

PART I

SECTION III – PROJECT INFORMATION

16. PROJECT DESCRIPTION:

E. *Scope of Work: Describe the full Scope of Work (SOW) of the project in detail:*

- i. *Describe the existing environmental setting, adjacent land uses, and history of the site. Describe the visibility of the project from the surrounding area, considering highways, residences, commercial developments and recreation areas.*

The Proposed Project area is located at the northwestern boundary of Madera County, bordering Fresno and Merced Counties. To the West is the San Joaquin River. The project area is east of Road 9 and north of Avenue 12 in what is referred to as the Red Top Area. Adjacent land uses include farms, dairies, rural housing, irrigation canals and operation and maintenance of irrigation facilities. The project site(s) are not visible from major highways, residences, commercial developments or recreation areas. CEQA/NEPA documents will be prepared during the Environmental Planning and Permitting phase. Encroachment permits have been submitted for 6 of the turnouts along the Eastside Bypass to the Flood Protection Board. The remaining will be submitted as the projects proceed. Encroachment permits and license agreements may be needed with the County for placing a pipeline along Road 4 and along the Road 4 Bridge over the Eastside Bypass. The following is a list of permits that will likely be required for the project:

- *U.S. Army Corp of Engineers 404 Permit*
- *Regional Water Quality Control Board 401 Permit*
- *California Department of Fish and Wildlife Streambed Alteration Agreement*
- *SJVAPCD Dust Control Permit*
- *SWPPP*

- ii. *Describe any land acquisition activities, and/or right-of-way or access easements that need to be obtained.*

The proposed project components will be installed on land owned by CCID, TTWD and various landowners in the Red Top Area. Agreements will be developed between the Districts and landowners during the Environmental Planning and Permitting phase of the schedule.

- iii. *If structural, discuss how the structure/building/facility will be constructed or retrofitted. Include building or structure dimensions, material types, depth and width of excavations, volume of materials excavated, type of equipment to be used, staging and parking areas, and any phasing of the project. If any tunneling is proposed, describe the method and any temporary trenches or pits.*

Construction – Construction will consist of site work and the furnishing material and labor to install all project components listed. Project components are listed as they are shown in the cost estimate. Only construction components are described below. See Attachment 3 – Project Plans for additional details of construction information and specific dimensions for the components of the project.

Item H. Clearing and Grubbing: Work in this task will include all labor and equipment to clear and grub the project area as needed to perform all other tasks at the project area, and any clearing and grubbing necessary to haul and dispose of unsuitable material that was cleared and grubbed to an approved disposal site selected. Ground disturbance will occur with all project components with the possible exception of retrofits or improvements that may be designed for existing structures. Total ground disturbance for this project is approximately 310 acres with an average depth of 1 foot.

Item I. Site Demolition and Irrigation Pipeline Protection: Work in this task includes all labor, equipment and tools to perform demolition as described in the 30% design plans.

Item J. Earthwork - Pond Excavation, Construction of Pond Levees, Proposed Ditch, Modifications to Existing Ditch: Work in this task includes all labor, equipment and tools to construct the ponds and the canal as described in the 30% design plans. This item includes the construction of multiple recharge basins located throughout the project area, covering approximately 300 acres.

Item K. Construct Levee Keyway: Work in this task includes all labor, equipment and tools to construct the levee keyway as described in the 30% design plans. Construction will include earthwork to build levee keyways consisting of approximately 6,000 cubic yards of material that will be specified in a future site geotechnical report. Keyway construction will include preparation of the subgrade including over-excavation, excavation of unsuitable materials, scarification, backfill, moisture conditioning, and compaction.

Item L. Furnish and Install Precast Concrete Structures - Inlet Structures at Ponds: Work in this task includes all material, labor, equipment and tools to construct the structures as described in the 30% design plans. Inlet structures are 3' wide x 4' tall. Construction will include all associated earthwork, site grading, excavation, and compaction.

Item M. Furnish and Install precast 4x4 Box Culvert with Concrete Headwall and Tail Wall: Work in this task includes all material, labor, equipment and tools to furnish and install the precast structures and the described in the 30% design plans. Culvert include a 4'x4' head gate, 120 lineal feet of 4'x4' precast concrete culvert with a concrete headwall approximately 7 feet tall by 6 feet wide.

Item N. Roadway Crossing - 48 inch CMP, Replace Roadway - Open Cut: Work in this task includes all material, labor, equipment and tools to install the crossing as described in the 30% design plans. Construction will include furnishing and installing 360 lineal feet (3 parallel pipes) of 48-inch diameter CMP and replacing the structural section of roadway that was open cut. Pipes will have minimum cover of at least 3 feet.

Item O. Furnish and Install 2 Flow Meters at Grover Junction: Work in this task includes all material, labor, equipment and tools to install the flow meters as described in the 30% design plans. Flow meters will be Stevenson Type Recorders.

Item P. Furnish and Install Concrete Measuring Station: Work in this task includes all material, labor, equipment and tools to install the measuring station as described in the 30% design plans. Concrete measuring station will be approximately 40 feet long have a bottom width of 2 feet, a height of 7 feet, and side slopes of 1.5 horizontal to 1 vertical.

Item Q. Furnish and Install Slant Pumps Work in this task includes all material, labor, equipment and tools to install the slant pumps as described in the 30% design plans. There are a total of 12 slant pumps proposed. Horsepower for each pump ranges from 30-100 hp motors with column lengths ranging from 15 to 20 feet long. The concrete slab on the interior of the channel is approximately 40 feet wide.

Item R. Furnish and Install 27-inch pipeline DR-51 (80 psi): Work in this task includes all material, labor, equipment and tools to install the pipeline as described in the 30% design plans. Construction will include furnishing and installing 21,273 lineal feet of 27-inch PVC DR-51 pipeline.

Item S. Furnish and Install Bridge Crossing at Road 4: Work in this task includes all material, labor, equipment and tools to install the pipe crossing attached to bridge as described in the 30% design plans. Construction will include attaching two 18-inch pipes along either side of the approximately 500-foot-long bridge on Road 4.

Item T. Remove and Replace Turnout-Ash Slough Work in this task includes all material, labor, equipment and tools to turnout as described in the 30% design plans.

Item U. Furnish and Install booster pump, motor, flowmeter and concrete pad (flow=20 cfs) Work in this task includes all material, labor, equipment and tools to install the lift pump, motor, flowmeter and concrete pad as described in the 30% design plans.

Item V. Construct Production Wells: Work in this task includes all material, labor, equipment and tools to construct production wells as described in the 30% design plans. Thirteen new production wells will be constructed for this project.

Item W. Furnish and Install Weir Check Structures for ponds: Work in this task includes all material, labor, equipment and tools to construct install weirs as described in the 30% design plans. This work includes labor and the estimated amount of material is based on the cubic yards of concrete build the structure, other work with is not know at this time.

Item X. Electric connection to Wells: Work in this task includes all material, labor, equipment and tools to connect service to wells as described in the 30% design plans.

Item Y. Remove and Replace Chowchilla WD Turnout, install flow meter: Work in this task includes all material, labor, equipment and tools to replace turnout as described in the 30% design plans. This work includes labor and the estimated amount of material is based on the cubic yards of concrete build the structure, other work with is not know at this time.

Item Z. Furnish and Install 18-inch pipeline DR-25 (80 psi): Work in this task includes all material, labor, equipment and tools to install the pipeline as described in the 30% design plans. Construction will include furnishing and installing 7,756 lineal feet of 18-inch PVC DR-25 pipeline.

Temporary disturbance will be approximately 396 acres. The permanent disturbance area will be approximately 310 acres. A map of potential effected area is included as Sheet 3 of the plans. Excavated material will be used so no material is expected to be removed off site, the levees for the ponds will be constructed using the cut and fill balance method for earthwork. Materials excavated to place pipelines will be replaced and compacted. It is anticipated that all excavated

material can be utilized on site. The total gross value for excavated material is approximately 345,000 cubic yards, of this quantity it is anticipated that all material can be utilized on site.

- iv. *Describe any demolition activities that need to occur prior to construction or retrofitting*

Demolition will consist of the removal of components that will be rehabilitated such as the Road 9 where the crossing will be installed.

- v. *Describe any waste resulting from demolition or construction. Identify by type (e.g. construction debris, dirt or sediment, domestic garbage, hazardous materials, etc.), amount of each type, and disposal methods.*

Construction debris generated by the project would include materials such as asphalt and gravel from Road 9 that would be removed to install additional culverts, soil material from excavation, and vegetative material from plants and trees that would be removed. Construction debris and vegetation debris would be disposed of in roll off dumpsters and picked up by the local licensed transfer station (name).

- vi. *If topsoil is salvaged for use after construction, describe how and where it will be collected and stored. Identify any Best Management Practices implemented to control wind or water erosion.*

Soils that are left onsite for use will be stored in accordance to SWPPP BMPs and allowable holding times and DCP requirements. Containment will ensure that soil cannot migrate via stormwater runoff or aerial deposition.

- vii. *Describe any engineered fill or compaction activities or requirements. If soil or dirt will be removed from the site, provide estimated volume, method of removal and where material will be relocated.*

Soils that are left onsite for use will be stored in accordance to SWPPP BMPs and allowable holding times and DCP requirements. Containment will ensure that soil cannot migrate via stormwater runoff or aerial deposition.

- viii. *Describe any water usage and its source. If ground water will be intercepted during construction describe how it will be captured, stored and recycled.*

Diverting Water – Diverting flow may be necessary if construction occurs during the wet season. If construction is required while conveyance structures are flowing, flow will be required to be diverted around project area. Aqua dams or other BMP will be put into place, depending on flow rates, and flow will be rerouted or pumped around site to maintain flow. Diversion methods will be detailed in Plans, Specs, and SWPPP documents.

Dewatering – Dewatering in locating near rivers and other water conveyance structures may be required during construction. Water will be pumped out of the excavation pits onto a location determined during the SWPPP process. Water and silt will be contained using best management practices, also identified in SWPPP documents, such as wattles and earthen berms. Water will be allowed to percolate into the ground.

Water Use – Depending on the season and availability, this project may use a combination of surface water and groundwater for compaction and dust control, among other needs. Water will be accessed through onsite drop pipes to prevent water source contamination. The site will be prepared in accordance with the requirements of the SWPPP to prevent runoff and migration of soils and debris.

- ix. *If re-vegetation is planned, describe plant species and/or seed mix to be used, rate of seed application or spacing of plants, planting methods and time of year for planting, and irrigation system.*

Construction of some project components will require temporary disturbance by the clearing of riparian vegetation. After construction is completed, the disturbed area will be graded back to the original contour and will be reseeded with a qualified biologist's approved seed mixture of native plants.

- x. *Provide a vicinity map sheet identifying the project location and staging area in relation to the surrounding area and community.*

Staging sites for construction activities will be outlined in Final Design and SWPPP documents. Due to the seasonal changes in land use staging areas may be relocated. Construction materials and equipment will be stored onsite in a secured area. Staging areas will be fenced and gated to prevent damage or theft. The general staging areas are shown in Attachment 3 – Project Plans.

See Attachment 2 – Overall Project Map and Sheet 1 from Attachment 3 – Project Plans for project vicinity.

18. HAZARD AND RISK ANALYSIS:

1. *History: Describe the hazards and risks to life, safety and improved property in the project area for at least the last 25 years.*

Flooding in the State of California has been well documented since the mid to late 1800s. Historic flooding in the Central Valley has also been well documented. Flood infrastructure along the San Joaquin River was developed to protect communities within the flood plains during times of high flow. The Cities of Firebaugh, Mendota, Dos Palos, El Nido, and Newman, along with homes and lands surrounding these communities continue to be affected by flooding during years of above average precipitation even with the current infrastructure in place.

Flood as a hazard is highly dangerous. It has contributed to many deaths and major losses of property and infrastructure. Although flood mitigation measures have been implemented, deteriorating infrastructure and subsidence limit the current effectiveness of flood protection.

History: The Table below excerpts selected flood events that occurred in the Planning Area. Regional financial impacts are difficult to estimate from historic records. However, total economic impacts and loss of life are significant.

Hazard Mitigation Grant Program DR-4308

MARPRO Red Top Joint Banking

Attachment 1 - Subapplication Responses

Flood Events in the Planning Area		
Year	Financial Impact	Effects/Loss
December 1955 – January 1956 Christmas Flood	\$200 Million	Regional Flooding - Slow rise, structure failure including levee breaches.
April – July 1958	\$24 Million	Regionwide Flooding – Slow rise, stormwater, and structure failure, damage to building and lands
December 1964 – January 1965		Regionwide Flooding – Slow rise with substantial damages
April – July 1967		Stanislaus, San Joaquin, and Fresno River Flooding – Slow rise and structure failure including levee seepage and damage to agricultural, commercial, residential, and public facilities
December 1968 – February 1969		Regionwide Flooding – Slow rise
1980		Regionwide Flooding – Slow rise and structure failure that caused significant health and safety issues and flooded homes and agricultural properties
December 1982 – March 1983	\$524 Million Total – \$151 Public, \$159 Million Private, \$214 Agricultural	Regionwide – Slow rise and stormwater flooding caused Orestimba, Crow, Salado, and Del Puerto creeks to top their banks and flood small communities
February 1986 St Valentine's Day Storm		Regionwide Flooding – Slow rise, debris flow, and structure failure caused flash floods and damages to roads and other structures.
January – April 1995	\$741.4 M Total – Public-\$299.6 M; individual-\$128.4 M; businesses- \$58.4 M; highways-\$158 M; agricultural-\$97 M; Damage to homes: major-1,883; minor-4, 179; destroyed-370.	Regionwide Flooding – Slow rise, stormwater, and debris flow causing widespread small stream flooding
January 1998		Regionwide Flooding – Slow rise and structure failure including several levee breaches and flood control structures and bypasses caused the flooding of agricultural lands.
December 2005- January 2006		Regionwide Flooding – Flash floods and slow rise flooding inundated the area.
January – February 2017		Regionwide Flooding – Slow rise, structure failure and losses to personal and municipal property prompted both state and federal emergency disaster declarations.

Permanent subsidence occurs when groundwater (or other fluid) is removed from an underlying aquifer causing a reduction in fluid pressure in the clay layers in the geological materials below the ground surface. The clay layers act as confining layers, separating aquifers into zones or distinctive aquifers. The reduction in fluid pressure causes deformation of these confining clay layers. Continued drainage of the aquifer can eventually cause permanent deformation due to compaction of the empty pore space. Compaction of the clay layer results in the decrease of ground surface elevation. A portion of the Planning Area is without sufficient surface water supplies which results in reliance on groundwater.

Inelastic land subsidence is irreversible. The impacts to the aquifer system are just starting to be realized and the potential to have dramatic and lasting effects is certain without immediate mitigation. The function and characteristics of the deep aquifer below the Central Valley is threatened by the effects of subsidence. However, the upper aquifer can be pumped without causing subsidence and will have minimal effect on groundwater resources if managed properly.

Subsidence has damaged many of the open channels within the conveyance systems in the Central Valley. This damage decreases the conveyance capacity of flood systems, irrigation channels and natural streams and rivers, which inversely affects flood potential. Subsidence increases loss of freeboard, contributing to diminished effectiveness of levees. Elevation changes in ground surface causes damage to roads, bridges, building foundations, pads, and footings, pipelines, and other surface and subsurface infrastructure. Damaged pipelines and sewer mains can cause soil and groundwater contamination.

According to the Upper San Joaquin Regional Flood Management Plan, subsidence in some parts of the Central Valley is occurring at a rate of 0.75 foot per year (9 inches). The results of subsidence have impacted the existing flood protections such as the Chowchilla and Eastside Bypass channels, decreasing their capacity by at least 25% (4,000 cfs). This impact to flood operations increases the potential loss of life and property as discussed in the previous flood hazards section. Recent surveying campaigns by the Department of Water Resources (DWR) and USBR indicate that subsidence continues at about 0.15 m/yr (0.5 ft/yr) near the Sack Dam and 0.27 m/yr (0.9 ft/yr) near the Eastside Bypass (Gerald Davis, USBR, written commun., December 6, 2013).

Subsidence in the Central Valley related to groundwater withdrawal began in the mid-1920s. The rate of subsidence increased after World War II as development increased expanding agriculture and population. Additional groundwater was needed to supply water for irrigation to areas without a permanent surface water supply. Subsidence rates exceeded 1 foot per year in some locations within Merced and Madera Counties. In 1955, about one-fourth of all groundwater extracted for irrigation in the United States was pumped from the San Joaquin Valley (Galloway and Riley, 1999). In 1970 more than half of the San Joaquin Valley had subsided at least 1 foot while areas to the southwest of the Mendota were experiencing up to 28 feet of subsidence (Poland et al., 1975). Caltrans surveys indicate that as much as 9 feet of subsidence occurred between the 1960s and 2004 along Highway 152. Currently, subsidence is occurring in the mid-valley near the San Joaquin River Restoration Program and surrounding areas (Luforff Scal).

A drought is a period of below-average precipitation in a given region, resulting in prolonged shortages in its water supply. Drought is a growing concern due to California's large population and economy. It is affected disproportionately by long term water shortage. Extended drought eventually depletes both surface and groundwater supplies, forcing cities to enact drastic water

conservation measures and restrictions on all aspects of water use. This can further impact environmental health and safety as water is available for only basic needs, while increasing fire danger and causing wells to go dry or become non-potable. Socioeconomic impacts of drought may not be as obvious as flooding issues. However, drought effects water supplies for urban and rural communities as well as agricultural. Costs for many goods and services increase, unemployment increases due to loss of farming jobs and associated support services and quality of life decreases because of the cumulative effects. The following list is an account of historical periods of drought.

- 1841; The drought was so bad that "a dry Sonoma was declared entirely unsuitable for agriculture
- 1864; This drought was preceded by the torrential floods of 1861-1862.
- 1924; This drought prompted farmers to develop more reliable irrigation methods due to inconsistency of surface water supplies.
- 1929–1934; This drought occurred during the infamous Dust Bowl period. The Central Valley Project was initiated in response to drought.
- 1950s; The 1950s-drought prompted the creation of the State Water Project.
- 1976–77; 1977 had been the driest year in state history.
- 1986–1992; California endured one of its longest droughts ever observed from late 1986 through early 1992. Much of the United States also suffered from severe drought during this period. The six-year drought ended in 1992. Hundreds of thousands of acres of irrigated crop lands suffered or were lost due to drought during that period.
- 2007–2009; The drought of 2007–2009 triggered conservation efforts in the form of reduced water diversions from the state water project.
- 2012–2015; The most recent drought caused emergency water restrictions and conservation efforts. 2013 became the record year for the lowest annual amount of rainfall in many Central Valley locations, resulting in the deepest groundwater levels ever seen in portions of the Central Valley.

Groundwater overdraft is the depletion of an aquifer due to groundwater pumping that cannot be replenished by natural or managed recharge of surface water or precipitation. This results in lowering of the water table and the need for deeper wells and stronger pumps. Overdraft is sometimes an unseen result of drought until the point in which access to or quality of water is compromised. The actual lasting impact of drought on groundwater overdraft is difficult to measure because groundwater pumping and overdraft is also a result of increased land development and changes in land use. Groundwater levels change seasonally and can be affected by groundwater pumping, surface water availability and potentially, subsidence. Groundwater levels in the deep aquifer declined by up to 50 feet in the Planning Area from 2007-2017 according to the Groundwater Information Center Interactive Map Application shown in CCID's Multi-Jurisdictional Hazard Mitigation Plan.

It is also important to note that the direction of groundwater flow has been altered because of overdraft. Groundwater that once flowed away from natural streams and rivers, following the topography of the land, now flows towards locations experiencing the most significant groundwater overdraft. Streams and rivers that received groundwater are termed gaining and those that gave water to the aquifer are losing. Groundwater overdraft can alter the connectivity of the water table to the streams and rivers.

Climate change is the long-term fluctuations in weather patterns. The effects of climate change are not immediate, and the impacts may increase slowly over time. Gradual changes resulting from climate change may be undetectable without reference to long term historic records. The most notable effects of climate change are precipitation and temperature.

Alterations in precipitation and temperature extremes will result in extended droughts and flood periods of increased magnitude. This equates to longer, hotter, drier periods followed by storms that produce more precipitation for extended periods, more frequently. Extreme storms are often the result of the atmospheric rivers, which push warm, moist air from the tropics to California.

Climate change is also projected to affect the availability of surface water to be used for irrigation and to shorten the length of time surface water is available due to changes in freeze thaw regimes. As temperatures increase, freshwater storage in the form of snow will decrease. The Sierra Nevada is the largest freshwater reservoir in California, slowly releasing snowmelt as freshwater. Precipitation, which typically occurs in the winter and spring months, will have a shorter retention and higher flow rates.

In short, precipitation historically fell as snow, which gradually melted during the April-May spring thaw. The effects of rising temperatures will decrease the amount of precipitation that falls as snow during the wet season (Nov-April). Runoff peaks will occur sooner in the year and have shorter durations. This will limit the amount of runoff during the summer when water demand is at its greatest. Additionally, flow rates will be much higher than pre-climate change rates increasing the risk of flood.

SECTION V – COST ESTIMATE

COST ESTIMATE NARRATIVE:

The methodology used to define each item is listed below per line item. Previous projects, direct contact with manufacturer's, direct contact with construction companies, the Caltrans Contract Cost Data Book and sound engineering was used to estimate each cost identified below. Hourly wages were used from the Provost & Pritchard 2018 fee schedule. See all back up information for each item in Attachment 8 – Cost Estimate Support Documentation, if there is no back up for a specific item it is due to the item being a specialty of the project, and the cost was estimated using sound engineering judgement.

A phased approach would be used to complete the project. Phase 1 would consist of Items A through F and Items AA and BB including preliminary meetings, site visits, environmental compliance, permitting, site acquisition, surveys, design, project management and all preaward costs. Phase 2 would consist of bidding and all construction activities, Items G through Z.

Item A. Phase 1 – Preliminary Meetings: Work in this item includes kick off meetings with the team. Meetings with the design team to set and schedule work. Cost was estimated using prior projects and the Provost & Pritchard fee schedule for the hourly rate.

Item B. Phase 1 – Site Review: Work in this item includes site meetings with the team. Meetings with the design team to set and schedule work. Cost was estimated using prior projects and the Provost & Pritchard fee schedule for the hourly rate.

Item C. Phase 1 – Environmental Compliance: Work in this item includes all surveys to acquire approval from the permitting agencies as well as compliance with State and Federal Law. Cost was estimated using previous constructed projects, contractor proposals similar to this project.

Item D. Phase 1 – Printing: Cost was estimated using prior projects an estimation of prints needed.

Item E. Phase 1 – Topographic Surveys: Work in this item will include all labor and equipment to perform a topographic survey to prepare a base map from which engineering plans can be generated. Cost was estimated using prior projects and the Provost & Pritchard fee schedule for the hourly rate.

Item F. Phase 1 – Design-Preparation of Plans, Specifications and Estimate: Work in this task will include the calculations, design and preparation of plans, specifications and estimate to properly bid the project. The cost was estimated using prior projects and the Provost & Pritchard fee schedule for the hourly rate for similar projects.

Item G. Phase 2 – Construction Supervision: Work in this task will include construction oversight during construction, to provide quality control. Cost was estimated using prior projects and the Provost & Pritchard fee schedule for the hourly rate.

Item H. Phase 2 – Clearing and Grubbing: Work in this task will include all labor and equipment to clear and grub the project area for construction of proposed project. Cost was estimated using prior projects and an evaluation of the project and the surrounding lands.

Item I. Phase 2 – Site Demolition and Irrigation Pipeline Protection: Work in this task includes all labor, equipment and tools to perform demolition as described in the 30% design plans. Cost was estimated using prior projects and an evaluation of the project and the surrounding lands.

Item J. Phase 2 – Earthwork-Pond Excavation, Construct Canal: Work in this task includes all labor, equipment and tools to construct the ponds and the canal as described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book.

Item K. Phase 2 – Construct Levee Keyway: Work in this task includes all labor, equipment and tools to construct the levee keyway as described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book.

Item L. Phase 2 – Furnish and Install precast concrete structures-inlet structures at ponds: Work in this task includes all material, labor, equipment and tools to construct the structures as described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book.

Item M. Phase 2 – Furnish and Install precast 4x4 Box Culvert with concrete headwall and tail wall: Work in this task includes all material, labor, equipment and tools to furnish and install the precast structures and the described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book for costs for concrete in cubic yardage.

Item N. Phase 2 – Roadway crossing 48-inch CMP, Replace roadway-open cut: Work in this task includes all material, labor, equipment and tools to install the crossing as described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book.

Item O. Phase 2 – Furnish and Install 2 flow meters at Grover Junction: Work in this task includes all material, labor, equipment and tools to install the flow meters as described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book.

Item P. Phase 2 – Furnish and Install Concrete measuring station: Work in this task includes all material, labor, equipment and tools to install the measuring station as described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book.

Item Q. Phase 2 – Furnish and Install Slant Pumps Work in this task includes all material, labor, equipment and tools to install the slant pumps as described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book

Item R. Phase 2 – Furnish and Install 27-inch pipeline DR-51 (80 psi): Work in this task includes all material, labor, equipment and tools to install the pipeline as described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book.

Item S. Phase 2 – Furnish and Install Bridge Crossing at Road 4: Work in this task includes all material, labor, equipment and tools to install the pipe crossing attached to bridge as described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book.

Item T. Phase 2 – Remove and Replace Turnout-Ash Slough Work in this task includes all material, labor, equipment and tools to turnout as described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book.

Item U. Phase 2 – Furnish and Install booster pump, motor, flowmeter and concrete pad (flow=20 cfs) Work in this task includes all material, labor, equipment and tools to install the lift pump, motor, flowmeter and concrete pad as described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book.

Item V. Phase 2 – Construct Production Wells: Work in this task includes all material, labor, equipment and tools to construct production wells as described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book.

Item W. Phase 2 – Furnish and Install Weir Check Structures for ponds: Work in this task includes all material, labor, equipment and tools to construct install weirs as described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book.

Item X. Phase 2 – Electric connection to Wells: Work in this task includes all material, labor, equipment and tools to connect service to wells as described in the 30% design plans. Cost was

estimated using prior constructed projects and the Caltrans Contract Cost Data Book.

Item Y. Phase 2 – Remove and Replace Chowchilla WD Turnout, install flow meter: Work in this task includes all material, labor, equipment and tools to replace turnout as described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book

Item Z. Phase 2 – Furnish and Install 24-inch pipeline DR-51 (80 psi): Work in this task includes all material, labor, equipment and tools to install the pipeline as described in the 30% design plans. Cost was estimated using prior constructed projects and the Caltrans Contract Cost Data Book.

Item AA. Phase 1 – Project Management: This includes direct costs to manage the project. The total amount is based upon P&P experience managing other projects of similar scope and cost that were co-funded by federal grants. This work would be done by a combination of CCID and consultants. An average hourly rate is assumed that represents a melded average rate. Actual hourly rates would vary according to staff performing the work. Project management would be done by a combination of CCID and their consultants' staff. Costs in this category include but are not limited to the following: grant administration, coordination of pre-construction activities, and preparation of progress reports and pay requests. Cost is approximately 2% of all other cost items in this preliminary estimate fitting within the 10% range suggested by FEMA staff for reasonable project management costs.

Item BB. Phase 1 – Subapplicant Pre-Award Costs: This item includes direct costs incurred by CCID for subapplication preparation and 30% design plans completed by Provost & Pritchard (the District's consultant) and is based upon P&P's estimated cost for that work.

SECTION VI – BENEFIT/COST EFFECTIVENESS

Damage Frequency Analysis Assumptions for Red Top Joint Banking Project (Project)

The Project Benefit/Cost Analysis is run using FEMA's Damage Frequency Analysis (DFA) tool using drought frequency and estimated benefits the Project would accomplish to reduce subsidence hazard damages. Benefits of the Project to reduce flood and drought hazard damages would be additional but are not included in the DFA. Subsidence hazard damages are costs that Central California Irrigation District (CCID) and Project partners, would incur without the Project to purchase an amount of water each year equal to the Project's annual yield of sub-Corcoran Clay overdraft correction to address the targeted subsidence hazard. Three recurrence intervals have been identified that represent different severities of subsidence damages as described below.

SJRECWA Critical Year Drought Hazard:

One degree of subsidence hazard severity corresponds to the most severe droughts on record, when drought is severe enough to cause the highest cost of water that would need to be purchased without the Project. That would occur when CCID has its contract supplies cut and coincides with years in which the United States Bureau of Reclamation (USBR) declares a "Critical Year" for members of the San Joaquin River Exchange Contractors Water Authority (SJRECWA, including CCID), and CCID receives 75% of its normal allocation of water. This has occurred about once every 10 years since the USBR has been supplying water to CCID under

the Exchange Contract (per e-mail from Chris White, Manager of CCID), thus a recurrence period of 10 years was assumed.

Without the Project, for subsidence correction purposes CCID would need to purchase water for sub-Corcoran Clay overdraft correction. For SJRECWA Critical Year's water purchases are assumed to be from north of California's Delta (where water can be purchased in those types of years) with transportation through "the Delta" via Central Valley Project, CCID, and other agency conveyance facilities to replace water pumped from wells tapping the aquifer below the Corcoran Clay. Thirty percent (30%) conveyance losses would be incurred before delivery.

Non SJRECWA Critical Year Subsidence Hazard:

The remaining 90% of the time (1.1 year recurrence interval) water costs would be lower.

111 Year Return Period Drought Hazard

Drought hazard with a return period of greater than 111 years represent drought conditions worse than any in recorded history. For that unlikely event, assumptions mirror the SJRECWA Critical Drought Hazard, except that water prices would be higher.

Recent water purchase costs that the San Luis and Delta Mendota Water Authority have made available to its members (including CCID) were reviewed to establish assumptions regarding the cost of water per acre-foot (AF) that CCID and Project partners avoid with the Project versus without the Project in SJRECWA Critical Years and 111 Year Return Period. For SJRECWA Critical Years water prices are calculated using \$714/AF (\$500/acre-foot lowest price in 2015 in the SLDMWA Water Transfers 2008-2016 table in Attachment 9 – BCA Support Documentation divided by 0.70 delivery factor). For the 111 Year Return Period the highest price of water offered in that year (\$665/AF divided by 0.70 delivery factor or \$950/AF) was assumed. The 2015-16 water year (aka 2015 water year) costs were used for those events because that is the last time large volumes of water were moved across the Delta in that type of year.

Water purchase costs in Non-SJRECWA Critical Years are based on average non-Critical Year costs that CCID sold water that growers within CCID have conserved (through land fallowing and other water conservation measures) to other members of the SLDMWA (\$289/AF average of all but the highest water price in "Exhibit A water price schedule from CCID.pdf" in Attachment 9 – BCA Support Documentation).

Annual maintenance costs of the Project are based on typical budgetary maintenance costs obtained from operators of other San Joaquin Valley water banking projects and include \$20/acre of recharge ponds twice each year (\$40/acre/year) for pond and associated features' maintenance and monitoring programs. An additional budget for repairing/replacing pumps and motors every 10 years is added based on typical pump and motor repair/replacement frequencies for San Joaquin Valley water banks. Costs for pump and motor repair/replacements were estimated by P&P).

A spreadsheet titled "Subsidence Hazard Damage and Maintenance Costs for Red Top JB Project" was developed and includes assumptions (yellow shaded cells), calculations, and their results (shaded differently). The calculation results were fed into the DFA module for Benefit Cost Analysis. See Attachment 9- BCA Support Documentation.