

RFP – No. PWG124-FLOOD-5451

Scope of Work

V. SCOPE OF WORK

A. **BACKGROUND INFORMATION:**

The proposed Bandicoot Basin Project (Project) follows the Hesperia Master Plan of Drainage (MPD) dated May 1996 prepared for the District by Williamson & Schmid and Huitt-Zollars. The MPD calls for a regional facility detention basin immediately upstream of the California Aqueduct (Sta. 1890+00, Mile Post 397.3).

Work to be provided by the District:

- Survey Data.
- Environmental Clearances furnished by the District, subject to updates by the District if deemed necessary.
- The District will provide a copy of the Draft Geotechnical Report. Proposers should incorporate into their proposals the task of finalizing the geotechnical report.

B. **MINIMUM PROPOSER REQUIREMENTS:**

The proposal must contain the following items:

1. A work plan for conducting all the tasks described in the scope of work and all applicable back-up documentation (the District reserves the right to use the proposal or proposal language as part of the contract language).
2. The proposer must have successfully finalized 100% of construction plans, specifications, and engineering estimates for at least two similar detention basin projects, each necessitating approval from both DSOD and DWR. These projects must fully constructed and currently operational, with a minimum construction cost of \$25 million each, prior to the proposal deadline.

The proposer's experience section should encompass details such as project names, locations, project owners, contact information for owner project managers, dates of DSOD and DWR approval, dates of completion for 100% PS&E, total engineer estimate cost, actual construction cost, as well as construction beginning and completion dates. The District reserves the right to request additional information and documents, and may reach out to any of the project owners listed in the experience section during the proposal evaluation period.

Projects that have not reached full construction or are still in the design or planning phases will not be regarded as relevant experience.

3. A list of key personnel and respective resumes. Identify the duties that each person will be responsible for.
4. The engineer's resume who will be responsible for signing and stamping the final plans and specifications along with providing a copy of his professional engineering license issued by the California Board.
5. Corporate information, including corporate structure, officers, and history of service to the District or other public agencies.

C. PROJECT DESCRIPTION:

This RFP seeks proposals for Professional Civil Engineering Services to design of Bandicoot Basin including preparing the necessary Hydrology and Hydraulic report per the City of Hesperia MPD and coordinating with both the DSOD and DWR to secure the necessary approvals of the proposed Bandicoot Basin on behalf of the District.

The District is requesting the Project files to be prepared using Autodesk Civil 3D, Adobe or Bluebeam pdf, and Microsoft Office software, as applicable, and all related work will be performed by the Consultant.

C.1 MANAGEMENT OF THE DESIGN PROCESS

Management of the design process shall include, but not be limited to, the following:

1. WORK PLAN

The selected Proposer (Consultant) will prepare a Work Plan that includes a list of deliverables, milestone submittal schedule, summary of organization responsibilities and contacts, specific scope of work, task budgets, reporting and invoicing procedures, quality assurance plan, and Project filing system. The Work Plan shall be submitted to the District prior to the first invoice.

Deliverables:

- Work Plan

2. FIELD REVIEWS

The Consultant shall conduct field reviews of the Project site as required for design so that the design anticipates any construction problems that may occur.

3. PROJECT MEETINGS/COORDINATION

The Consultant shall document Project meetings and prepare minutes of the meetings for the District's review within three (3) working days after each meeting. The proposal shall clearly identify within the cost proposal any management hours necessary to complete the project's required design services. The fee proposal at a minimum shall include the following items of work.

- Kick-off Meeting – The Consultant shall organize an initial meeting with the District's staff to review and confirm the Project scope, risks, issues, assumptions, and constraints as well as the Project schedule.
- 36 Monthly Progress Updates – The Consultant shall schedule and conduct monthly progress meetings via in-person or video conference call with the District staff to review Project direction and redirect some elements as necessary to ensure the Project's progress within the available budget and/or funding schedule. The Consultant shall maintain a list of action items with projected completion dates and shall use this as a basis for monthly updates to the District's staff. The Consultant shall send the current action item list via e-mail to the District staff three (3) working days prior to each progress meeting.
- The Consultant shall coordinate meetings and process Project documents for approval through DSOD, DWR, and government agencies.

Deliverables:

- Meeting Minutes.
- Written summaries of telephone/email coordination as appropriate.
- Monthly Progress Reports.

4. QUALITY ASSURANCE AND QUALITY CONTROL

The Consultant will have a Quality Assurance and Quality Control Plan in effect for the duration of the Scope of Services. The plan will establish a process whereby all deliverables are independently checked, corrected, and back-checked prior to any formal submission, and all job-related correspondence and memoranda are routed and received by affected persons and then appropriately filed. An appointed Quality Assurance Officer will monitor and review Project activities and deliverable schedules. All deliverables shall contain the signature of the Quality Assurance Officer.

Deliverables:

- Deliverables such as plans, specifications, reports, cost estimates, quantity calculations, etc. shall be subject to signature by the Quality Assurance Officer.

5. PROJECT SCHEDULE

The Consultant proposal shall include a Project schedule for a period that does not exceed thirty-six (36) months starting from the award date. The Consultant will prepare and update a monthly Project schedule with tasks and milestones. The Consultant will break down the schedule by logical tasks consistent with the scope of work and with enough detail to track the Project's progress. Both a baseline schedule and tracking updates are required. The schedule must reflect realistic estimates of review periods by other agencies for tasks, such as reports, plans, permits, and coordination.

Deliverables:

- Project Schedule with Proposal
- Updated Monthly Project Schedule

6. MONTHLY PROGRESS REPORT AND INVOICE

The Consultant will establish and apply internal accounting methods and procedures acceptable to the District for documenting and monitoring contract costs. The Consultant will submit monthly invoices broken down in a manner consistent with the Work Plan. The Consultant shall include with the monthly invoice a progress report that reflects the work completed within the invoice period. Payments to the Consultant are to be in arrears. In other words, the Consultant must have actually accrued and paid the costs before invoicing the District.

Invoices shall include the following:

- Prepared on the Consultant's letterhead;
- Signed by the Consultant's Project Manager;
- Progress report that reflects the work completed within the invoice period;
- Appropriate backup documentation is to be attached to the invoice.
- If the contract involves subconsultants, a separate invoice for each subconsultant shall be attached in the same format as the prime Consultant's invoice and should be included in the summary of the prime Consultant's invoice.

The Consultant shall regularly review Project budgets per task versus the percent of work completed per task to determine if there are any issues that need to be resolved, or if effective practices can be

implemented to keep costs within budget. Tasks anticipated to exceed the total estimated costs must be identified and presented to the District as early as possible and before the work starts. If the Consultant fails to comply with the above requirements, the District shall have the right to delay payment.

Deliverables:

- Monthly Progress Report and Invoice.

C.2 PROJECT SCHEDULE

The Project Plans and all associated Reports, Special Provisions and Engineer's Estimates as described in the scope of services of this RFP shall be completed within Thirty-six (36) months of the notice to proceed.

C.3 HYDROLOGY/HYDRAULICS

The Consultant is responsible for preparing a hydrology and hydraulic report for the project utilizing the hydrology information from the City of Hesperia Master Plan of Drainage (MPD) and obtaining the necessary approval from DSOD and DWR.

The Consultant is responsible for arranging a meeting with both the DSOD and the District team to address any DSOD fees prior to making any payments.

The Consultant shall use Army Corps and/or WSPG for the Hydraulic analysis and the AES software or Pondpack program to perform basin routing analysis to model the proposed system, design the detention basin, design the inlet structure into the basin, design the basin outlet structure, design the spillway, and any other structure or lateral connection. All hydrological data including all assumptions, basis of analysis, and background information shall be included in the final project Drainage Report.

Deliverables:

- The Final Drainage Report (signed and stamped by the Engineer of Record).
- The approval of DSOD and DWR.

C.4 GEOTECHNICAL SERVICES:

The District will provide a copy of the Draft Geotechnical Report. Proposers should incorporate into their proposal the cost and task of finalizing the geotechnical report along with any additional technical assistance needed for the basin design and the creation of the final plans and specifications.

C.5 Utility Coordination:

The Consultant is responsible for the Project utility coordination/relocation including identifying and mapping existing utilities, coordinating with utility companies, and assisting in utility relocations.

Utilities located in the Project proximity shall be delineated on plan views and profile views of the design plan accordingly.

C.6 ENVIRONMENTAL SERVICES

The California Environmental Quality Act compliance and environmental regulatory permitting processes have been completed for the construction of a flood control basin for the Bandicoot Basin Project.

The Consultant shall conduct meetings with the Environmental Management Division (EMD) and/or regulatory agency staff during the duration of the Project. Updates and transmittals shall be submitted to the District accordingly.

If required, the District will revise the essential Environmental permits to align with the final basin design.

Documents will be provided by the District:

- ACOE (404) - Expires July 8, 2029 (SPL-2016-00690-SLP)
- CDFW (1602) Expires October 21, 2026 (1600-2016-0121-06)
- LRWQCB (401) WDID No. 6B361606003 Expires July 8, 2029

C.7 ENGINEER'S ESTIMATE

The Consultant is responsible for creating and presenting the Engineer's Cost Estimate(s), encompassing shared components like mobilization, construction area signs, job site management, etc. This will be followed by individual breakdowns for the Project, incorporating all feasible construction elements outlined in the design package. The anticipated quantities will encompass various aspects, including but not limited to, specific categorizations such as removals, relocations, water pollution control, water diversion, demolition, basin construction (involving excavation, fill, compaction, reinforced concrete, rock slope protection, grouting, etc.), asphalt concrete (AC) paving if relevant, fencing and gates, survey monument if applicable, traffic control systems related to the Project, painting of pavement symbols and signs, raised pavement markers where appropriate, Project-specific signs, and more.

The Consultant is obliged to periodically update the cost estimates. At a minimum, these updates must be provided at 35%, 65%, and 95% completion of the Final Plan, alongside comprehensive backup calculation documents. The final construction cost estimate from the Consultant must be in harmony with the ultimate estimated quantities, with detailed computations showcasing projected quantities and costs of tasks, including cumulative totals. These computations will be shared with the District for assessment, but this act does not negate the Consultant's responsibility for submitting a precise quantity estimate.

Maintaining confidentiality is essential; all cost estimate records are considered confidential and can only be disclosed to the District's Project Manager. Submissions of cost estimates should be labeled as "Confidential" with a watermark. Within the Consultant's organization, disclosure of cost estimates should be limited to essential personnel on a need-to-know basis.

Deliverables:

- Quantity Breakdown for Bidding and Engineer's Cost Estimate.

C.8 RIGHT OF WAY

The District will provide the Consultant with all necessary Project-related right-of-way base maps for the design plan. The District will provide PDF files of all Recorded Documents which include the Legal Descriptions and Deed Plats of all properties owned by the District or properties in which the District has Easements along with any other right-of-way file which contains the exact location and boundary of all existing rights-of-way and other easements. The District will also provide any notes giving the exact document and/or map from which this information was gathered.

The Consultant shall conduct meetings with the District's right-of-way staff during the duration of the Project. Additionally, they must utilize the provided PDF data to finalize the project design, define the right of way on the plans, and submit the requisite applications to DWR for a construction encroachment permit.

Deliverables:

- DWR Encroachment Permit approval (if needed).

C.9 TRAFFIC

The Consultant shall prepare a traffic control plan including signing, striping plans, and detour plans that will show all applicable truck routes for basin grading import/export operations. The Consultant shall contact and coordinate with SBC Public Works Traffic Division for templates, standards, and requirements on traffic control devices. Likewise, the Consultant shall conduct the same practice with roads located within the City of Hesperia and shall ensure to incorporate all the City's requirements on the traffic plans accordingly. The Consultant shall be responsible for all the fees and permits required by the City of Hesperia as needed.

- a. The Consultant shall prepare a schedule for Road Closure at the intersection of Bandicoot Trail and Cedar Street as needed and should include it in Special Provisions.
- b. Traffic Signing and Striping plans (aerial survey allow) and Traffic Control Devices should be tabled to coincide with pavement rehabilitation efforts.

Deliverables:

- Traffic Control Plan including Signing, Striping Plans, and Detour Plan.
- Road Closure Schedule (if applicable).

C.10 SURVEYING

The District will provide survey data, obtained from Towill in August 2012 in **Terramodel Format** and Aerotech in October 2010 in **CAD format**, necessary for the design of this Project as identified by the Consultant. Any surveying needs must be formally submitted to the County's Surveyor Office in written form. The amount of survey that can be requested and expected to be completed shall be limited to what can be reasonably accomplished by two (2) – two (2) man crews daily. The Consultant should anticipate a timeline of approximately 45 days for completion by the county surveying division.

C.11 PAVEMENT DESIGN

The District will provide the Consultant with the Pavement Design Report and Traffic Index as required for the pavement structural sections if applicable.

C.12 STRUCTURAL DESIGN ENGINEERING SERVICES

Structural design of the following reinforced concrete structures is required, these items are further detailed below:

- a. Basin Inlet and outlet structures including rectangular channel and trapezoidal transitions (including subdrain system as required).
- b. Connection to DWR Aqueduct over-chute.
- c. Subdrain system, if required, for trapezoidal concrete transition.
- d. Concrete spillway with subdrain system.
- e. Box culverts designed for minimum H20-44 highway loading, including parapets.
- f. Headwalls and wingwalls at the upstream and downstream ends of the Project.
- g. Any other necessary structures.

Design tasks include design of retaining walls, headwalls, wingwalls and L-walls, if used, for stability (sliding, overturning); structural analysis including all applicable loading conditions; structural design of structures which will have dimensions to accomplish the hydraulic, retaining and other functions of the structures shown on the civil plans; structural calculations; determination of hydrostatic uplift forces

and design of subdrain systems and/or other means of relieving uplift forces to provide economical structures which resist uplift forces and prevent flotation; structural drawing sheets expressing the structural designs, including tables and sections showing concrete thicknesses, reinforcements, etc; details of connections between structural elements (i.e., connection between channels and culverts and headwalls, connection between precast and cast-in-place culverts, etc.; detailing of design including channel construction and expansion joints, chamfers, cut off walls, etc.; drawings of subdrain system.

The drawings shall be prepared and submitted using Autodesk Civil 3D software. Additional related tasks include the preparation of Special Provisions for the reinforced concrete structures.

Deliverables:

The Consultant shall complete and submit the following deliverable items of work:

- **Structural analysis and preliminary structural design:**
The Consultant shall perform structural analysis and preliminary structural design for the various structures. Deliverables shall consist of structural analysis and preliminary structural design calculations and sketches.
- **Develop recommended configurations:**
The Consultant shall develop alternative structure configurations and recommend the optimum configurations and shall recommend standard designs as applicable. The deliverable shall consist of alternative and recommended design configurations with supporting calculations and sketches.
- **Final design:**
The Consultant shall perform structural design for the various structures and perform additional structural design as may be required in conjunction with the application of standards, if necessary. The Consultant shall submit final calculations and sketches. The Consultant shall make recommendations for standard designs to be used. The deliverable shall consist of the final structural calculations and a memorandum summarizing the design assumptions and calculations.
- **Structural drawings, including detailing, Special Provisions, and Estimates:**
The Consultant shall prepare and submit structural plan sheets using Autodesk Civil 3D, including details as previously set forth. Deliverables shall consist of structural Special Provisions and Estimates.

C.13 SPECIAL PROVISIONS

The Consultant shall prepare the Special Provisions for the ultimate condition of the Bandicoot Basin Construction Project. The Special Provisions shall reference the latest version of the California Department of Transportation (Caltrans) Standard Specifications and Standard Plans, and Standard Plans for Public Works Construction (SPPWC). Any Caltrans Standard Drawings utilized shall be the 2023 edition, or later with the latest Revisions. The Consultant shall prepare a preliminary and final quantity and cost estimate.

The Consultant shall utilize and incorporate the District's "Boiler Plate" documents, including the Notice-to-Bidders, proposal, bond forms, insurance requirements, and agreement into the Special Provisions.

The Special Provisions shall include all sections covering specifications for the project-related construction items as well as utilities, standard plates, Project special drawings, and regulatory permits.

The Consultant shall be required to periodically submit updated Special Provisions for review. At a minimum, the Special Provisions shall be submitted following the progress of the Basin Design Plan as 65%, 95%, and Final Plan.

Deliverables:

- Draft and Final Special Provisions

D. BASIN DESIGN:

The District proposes to construct a Bandicoot Detention Basin. This project, in general, consists of extensive basin excavation and construction of inlet and outlet structures, connection to DWR Aqueduct over-chute, closed conduits, transition structures, wingwalls, headwalls, cutoff walls, basin embankments, emergency spillway, grated inlets, and various access roadways and ramps. See Exhibit B, "Project Location Map".

The successful proposer will be required to coordinate and supply certain data items as specified in the "Submittals" portion of the RFP.

The approximate basin storage volume measured to the spillway crest is 555 acre-feet. The basin embankment slopes will be constructed at a 3 to 1 ratio (3H:1V) for the interior slopes and at a 2 to 1 ratio (2H:1V) for the exterior slopes, with a minimum top width of 20 feet. A 20-foot wide access road will be constructed along the top of the embankment and around the basin within and beyond the cut-and-fill slopes. A number of access ramps will be provided for maintenance purposes. The access ramps shall also have a minimum width of 20 feet. The preliminary basin size includes embankments that range from 0 to approximately 30 feet. Basin Discharge is 1,600 cfs (Aqueduct over-chute).

Additionally, the successful proposer shall provide the design of embankment sections of the basin levees to meet the DSOD. The Proposer shall provide recommendations such that on-site materials can be utilized to the maximum extent practicable.

The design consultant is responsible for the following (If applicable):

1. Design components that include and are not limited to what is listed under Structural Design Engineering Services.
2. Design plans, profiles, details, and cross sections.
3. Construction bid documents including Special Provisions.
4. Calculate quantity takeoff and cost estimate.
5. Provide field and records research to prepare the necessary design parameters.
6. Coordinate with the Flood Control District Engineer throughout the design process.
7. Obtain permits and/ or approvals from all applicable agencies.
8. Project schedule for the design process.
9. Submittals to the District for review and comments at 35%, 65%, 95%, and 100% completed plans, specifications, quantity takeoff, and engineer estimate.
10. Determine the need for additional right-of-way or design survey.
11. Update the Drainage report.
12. Coordination with the District Environmental Management department for any update necessary.
13. Monthly progress meetings.
14. Seismic conditions including fault locations and potential seismic surface movements with respective loadings and parameters of seismic shaking.
15. Potential impact of reservoir loading on geologic structures.
16. Evaluation of excavation and construction problems including subsurface rock, oversized material, caving soils, site preparation/grading (including potential over-excavation limits), backfill, drivability of temporary shoring, potential for groundwater seepage and dewatering.
17. Horizontal and vertical recommended limits for over-excavation beneath proposed embankments and concrete structures.

18. Recommended design parameters including but not limited to the following, for the embankment and its natural abutments and slopes adjacent to the basin areas:
 - a) Lateral earth loadings.
 - b) Shear strengths.
 - c) Bearing capacities.
 - d) Permeability.
 - e) Recommendations for temporary and permanent excavation slopes based on static and seismic analysis.
 - f) Special design and construction recommendations including, but not limited to, the following:
 - i. Foundation preparation requirements.
 - ii. Suitability of materials for embankments (gradation, sand equivalent, etc.).
 - iii. Relevant earthwork recommendations.
 - iv. Shrinkage and bulking percentages.
 - v. Percentage of material suitable for embankment construction.
 - vi. Compaction methods and minimum requirements.
 - vii. Seepage and piping control provisions.
 - viii. Potential for settlement.
 - ix. Seismic considerations
 - x. Necessity of impervious core or shear key.
 - xi. Embankment side slope protection, including recommendations for erosion protection and armoring.
19. Required relative compaction of embankment materials.
20. Location and extent of required over-excavation.
21. Determination of applicable geotechnical-related data, properties, coefficients, etc. required for the structural design of the concrete box structure, spillways, channels, and the design of shoring and trench stability for any work proposed underground work.
22. Provide design of spillway subdrain system(s).
23. Provide recommendations for Special Provisions related to Caltrans Standard Specifications for construction.
24. Foundation evaluation of spillway and reinforced concrete box inlet/outlet structures.
25. Recommendations for construction monitoring and testing.

Deliverables:

Engineering services submittals at a minimum shall include the following items:

- *AT 35% complete*
 - Title Sheet
 - Plan and profile sheet
 - Detail sheet with schematic design for major inlets and system outlet
 - Detention basin grading plan
 - Right-of-way / easement areas identified.
 - Design assumptions / Basin Routing / Hydraulic calculations (draft Drainage Report)
 - Preliminary Cost Estimate
 - Project Schedule
 - Estimated area of impact within Waters of the State and Waters of the United States to determine if a necessary update is required for the Environmental permits.

- Electronic copy of all submittal items in their original format and in PDF format.
- *AT 65% complete*
 - Title Sheet
 - General Notes / typical section sheet.
 - The plan and profile are to be more refined than the previous stage.
 - Storm drain detail sheets (if any).
 - Storm drain connector pipe profile sheets (if any).
 - Exhibit of additional right-of-way acquisition areas (if any).
 - Detention basin grading plan.
 - Detention basin inlet and outlet detail sheets.
 - Detention basin misc. detail sheets (not including steel reinforcement schedules).
 - List of contract bid items.
 - Revised cost estimate.
 - Revised project schedule with slippage.
 - Revised list of anticipated construction equipment with estimated hours of use to determine if a necessary update is required for the Environmental permits.
 - Revised estimated area of impact and quantities of materials within Waters of the State and Waters of the United States to determine if a necessary update is required for the Environmental permits.
 - Electronic copy of all submittal items in their original format and in PDF format
- *AT 95% complete,*
 - Complete plans, special provisions, and estimates.
 - Backup quantity calculations.
 - Backup structural calculations if applicable.
 - Final Drainage Report with DSOD, and DWR approval.
 - Electronic copy of all submittal items in their original format and in PDF format.
- *At 100% complete,*
 - Final plans, special provisions, and estimates (including signed mylars).
 - Notes to Resident Engineer.
 - Final backup quantity calculations.
 - Final Drainage Report with -DSOD, and DWR approval.
 - Electronic copy of all submittal items in their original format and in PDF format.
 - The Consultant shall prepare all necessary construction ready plans, reports, and/or applications including the SWPPP and/or Water Pollution Control Program (WPCP). Provide Final SWPPP and/or WPCP.

BKF Engineers

Scope of Work

SCOPE OF WORK

TASK 1 MANAGEMENT OF THE DESIGN PROCESS

Task 1.1 - Work Plan: BKF will prepare a Work Plan that includes a list of deliverables, milestone submittal schedule, summary of organization responsibilities and contacts, specific scope of work, task budgets, reporting and invoicing procedures, quality assurance plan, and project filing system. The work plan will identify standard plans and specifications to be used in the development of the project's design. A preliminary Work Plan will be submitted to the District prior to the first invoice. Comments issued on the preliminary Work Plan will be discussed with District staff and incorporated as agreed upon during the discussion. A final Work Plan will then be submitted for District approval.

DELIVERABLES:

- Work Plan

Task 1.2 - Field Review: The BKF team will conduct field reviews of the Project site identifying any design constraints and/or construction problems resulting from visual features that may occur.

Task 1.3 - Project Meetings/Coordination: BKF will document project meetings and prepare minutes for the District's review within three (3) working days after each meeting. Upon receipt of the District's comments, if any, BKF will incorporate comments into the meeting minutes. Comments, which are not incorporated, will be discussed with the District as to why such information has not been incorporated. This proposal clearly identifies within the cost proposal the project management hours necessary to complete the project. The fee proposal includes the following items of work.

- Kick-off Meeting** – BKF will coordinate an initial project meeting with the District's staff to review and confirm the project scope, risks, issues, assumptions, and constraints as well as the project schedule.
- 36 Monthly Progress Updates** – BKF will schedule and conduct monthly progress meetings via in-person or video conference call with the District staff to review project direction and redirect some elements as necessary to ensure the project's progress within the available budget and/or funding schedule. BKF will maintain a list of rolling action items with projected completion dates and will use this as a basis for monthly updates to the District's staff. BKF will send the rolling action item list via e-mail to the District staff three (3) working days prior to each progress meeting.
- Additional Meetings** – BKF will coordinate meetings with DSOS, DWR, and government agencies, as required, to process project documents for approval. Ten (10) additional meetings have been assumed for the completion of this task.

DELIVERABLES:

- Meeting Minutes
- Written summaries of telephone/email coordination as appropriate
- Monthly Progress Reports

Task 1.4 - Quality Assurance and Quality Control: BKF will prepare and submit for approval a project-specific Quality Assurance and Quality Control Plan in effect for the duration of the Scope of Services. The plan will establish a process whereby all deliverables are independently checked, corrected, and back-checked prior to any formal submission, and all job-related correspondence and memoranda are routed and received by affected persons and then appropriately filed. BKF has designated a Quality Assurance Officer for this project who will monitor and review project activities and deliverable schedules. All deliverable will contain the signature of the Quality Assurance Officer.

DELIVERABLES:

- Deliverables such as plans, specifications, reports, cost estimates, quantity calculations, etc. will be subject to signature by the Quality Assurance Officer.

Task 1.5 - Project Schedule: Upon the District's Notice to Proceed (NTP), BKF will update the project schedule for a period that does not exceed 36 months from the NTP date. BKF will prepare and update a monthly project schedule with tasks and milestones. The schedule will break down logical tasks consistent with the scope of work and with enough detail to track project progress. Both a baseline schedule and tracking updates will be provided. The schedule will reflect realistic estimates of review periods by the District and other agencies for tasks, such as reports, plans, permits, and coordination.

DELIVERABLES:

- Project Schedule with Proposal
- Updated Monthly Project Schedule

Task 1.6 - Monthly Progress Report and Invoice: BKF will establish and apply internal accounting methods and procedures acceptable to the District for documenting and monitoring contract costs. BKF will submit monthly invoices broken down in a manner consistent with the Work Plan (see below). BKF will include with the monthly invoice a progress report that reflects the work completed within the invoice period. It is understood that payments to BKF will be made in accordance with the Professional Services Agreement (PSA). Typically, BKF staff are paid prior to receiving payment from the District. BKF will provide a separate invoice for each subconsultant attached in the same format as BKF's invoice and will be included in the summary of BKF's invoice.

Invoices will include the following:

- Prepared on BKF's letterhead;
- Signed by BKF's project manager;
- Have a unique invoice number;
- Progress report that reflects the work completed within the invoice period;
- Appropriate backup documentation is to be attached to the invoice.

BKF will regularly review project budgets per task versus the percent of work completed per task to determine if there are any issues that need to be resolved, or if effective practices can be implemented to keep costs within budget. Tasks anticipated to exceed the total estimated costs will be identified and presented to the District as early as possible.

It is understood that if BKF fails to comply with the above requirements, the District will have the right to delay payment.

DELIVERABLES:

- Monthly Progress Report and Invoices

TASK 2 PROJECT SCHEDULE

BKF will prepare the Project Plans and all associated Reports, Special Provisions and Engineer's Estimates as describe in this Scope of Work within 36 months from the NTP.

TASK 3 HYDROLOGY/HYDRAULICS

Task 3.1 - Research and Review: BKF's subconsultant, Q3, will research previous studies, including the Hesperia Master Plan, and review methodology, calculations, to preserve some of the data. It is assumed that new drainage area delineations will need to be conducted using more recent available topographic data and land use data.

DELIVERABLES:

- A list of reference documents related to Bandicoot Basin will be maintained and updated. All non-copyrighted documents will be stored in PDF format to the extent practical. A copy of the reference list of the documents in PDF format will be submitted to the District.

Task 3.2 - Preliminary Hydrology: BKF's subconsultant, Q3, will calculate the pre- and post-project condition hydrology for both the current watershed land use, as well as the "ultimate" land use. Using the District's current models, from the Bandicoot Basin Study, Q3 will review, update/modify, based on the latest available land use, soils, and topographic data. The AES Software will be used to evaluate the basin inflow hydrographs for the 2-, 5-, 10-, 25-, and 100-year storms. For DSOD permit processing requirements, Q3 will prepare hydrology for the 1,000-year event. These inflow hydrographs will be the basis of design for the alternative analyses.

Hydrology will include the future Oak Hills Basins and the residential detention basin just upstream of the Bandicoot Basin (Tract 16593 Detention Basin) and the upstream Oak Hills Basins.

Task 3.3 Preliminary Hydraulics: Detailed hydraulics will be evaluated for both the upstream and downstream channel sections. For the downstream section, the evaluation will include the California Aqueduct overchute. WSPGW (or WSPG) will be used from the proposed basin outlet to just downstream of the overchute. The upstream drainage course will also be evaluated from the existing detention basin (Tract 16593) to the basin inlet. The upstream section of channel will be evaluated to understand the velocity of the various flows within the earthen channel section. Channel hydraulics for the upstream section will be performed for the 2-, 5-, 10-, 25-, and 100-year storm events.

The downstream section hydraulics will be performed to identify the existing capacity of the system. New calculations will be performed and compared to previous studies. The various design storms for the downstream channel reaches will be performed in conjunction with the evaluations of the basin alternatives. The downstream channel hydraulics assumes three (3) fully developed alternative outflows.

For the spillway, the team will evaluate the required design to accommodate the TCW flowrate. Depending on the type of spillway chosen, hydraulics will be performed with the necessary modifications for slopes over 10-percent.

Task 3.4 - Sediment Yield Analysis: BKF's subconsultant, Q3, will perform a sediment yield analysis to identify the expected sediment volumes to the basin. This evaluation assumes no upstream debris basins are in place. Using more recent available literature and data, Q3 will derive a representative basin "n" value and calculate the "representative slope". The representative slope is more accurate than the average slope and will impact the sediment yield values. Q3 will evaluate all potential methods and select the most reasonable based on the project site and watershed characteristics.

Task 3.5 - Alternatives Feasibility Analysis: BKF's subconsultant, Q3, will prepare an alternative analysis to determine the most viable project option that is acceptable to the District. Using the District's existing basin configuration as a basis, Q3 will identify up to three (3) alternative concept basin configurations. Project limits will be identified and the District's basin design guidelines will be used to establish a preliminary footprint. Alternatives could include modifying the original basin footprint, location of debris/recharge berm, and modifying the outlet structure types and locations.

A full evaluation of the 2-, 5-, 10-, 25-, and 100-year inflow hydrographs will be routed through the basin alternatives. Initial basin sizing will be performed using County approved software. Outlet rating curves will be prepared using FHWA-based software. Final basin routing calculations will be performed using AES software.

A matrix evaluation of criteria will be developed and analyzed. Included in this matrix will be hydraulic effectiveness, preliminary construction costs, groundwater recharge benefits, and estimates for environmental impacts. Plan view exhibits will be prepared (single sheet per alternative), to show the general basin grading extents, location of hydraulic structures, and debris/recharge berm.

A Preliminary Design Report (PDR) will be prepared summarizing the calculations and identifying a recommended design. This PDR will serve as the basis of design for the Final Design project.

DELIVERABLES:

- • Preliminary Design Report

Task 3.6 - Final Hydrology and Hydraulics: Upon District's selection of the preferred basin configuration, a final hydrology and hydraulic analysis of the Bandicoot Basin facility will be prepared. This engineering analysis will provide verification of the hydraulic operation for the proposed facilities and become the technical engineering basis of the final design. The final engineering analysis will include hydrologic routing of the detention basin for a range of discharges up to 100-year, including utilizing AES FloodSCx. Water surface profiles will be prepared for the proposed inlet and outlet conduits, the spillway, and open channel facilities. The final calculations will be prepared at the 65-percent and subsequent submittals. A 1000-year storm event will be evaluated for the final emergency spillway.

DELIVERABLES:

- Final Design Report
- Final Drainage Report (Signed and stamped by the Engineer of Record)
- Approval from DSOD and DWR

TASK 4 GEOTECHNICAL SERVICES

BKF's subconsultant, Ninyo & Moore (NM), has reviewed the Draft Bandicoot Basin Geotechnical Data Report dated October 2016, prepared for San Bernardino County Flood Control District and prepared by GEI Consultant. Based on the concept plan included in the Draft Geotechnical Report, NM anticipate that four (4) borings will be drilled to a depth of approximately 50 feet, one boring to a depth of 40 feet, one boring to a depth of 35 feet, three borings to a depth of 30 feet, and two borings will be drilled to a depth of 20 feet. The borings will be drilled to the indicated depths, or refusal, whichever is shallower. The boreholes will be backfilled with grout in accordance with San Bernardino County guidelines. Excess drill cuttings will be spread on-site. The soil samples will be sent to the lab to evaluate in-situ moisture content and dry density, gradation, Atterberg limits, Proctor density, direct shear strength, triaxial shear strength, consolidation/collapse potential, and soil corrosivity, as appropriate.

The data will be compiled and used to provide geotechnical recommendations on suitability of the site for the construction of the proposed detention basin and the associated structures; description of the geology and soils anticipated during construction; evaluation of the site seismicity including anticipated earthquake ground motions and appropriate 2022 California Building Code (CBC) seismic design parameters; prepare representative geologic cross sections for slope stability modeling using the SLOPE/W computer program for static empty, static full, static rapid drawdown, and pseudo-static conditions; seepage analysis for the proposed embankment dam and spillway to evaluate the potential for piping erosion and hydrostatic uplift; excavation characteristics of the on-site materials for anticipated difficult excavation and caving potential; evaluation of collapsible soils and the potential for settlement of the basin embankment slopes and structures; fill material and compaction requirements; foundation engineering for the inlet and outlet structures, culverts, channels, spillway; and evaluation of corrosion potential of on-site soils.

DELIVERABLES:

- Draft Geotechnical Evaluation Report
- Final Geotechnical Evaluation Report

TASK 5 UTILITY COORDINATION

BKF will identify public and private utilities within the project limits. BKF will prepare Utility 'A' Letters requesting record mapping, block maps, inspection reports from previous construction (installation/repair), and any prior rights they may have for their existing facilities. These letters will be formatted to be printed on District letterhead. Once responses are received from the utility agencies, their existing facilities will be documented in CADD to be used as part of the project base mapping. Utility 'B' Letters will then be prepared and delivered to utilities agencies for their confirmation of the accuracy of their facilities depicted on the plans.

BKF will develop, update, and maintain a comprehensive inventory within the project limits, and the ultimate disposition of these utilities (protect-in-place, adjust, relocate, or remove/abandon). BKF will track the correspondence/responses from the agencies in a Utility Response Matrix.

DELIVERABLES:

- Utility Matrix
- Copies of maps and record drawings from utility agencies
- Copies of correspondences/request letters with utilities agencies
- Utility Base Map

TASK 6 ENVIRONMENTAL SERVICES

BKF understands that the District has completed the CEQA, ACOE 404 permit, CDFW 401 permit, LRWQCB 401 permits. We will conduct meetings with EMD and/or regulatory agency staff during the design process and notify the District if any revisions to the permits are required to align with the final basin design.

TASK 7 ENGINEER'S ESTIMATE

BKF will compile and prepare the Cost Estimate(s) that includes shared items such as mobilization, construction signs, job site management, etc. following by individual line items for the project based on all biddable construction items identified throughout the design package and consistent with District's "Boiler Plate". The estimated quantities will include, but not be limited to, itemizing all removals, relocations, water pollution control, water diversion, demolition, basin construction (involving excavation, fill, compaction, reinforced concrete, rock slope protection, grouting, etc.), asphalt concrete (AC) paving, fencing and gates, survey monument, traffic control systems, painting of pavement symbols and signs, raised pavement markers, project signs, etc.

BKF will submit updated cost estimates at the District's request. At a minimum, cost estimate will be submitted at 35%, 65%, 95% and Final Plan completion. BKF's final construction cost estimate will be based upon, and in agreement with, the final estimate quantities. Computations showing estimated quantities and costs of work, as well as the sum totals, will be submitted to the District for review. BKF understands that submission of computations does not relieve BKF's responsibility for submitting an accurate estimate of quantities.

BKF will keep all cost estimates as confidential documents which may only be disclosed to the District's Project Manager. All cost estimate submittals will be watermarked "Confidential". BKF will only disclose the cost estimate to design team staff on a need-to-know basis.

DELIVERABLES:

- Quantity Breakdown for Bidding and Engineer's Cost Estimate

TASK 8 RIGHT OF WAY

BKF understands that the District will provide all necessary project-related right-of-way base maps for the design plan. The District will provide PDF files of all Recorded Documents which include the Legal Descriptions and Deed plats of all properties owned by the District or properties in which the District has Easements along with any other right-of-way file which contains the exact location and boundary of all existing rights-of-way and other easements. The District will also provide any notes giving the exact document and/or map from which this information was gathered.

BKF will perform, and provide an Autodesk Civil 3D right of way base drawing for the project to be verified by the District's Right of Way section. The right of way base CADD drawing will contain a specific and separate layer identifying the exact location and boundary of all existing rights-of-way, offers of dedications, and utility and other easements, along with a note providing the exact document and/or map from which this information was gathered.

BKF will also add to the CADD right of way base drawing all proposed rights-of-way, temporary construction easements (TCEs) and permits to enter and construct (PEC).

BKF will submit the right of way base map to the District at 35%, 65%, 95% and final review submittal. Upon District's final approval, BKF will submit the requisite applications top DWR for a construction encroachment permit.

DELIVERABLES:

- DWR Encroachment Permit approval (if needed)

TASK 9 TRAFFIC

A Traffic Control Plan for the intersection of Bandicoot Trail and Cedar Street will be prepared to isolate the construction zone from the existing traffic. The Traffic Control Plans will utilize accepted methods of signage and barricading. Specific work areas will be protected from traffic based on the construction phase, type of work and construction equipment required within the work area. The plans will be designed to maximize lane usage for all traffic movements, minimize impacts to existing driveways, and provide a workable area. If needed, plans will also include signage and striping for the construction zone. The Traffic Control Plans will be prepared based on the requirements set forth in the 2014 California Manual on Uniform Traffic Devices (MUTCD), San Bernardino Public Works Traffic Division, and the City of Hesperia as appropriate.

Currently, the export site for excavated dirt from the basin is not known. Ince an export site has been identified, a scope for a haul route and further traffic control and detour plans can be prepared. Traffic Control for these plans will follow guidelines established above.

It is anticipated that there will be one (1) stage of construction to complete the work as follows:

Stage 1 – Barricade and close public access at the intersection of Cedar Street and Bandicoot Trail. Access will be restricted to construction activities.

Traffic Signing and Striping plans and Traffic Control Devices will be tabled to coincide with pavement rehabilitation efforts.

DELIVERABLES:

- Traffic Control Plan including Signing, Striping Plans, and Detour Plan
- Road Closure Schedule (If applicable)

TASK 10 SURVEYING

BKF understands that the District will provide survey data from Towill In August 2012 in Terramodel Format and Aerotech in October 2010 in CAD format. BKF will formally submit all surveying needs to the County's Surveyor Office in written form. BKF understands that the survey request can be requested and expected to be completed shall be limited to what can be reasonably accomplished by two 2-men crew daily. The anticipated timeline of approximately 45 days for completion by the county surveying division.

TASK 11 PAVEMENT DESIGN

BKF understands that the District will provide the Pavement Design Report and Traffic Index as required for the pavement structural sections, if applicable. BKF will review and coordinate with the District staff on the pavement design.

TASK 12 STRUCTURAL DESIGN ENGINEERING SERVICES

BKF will perform the structural design of the following reinforced concrete structures and any other structures as required for the basin. These items are further detailed below:

- Basin inlet and outlet structures including rectangular channel and trapezoidal transitions (including subdrain system as required)
- Connection to DWR Aqueduct overchute
- Subdrain system, if required, for trapezoidal concrete transition
- Concrete spillway with subdrain system
- Box culverts designed for minimum H20-44 highway loading, including parapets
- Headwalls and wingwalls at the upstream and downstream ends of the project
- Special provisions and estimates
- Review submittal

This task includes design of retaining walls, headwalls, wingwalls and L-walls, if used, for stability (sliding, overturning); structural analysis including all applicable loading conditions; structural design of structures which will have dimensions to accomplish the hydraulic, retaining and other functions of the structures shown on the civil plans; structural calculations; determination of hydrostatic uplift forces and design of subdrain systems and/or other means of relieving uplift forces to provide economical structures which resist uplift forces and prevent flotation; structural drawing sheets expressing the structural designs, including tables and sections showing concrete thicknesses, reinforcements, etc.; details of connections between structural elements (i.e., connection between channels and culverts and headwalls, connection between precast and cast-in-place culverts, etc.; detailing of design including channel construction and expansion joints, chamfers, cut off walls, etc.; drawing of subdrain system.

The drawings will be prepared and submitted using Autodesk Civil 3D software. Additional related tasks include preparation of Special Provisions for the reinforced concrete structures, and the items of work are more particularly described as follows:

- a. Basin inlet and outlet rectangular open channels – The rectangular open channels, including at reaches with transition widths and/or heights, will be designed in accordance with the Los Angeles County Flood Control District Structural Design Manual, including all loading cases. The lateral loading imposed by any adjacent roads will be determined and included in the design loads.

Structural analyses will use a 28-day compressive strength of the invert concrete of 5,000 psi.

Consideration will be given to use of accelerating admixtures to reduce time required before loads may be applied.

A subdrain system or other drainage methods will be designed to provide for an economical rectangular channel design.

- b. Subdrain system for trapezoidal channel - Based on groundwater information available from DWR, the depth to groundwater is more than 400 feet below the ground surface in the project vicinity. BKF will evaluate the groundwater condition based on the NM's findings and design an adequate subdrain system for the channel to alleviate hydrostatic uplift.
- c. Basin access ramps – The basin features access ramps and access roads to access around the basin and to the basin bottom. If it is determined that concrete paved access ramps and access roads are desired, they will be designed for the H20-44 loading. The ramps may be designed similarly to a rectangular channel, or with a separate retaining wall and concrete ramp pavement.
- d. Box culvert designed for highway loading – The basin features box culvert which will be designed for H20-44 highway loading. The culverts may be cast-in-place or precast on-site or off-site. Structural design of cast-in-place or precast culverts will be done by BKF. The stresses induced during lifting will be included in the structural design of pre-cast culverts. Consideration will be given to the weight of each length of pre-cast culvert. The culvert will be placed in an open trench.
- e. The reinforced concrete box culverts will be designed in accordance with the Los Angeles County Flood Control District Structural Design Manual, including all loading cases.
- f. Structural analyses will use a 28-day compressive strength of the invert concrete of 5,000 psi.
- g. Consideration will be given for the use of accelerating admixtures to reduce time required before loads may be applied.
- h. Headwalls and wingwalls – The basin features wingwalls, headwalls and cutoff walls at the downstream end of the concrete channel and inlet/outlet locations. BKF will provide details of these structures in accordance with the 2023 Caltrans Standard Plan D84 or latest edition. BKF will verify the adequacy and applicability of the indicated wingwalls, headwalls standards and provide a structural design for the cutoff wall at the downstream of these structures along with connection details. IF BKF does not deem the reference standard adequate and applicable, we will provide a structural design for the wingwalls and headwalls.
- i. BKF will prepare sections of the Project Special Provisions for the reinforced concrete structures. The Special provisions will reference the latest version of Caltrans Standard Specifications and Standard Plans. BKF will prepare a preliminary and final quantity and cost estimate.

DELIVERABLES:

- Structural analysis and preliminary structural design calculations and sketches
- Develop recommended optimum configuration with supporting calculations and sketches
- Final design calculations and sketches
- Structural drawings, including details, Special Provisions, and Estimates

TASK 13 SPECIAL PROVISIONS

BKF will prepare the Special Provisions for the ultimate condition of the Bandicoot Basin Construction Project. The Special Provisions will reference the latest version of the Caltrans Standard Specifications and Standard Plans, and Standard Plans for Public Work Construction (SPPWC). All Caltrans Standard Drawings will be the 2023 edition or later with the latest revisions. BKF will prepare a preliminary and final quantity and cost estimate.

BKF will utilize and incorporate the District's "Boiler Plate" documents, including the Notice-to Bidders, proposal, bond forms, insurance requirements, and agreement into the Special Provisions.

The Special Provisions will include all sections covering specifications for the project-related construction items as well as utilities, standard plates, Project special drawings, and regulatory permits.

BKF will submit updated Special Provisions at the District's request for review. At a minimum, the Special Provisions will be submitted following the progress of the Basin Design Plan at 65%, 95% and Final Plan completion.

DELIVERABLES:

- Draft and Final Special Provisions

TASK 14 BASIN DESIGN

Task 14.1 - 35%-Level Plans: BKF will prepare 35%-level plans in accordance with District submittal requirements. The plans will include, but will not be limited to showing basin grading, locations of inlet and outlet structures, headwalls, wingwalls, rock slope protections, access roads, access ramps, and basin spillway. It is anticipated that the 35%-level plans set and submittal package will consist of:

- Title Sheet
- Detention basin grading plan
- Plan and Profile sheets
- Detail sheet with schematic design for major inlets and system outlet
- Right-of-way/easement areas identified
- Preliminary Design Technical Memorandum (Task 3.5)
- Draft geotechnical evaluation report
- Preliminary Cost Estimate
- Project Schedule
- Estimate area of impact within Waters of the State and Waters of the United States to determine if a necessary update is required for the Environmental permits
- Electronic copy of all submittal items in their original format and in PDF format

DELIVERABLES:

- One (1) set of full-sized plans
- Preliminary Design Report (see Task 3.5)
- Draft geotechnical evaluation report
- Preliminary cost estimate
- Preliminary quantity calculations
- Project schedule

Task 14.2 - 65%-Level Plans: BKF will prepare 65%-level plans in accordance with District submittal requirements. The plans will include, but will not be limited to showing basin grading, locations of inlet and outlet structures, headwalls, wingwalls, rock slope protections, access roads, access ramps, and basin spillway. It is anticipated that the 65%-level plans set and submittal package will consist of:

- Title Sheet
- General Notes/Typical Section Sheet
- Geotechnical Boring Logs
- Detention basin grading plan
- Detention basin cross-sections
- Plan and Profile sheets with more refined than 35% submittal
- Rectangular Channel detail sheets (no steel reinforcement schedules)
- Detail sheet with schematic design for major inlets and system outlet
- Detention basin miscellaneous detail sheets (no steel reinforcement schedules)
- Additional Right-of-way acquisition (if any)
- Final Design Technical Memorandum (Task 3.5)
- Final Drainage Report
- Final geotechnical evaluation report
- Revised Cost Estimate
- Revised Project Schedule
- List of contract bid items
- Revised list of anticipated construction equipment with estimated hours of use to determine if a necessary update is required for the Environmental permits
- Revised Estimate area of impact within Waters of the State and Waters of the United States to determine if a necessary update is required for the Environmental permits
- Electronic copy of all submittal items in their original format and in PDF format

DELIVERABLES:

- One (1) set of full-sized plans
- Final Design Report (see Task 3.6)
- Final Drainage Report (see Task 3.6)
- Final geotechnical evaluation report
- 65%-level cost estimate
- 65%-level quantity calculations
- Project schedule
- Draft Specifications

Task 14.3 - 95%-Level Plans: BKF will prepare 95%-level plans in accordance with District submittal requirements. The plans will include, but will not be limited to showing basin grading, locations of inlet and outlet structures, headwalls, wingwalls, rock slope protections, access roads, access ramps, and basin spillway. It is anticipated that the 95%-level plans set and submittal package will consist of:

- Complete plans, special provisions, and estimates
- Backup quantity calculations
- Backup structural calculations
- DSOD and DWR approval
- Electronic copy of all submittal items in their original format and in PDF format

DELIVERABLES:

- One (1) set of full-sized plans
- Specifications and Special Provisions
- Cost Estimate
- Quantity calculations
- • Structural calculations
- • Project schedule

Task 14.4 - 100%-Level Plans: BKF will prepare final plans in accordance with District submittal requirements. It is anticipated that the final plans set and submittal package will consist of:

- Final plans, special provisions, and estimates (included signed mylars)
- Notes to Resident Engineer
- Final backup quantity calculations
- Final backup structural calculations
- Final DSOD and DWR approval
- SWPPP
- Electronic copy of all submittal items in their original format and in PDF format

DELIVERABLES:

- One (1) set of full-sized plans
- Specifications and Special Provisions
- Cost Estimate
- Quantity calculations
- Structural calculations
- SWPPP
- Project schedule

Task 14.5 - Dam Inundation Study/Emergency Action Plan: A dam inundation study will be prepared for the project site. Work will include a full breach analysis, hydraulic mapping of the downstream areas susceptible to flooding, and preparing an Emergency Action Plan (EAP). It is assumed that available topography will be used for the area downstream of the dam for hydraulic modeling and mapping.

DELIVERABLES:

- Dam Inundation Study with flood mapping
- EAP