at the 30 percent completion level. The following technical analyses are required to further the design and associated drawings to the 30 percent level:

- **Dam removal approaches & access**
- **Post-removal reservoir hydraulics to support restoration**
- **Post-removal restoration approach and plan, which would not include invasive vegetation surveys or removal, erosion control measures, irrigation design or seed collection**
- **Geomorphology & fish passage initial assessment**
- **Access and hauling routes.**
- **Orifice and reservoir drawdown hydraulic analyses and tunnel/gate detailed design are not included in this subtask**

A preliminary list of drawings anticipated to be included at the 30 percent design level includes the following:

- 1. Project location and general arrangement plan**
- 2. Access and Hauling Plan**
- 3. Existing Conditions – Dam/ Reservoir**
- 4. Existing Conditions – Dam/Plunge Pool**
- 5. Existing Conditions – Elevation**
- 6. Existing Conditions – Sections**
- 7. Dam Alteration Site Plan (pre-drawdown)**
- 8. Dam Alteration Grading Plan (pre-drawdown)**
- 9. Dam Alteration profiles & Sections (pre-drawdown)**
- 10. Dam Alteration Details**
- 11. Dam Removal Access Plan (post-drawdown)**
- 12. Dam Removal Site Plan (post-drawdown)**
- 13. Dam Removal Sequencing**
- 14. Post-Removal Grading Plan**
- 15. Post-Removal Profile and Sections**
- 16. Post-Removal disposal Site Grading**
- 17. Post-Removal Reservoir Restoration Plan**
- 18. Post-Removal Restoration Details**

19. Sediment & Concrete Disposal Area Plan and Sections

Subtask 5.2 – Monitoring and Adaptive Management Plan

CONSULTANT shall develop a Monitoring and Adaptive Management Plan to identify appropriate monitoring activities and associated thresholds for management or maintenance activities associated with the design and construction. The plan shall be primarily based on the uncertainties and risks associated with accumulated sediment evacuation and transport, both downstream of the dam down to the Pacific Ocean and within the reservoir area. The plan shall describe how monitoring activities shall be developed commensurate with project objectives and success criteria, as well as considering possible applicable regulatory requirements.

Subtask 5.3 – 30 Percent Design Report

CONSULTANT shall develop a Design Report describing the selected dam removal approach through the 30 percent design level. The report shall summarize the structural and related analyses supporting the dam removal process, beginning with orifice construction and continuing through the removal steps and sequence, as well as restoration measures within the former reservoir basin. In addition to technical analyses listed under Sub-task 5.2, the design report shall summarize the following:

- **Key design considerations related to the orifices, plug blasting and gates.**
- **Design considerations related to hydrology, downstream hydraulics and sediment transport.**

Potential risks that are not expected to be addressed through analysis for the 30 percent design include the following:

- **Public access road deficiencies for construction traffic/loads**
- **Reservoir rim stability during drawdown.**
- **Geology and geotechnical considerations at potential borrow sites (for access berm construction).**
- **Geology and geotechnical considerations at disposal sites.**
- **Hazardous materials characterization (Phase I or II) for dam or other facilities.**

The table of contents for the Design Report shall include the following:

Executive Summary

1.0 Introduction

1.1 Background

1.2 Project Goals & Objectives

1.3 Report Organization

2.0 Existing Conditions

3.0 Design Criteria

4.0 Hydrology, Hydraulics and Sediment Transport

5.0 Dam Structural Analysis

6.0 Orifice and Gate Design

7.0 Reservoir Drawdown

8.0 Dam Removal Approach & Sequencing

9.0 Geomorphology and Fish Passage

10.0 Post-Removal Restoration

11.0 References

Deliverables:

- **Draft 30 Percent Plans for AGENCY and CMT review**
- **Revised 30 Percent Plans, incorporating comments received from the AGENCY AND CMT**
- **Draft Monitoring and Adaptive Management Plan for AGENCY and CMT review**
- **Final Monitoring and Adaptive Management Plan, incorporating comments received from the AGENCY and CMT**
- **Draft 30 Percent Design Report for AGENCY and CMT review**
- **Final 30 Percent Design Report, incorporating comments received from the AGENCY and CMT**

Task 6 – 65 Percent Design

Subtask 6.1 – 65 Percent Plans

CONSULTANT shall develop construction plans, including sections and details necessary to depict the 65 percent design of all project components. The following analyses shall be carried out to help advance the design to the 65 percent level:

- **Post-removal reservoir hydraulics to support restoration**
- **Post-removal restoration approach and plan**
- **Updated river wide hydraulics and sediment transport shall be summarized, as it pertains to design**
- **Structural analysis for the orifices, plug blasting and gates is not included, since this is expected to be covered at a later stage of the project.**

A draft plan package shall be submitted to the AGENCY and CMT for review and comment. CONSULTANT shall address and incorporate comments as appropriate and submit a revised plan package at the 65 percent level. Any items remaining to be resolved during future phases of detailed design shall be summarized and documented.

The drawing list of the 65 percent design plans expands on the list summarized for the 30 percent design. The level of detail provided per sheet shall increase as appropriate to reach an approximate 65 percent completion level, established based on judgement and experience. At this overall level of completion, some drawing sheets are expected to be levels of completion greater than 65 percent while others shall be less developed.

Subtask 6.2 – Project Cost Estimate and Specification Inventory

CONSULTANT shall develop an engineer's estimate of project construction costs in accordance with the definitions established by the Association for the Advancement of Cost Engineering International (AACE, 1997). Construction pricing shall be developed using logic, methods, and procedures for pricing that are typical for the construction industry. Estimated costs shall utilize crew and equipment work – item analysis to develop unit costs, and then multiply these by the quantity measurement to arrive at work item subtotals. Unit rates shall be established using input from RS Means database, Equipment Watch database and Davis Bacon Wage Determination database. Rates shall be further determined and validated with project data and award bids from similar projects. Equipment costs shall be based on the latest understanding of the equipment required to complete the work. Vendor quotes for materials such as gates shall also be used. Overall prices shall be established by taking location, access and construction operation into consideration.

The project cost estimate shall also include a summary of overall project costs, including cost estimates provided by the other consultants for project components they are contracted to design. The overall project cost estimate shall include contingency and escalation assumptions for further implementation agreed to in consultation with the CMT and AGENCY.

A list and description of the technical specifications shall be included (the technical specifications themselves are not included in this scope). The division 2 (technical) specifications list shall be completed using the latest edition of the Construction Specification institute (CSI) format, however will strive for consistency with County specification protocol, including the Greenbook Standard Specification for Public Works Construction, and examples provided by AGENCY.

Subtask 6.3 – 65 Percent Design Report

CONSULTANT shall develop a 65 Percent Design Report describing the selected dam removal project components and details. The report shall summarize the structural and related analyses supporting all elements of the project design including the orifice construction, dam removal steps and sequence, and restoration measures within the former reservoir basin. The table of contents for the Design Report shall expand upon the subjects listed under the Task 5.3 for the

30 Percent Design Report. Significant additions to the design report at 65 percent include the following:

- **Sections shall be added to the report to document the engineer's opinion of probable construction costs, based on the 65 percent design.**
- **Structural analysis for the orifices, plug blasting and gates is not included, as this is expected to be completed at a later stage of the project.**

Deliverables:

- **Draft 65 Percent Plans**
- **Revised 65 Percent Plans, incorporating comments received from the AGENCY and CMT on Draft 65 Percent Plans**
- **Draft 65 Percent Design Report for AGENCY and CMT review**
- **Revised 65 Percent Design Report, incorporating comments received from the AGENCY and CMT**

Task 7 – Final Report

CONSULTANT shall develop a summary report of the work performed under the California Department of Fish and Wildlife grant. The report shall summarize the work performed under each task and subtask, along with the findings of the work, and shall reference all the completed deliverables. To ensure a comprehensive document, the deliverables shall be provided as appendices to the report.

Deliverables:

- **Draft a Final Report for the AGENCY and CMT review**
- **Revised Final Report, incorporating comments received from the AGENCY and CMT**

3. Extra Services

Extra Services are separate from but related to the Basic Services described above. Extra Services shall be performed by CONSULTANT only after being authorized in writing by the Project Manager for AGENCY. AGENCY's written authorization will include a statement of the Extra Services required and time schedule for completion. CONSULTANT's billing and AGENCY's payment for Extra Services shall occur pursuant to Exhibit C.

4. County Services

AGENCY will provide or accomplish the following:

1. Full information as to the requirements of the services to be provided by CONSULTANT under the contract.

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2. Review documents submitted by CONSULTANT and provide comments, direction, or approval as needed in a timely manner.
3. Provide environmental permitting for all field investigations.

End of Exhibit A

EXHIBIT B - TIME SCHEDULE

1. Schedule

All Work on this contract shall be completed by **3/31/2022**.

CONSULTANT shall complete intermediate tasks as follows:

Task Table

Task	Description	Due Date
1	Field Investigations	
1.1	Geotechnical Field Investigations to Characterize Fine Sediment and Organics	07/07/2018
1.2	Field Investigations to Characterize Dam Concrete	07/07/2018
1.3	Field Investigations Memorandum	08/30/2018
1.4	Biological Support for Field Investigations	09/15/2018
2	Dam Removal Feasibility Study	
2.1	Structural Evaluation of Dam With and Without Orifices	03/13/2020
2.2	Detailed Sediment Transport Modeling From Dam to Ocean	01/31/2020
2.3	Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses	3/31/2021
2.4	Re-evaluation of Downstream Project Components	03/30/2020
2.5	Predictability Assessment of Flushing Storm Event	01/31/2020
2.6	Update Dam Removal Concept To 10 Percent Design	04/24/2020
2.7	Updated Dam Structural Analysis	03/13/2020
2.8	Dam Removal Feasibility Study Report	03/30/2020
2.9	Detailed 1D and 2D Modeling	3/31/2021
2.10	Bank Erosion Screening Level Assessment	4/30/2021
3	Review and Update Real Estate Plan	
3.1	Review USACE Real Estate Plan	01/01/2020
3.2	Development of Real Estate Plan/Downstream Project Component Decision Matrix	2/29/2020
3.3	Update Real Estate Plan	3/31/2020
4	Impacts to Water Supply Infrastructure	
4.1	Short-Term Impacts Alternatives Refinement	8/31/2020
4.1.1	Data Review	5/31/2020
4.1.2	Analysis of Short-Term Impacts to Water Supply Agencies	6/30/2020
4.1.3	Development of Conceptual Alternatives	7/31/2020
4.1.4	Coordination with Water Supply Agencies	8/31/2020
4.1.5	Refinement of Alternatives	8/31/2020
4.2	Long-term Impacts Alternative Options Study (Robles Diversion)	9/30/2020
4.2.1	Background and Operational Review	7/31/2020
4.2.2	Case Study Evaluation	8/31/2020
4.2.3	Preliminary Evaluation and Draft Summary Report	9/30/2020
4.2.4	Workshop and Final Summary Report	10/31/2020
5	30 Percent Design	
5.1	30 Percent Plans	6/30/2021
5.2	Monitoring and Adaptive Management Plan	7/31/2021

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Task	Description	Due Date
5.3	30 Percent Design Report	6/30/2021
6	65 Percent Design	
6.1	65 Percent Plans	11/30/2021
6.2	Project Cost Estimate and Specifications Inventory	11/30/2021
6.3	65 Percent Design Report	11/30/2021
7	Final Report	12/31/2021

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

EXHIBIT C – Fees and Payments

1. Compensation Summary

The following summarizes the maximum amount of compensation available to CONSULTANT under this contract. The actual amount of compensation shall be established and paid in accordance with the applicable provisions of the contract including this Exhibit C.

Maximum Fees for Basic Services:	\$ <u>1,688,733.00</u>
Maximum Fees for Extra Services:	\$ <u>0.00</u>
Maximum Reimbursement for Expenses:	\$ <u>0.00</u>
 Total Amount Not to Exceed:	 \$ <u>1,688,733.00</u>

2. Fees For Basic Services

AGENCY agrees to pay CONSULTANT the following fees for Basic Services

☒ a **fixed fee** compensation, in the lump sum amount of \$1,688,733.00, for completion of all Basic Services.

Task Table

Task	Description	Lump Sum
1	Field Investigations	
1.1	Geotechnical Field Investigations to Characterize Fine Sediment and Organics	\$137,538.00
1.2	Field Investigations to Characterize Dam Concrete	\$61,612.00
1.3	Field Investigations Memorandum	\$32,034.00
1.4	Biological Support for Field Investigations	\$16,898.00
2	Dam Removal Feasibility Study	
2.1	Structural Evaluation of Dam With and Without Orifices	\$32,992.00
2.2	Detailed Sediment Transport Modeling From Dam to Ocean	\$135,594.00
2.3	Hydraulic Studies to Determine 100-yr Water Surface Elevation Based on Detailed Sediment Transport Analyses	\$43,886.00
2.4	Re-evaluation of Downstream Project Components	\$61,172.00
2.5	Predictability Assessment of Flushing Storm Event	\$42,070.00
2.6	Update Dam Removal Concept To 10 Percent Design	\$102,520.00
2.7	Updated Dam Structural Analysis	\$147,248.00
2.8	Dam Removal Feasibility Study Report	\$25,636.00
2.9	Detailed 1D and 2D Hydraulic Modeling	\$150,000
2.10	Bank Erosion Screening Level Assessment	\$44,500
3	Review and Update Real Estate Plan	
3.1	Review USACE Real Estate Plan	\$4,787.00

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Task	Description	Lump Sum
3.2	Development of Real Estate Plan/Downstream Project Component Decision Matrix	\$24,991.00
3.3	Update Real Estate Plan	\$23,597.00
4	Impacts to Water Supply Infrastructure	
4.1	Short-Term Impacts Alternatives Refinement	
4.1.1	Data Review	\$2,074.00
4.1.2	Analysis of Short-Term Impacts to Water Supply Agencies	\$4,197.00
4.1.3	Development of Conceptual Alternatives	\$5,821.00
4.1.4	Coordination with Water Supply Agencies	\$7,565.00
4.1.5	Refinement of Alternatives	\$13,112.00
4.2	Long-term Impacts Alternative Options Study (Robles Diversion)	
4.2.1	Background and Operational Review	\$33,588.00
4.2.2	Case Study Evaluation	\$15,660.00
4.2.3	Preliminary Evaluation and Draft Summary Report	\$18,684.00
4.2.4	Workshop and Final Summary Report	\$11,556.00
5	30 Percent Design	
5.1	30 Percent Plans	\$142,032
5.2	Monitoring and Adaptive Management Plan	\$36,100
5.3	30 Percent Design Report	\$54,708
6	65 Percent Design	
6.1	65 Percent Plans	\$138,675
6.2	Project Cost Estimate and Specifications Inventory	\$53,892
6.3	65 Percent Design Report	\$42,403
7	Final Report	\$21,591
Total		\$1,688,733.00

3. Fees For Extra Services

For Extra Services authorized in writing in advance by AGENCY in accordance with Exhibit A, AGENCY agrees to pay CONSULTANT an **hourly rate** compensation for actual hours of Extra Services performed that is based upon the hourly rates set forth in the Rate Table for Basic Services above or, if none, then based upon the hourly rates set forth in the following Rate Table for Extra Services, which rates shall remain fixed for the duration of the contract, not to exceed the **maximum fee amount of \$ 0.00**.

4. Delays

If Work cannot be completed by the dates specified in Exhibit B through no fault of CONSULTANT, the fees 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

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Work can actually be completed. Any payment of an additional fee as described in this paragraph must be authorized by AGENCY with a written modification to this contract.

5. Reimbursable Expenses

CONSULTANT shall be reimbursed a sum for the following reasonable out-of-pocket expenses that are incurred and paid for by CONSULTANT in furtherance of performance of its obligations under this contract, but only to the extent that such expenses are directly related to CONSULTANT's services hereunder and do not exceed the **maximum reimbursable amount of \$ \$0.00** :

(i) Outside printing directly related to deliverables but not for internal uses of CONSULTANT or its Subconsultants;

(ii) Reproduction or reprographic costs directly related to deliverables but not for internal uses of CONSULTANT or its Subconsultants. If CONSULTANT provides allowable reprographic services using its own equipment rather than using an outside service, the unit billing rates for such charges must be approved in advance by AGENCY;

(iii) Shipping, overnight mail, postage, messenger, courier and/or delivery services (but not for CONSULTANT's internal communications);

(iv) Only if authorized in writing in advance by AGENCY, reimbursement for business travel for the specific position descriptions so identified in the Rate Tables for Basic Services or Extra Services set forth above. AGENCY shall reimburse CONSULTANT for transportation, lodging, and meal expenses consistent with the policies and amounts approved for County employees as defined by policy number Chapter VII(C)-1, *Reimbursement of Employees County Business Expenses*, in the County's Administrative Policy Manual (latest edition);

(v) Only if authorized in writing in advance by AGENCY, fees and costs for Subconsultant services that are not included in the Rate Tables for Basic Services or Extra Services set forth above.

Exclusive List. The list of reimbursable expenses set forth above is the sole and exclusive list of reimbursable expenses that CONSULTANT is entitled to receive.

Approval Limits. Any reimbursable expense wherein a single item exceeds \$500 in value, whether purchased or leased, must be approved in writing in advance by AGENCY.

No Administrative Charge or Mark-Ups. The reimbursement provided for herein shall not include an administrative charge, multiplier or other mark-up by CONSULTANT unless authorized in writing, in advance, by AGENCY.

No Reimbursement for Specified Basic Services Paid for by a Fixed Fee. Notwithstanding the above, expenses related to Basic Services specified in Exhibit B are not reimbursable if CONSULTANT is compensated for Basic Services by a fixed fee.

6. Payment

AGENCY shall make payments to CONSULTANT under the contract as follows:

Requests for Payment

To request payment, CONSULTANT shall complete and submit to AGENCY a Consultant Services Invoice Form that shall include, at a minimum, (i) personnel time records for Basic Services and Extra Services actually performed at the rates specified in this Exhibit C if applicable and (ii) receipts for all authorized reimbursable expense, along with the written AGENCY authorization for any specific reimbursable expenses requested for payment, if required above.

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When invoicing for Extra Services, CONSULTANT shall clearly mark on the Invoice Form which services are Extra Services and keep those services separate from or Basic Services, and shall include a copy of the written AGENCY authorization for the Extra Services for which payment is requested.

CONSULTANT shall submit all invoices to:

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

Payment Schedule

Payments shall be made monthly by AGENCY upon presentation of a properly completed AGENCY Invoice Form as described above. Upon approval of the invoice, AGENCY shall pay CONSULTANT 95% of the maximum fee for the specific task/milestone. Upon completion and acceptance by AGENCY of the task/milestone, AGENCY shall pay CONSULTANT the balance of the fee.

Timely Invoicing

Timely invoicing by CONSULTANT is required. 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 submit a properly completed invoice no later than 60 calendar days after the services which are the subject of the invoice were performed. An invoice received by AGENCY more than 60 calendar days after the services were performed shall be reduced by 5% to compensate AGENCY for the additional management costs. Additionally, since increases in administrative costs and budgetary problems caused by late invoicing correlate to the length of delay in invoicing, there will be an additional 5% reduction in compensation for each additional 30-calendar-day period beyond 60 days between the date the services were performed and the submission of the invoice for those services.

CONSULTANT shall submit a final invoice form within 60 days of the earliest of the following events: 1) completion and acceptance by AGENCY of all Work required by the contract; or 2) termination of the contract.

End of Exhibit C